KUMARAGURU COLLEGE OF TECHNOLOGY, COIMBATORE – 641 049
(An Autonomous Institution Affiliated to Anna University, Chennai)

REGULATIONS - 2014
CURRICULUM AND SYLLABI FOR I & II SEMESTERS
SEASON – I
(COMMON TO ALL BRANCHES OF ENGINEERING & TECHNOLOGY)

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**TOTAL – 34 HOURS**

**TOTAL CREDITS – 24**

*Physics Lab is offered for 50% of the classes and Chemistry lab for remaining 50% of the classes in the first semester. In the second semester the labs are interchanged.

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## B.E - AERONAUTICAL ENGINEERING

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**TOTAL – 33 HOURS**  
**TOTAL CREDIT – 25**
# B.E – AUTOMOBILE ENGINEERING

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**TOTAL – 32 HOURS**  **TOTAL CREDITS – 24**

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4
# B.Tech – BIOTECHNOLOGY

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**TOTAL – 31 HOURS**

**TOTAL CREDITS – 23**
## B.E CIVIL ENGINEERING

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**TOTAL – 32 HOURS**

**TOTAL CREDITS – 24**
**B.E - COMPUTER SCIENCE AND ENGINEERING**

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# B.E - ELECTRONICS AND COMMUNICATION ENGINEERING

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**TOTAL – 33 HOURS**

**TOTAL CREDITS – 24**
### B.E - ELECTRICAL AND ELECTRONICS ENGINEERING

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TOTAL – 33 HOURS

TOTAL CREDIT – 25
B.E - ELECTRONICS AND INSTRUMENTATION ENGINEERING

SEMESTER – II

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TOTAL – 32 HOURS

TOTAL CREDITS – 24
### B.Tech - TEXTILE TECHNOLOGY (FASHION TECHNOLOGY)

**SEMESTER – II**

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**TOTAL – 31 HOURS**

**TOTAL CREDIT – 23**
### B.Tech - INFORMATION TECHNOLOGY

#### SEMESTER – II

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**TOTAL – 32 HOURS**

**TOTAL CREDIT – 24**
## B.E - MECHANICAL ENGINEERING

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**TOTAL – 32 HOURS**

**TOTAL CREDITS – 24**
### B.E - MECHATRONICS ENGINEERING

#### SEMESTER – II

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**TOTAL – 32 HOURS**

**TOTAL CREDIT – 24**
### B.Tech - TEXTILE TECHNOLOGY

**SEMESTER – II**

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**TOTAL – 32 HOURS**

**TOTAL CREDITS – 24**
OBJECTIVES
- Discover an understanding of the process of oral communication
- Originate knowledgeable audience-centered speaking
- Formulate a significant training ground for the development of student’s abilities in public speaking
- Create multiple opportunities for students to practice and share their reading skill development
- Improve critical thinking and analytical skills
- Develop a milestone for leadership and group participation through communication skills

READING: FUNDAMENTALS OF ENGLISH 15 Hours

WRITING: BASIC STRATEGIES OF WRITING 15 Hours
Agreeing and disagreeing – Practice of frequency - Article Writing (Critical writing- Creative writing)- Anecdote Formation - Greeting friends and strangers - Short prepared compositions on current affairs - Writing a proposal for conducting science exhibition - Factual business letters and E-mail etiquette

LISTENING: LANGUAGE ACQUISITION 15 Hours
Descriptive words and regular - irregular verbs - Conversation between old friends; introducing others - Tense and voice - Establishing relationships and negotiating - Discussion on Practical business tasks- Ordering or answering enquiries - Short telephone conversations - Outline a problem and present a solution - Fluency Drills- British and American equivalents.

SPEAKING: ADEPTNESS OF ARTICULATION 15 Hours
Practice of phonetic transcription (Vowel and Consonant symbols) - Presenting information - General business discussions and factual discussions -Giving and getting product information - Describing organizations - Practicing of conversation starters and closers with friends and strangers - Asking about possibility/preference - Offering help - Seeking permission – Persuading - Talking about people and places - Explaining ideas and visual information
L: 30 Hr, T: 30 Hr, TOTAL: 60 HOURS
REFERENCES

COURSE OUTCOMES
- Formulate and practice effective reading strategy to enhance technical communication
- Assess strengths in writing skills and set goals for future growth
- Practice and perceive the full repertoire of listening strategies by using authentic listening tasks
- Create learning situations to develop speaking skills based on sound educational and communication theories.
OBJECTIVES:

On completion of the course the students are expected

- To know eigen values and eigen vectors and diagonalization of a matrix.
- To know about the geometrical aspects of curvature, evolute and envelope.
- To solve ordinary differential equations of certain types and its application.
- To understand the concepts of partial differentiation, maxima and minima.

MATRICES 9 Hours


GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS 9 Hours


FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS 9 Hours

Leibnitz’s equation – Bernoulli’s equation – Equations of first order and higher degree - Clairauts form – Applications: Orthogonal trajectories and simple Electric circuit problems.

HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS 9 Hours

Linear equations of second and higher order with constant coefficients – Euler’s and Legendre’s linear equations – Method of variation of parameters – First order Simultaneous linear equations with constant coefficients - Application - Oscillatory electrical circuit. (Differential equations and associated conditions need to be given).
FUNCTIONS OF SEVERAL VARIABLES  


L: 45 + T: 15 = 60 Hours

REFERENCES


Course Outcome

After pursuing the above mentioned course, the students will be able to:

➢ Know eigen values and eigen vectors and its role in the system of equations.
➢ Discover the radius, centre and circle of curvature of any curves.
➢ Solve the ordinary differential equations of certain types and its applications.
➢ Identify the maximum and minimum values of surfaces
OBJECTIVES
At the end of the course the students would be exposed to fundamental knowledge in
- Various engineering subjects and applications.
- Structure identification of engineering materials.
- Non-destructive techniques.
- Interferometric techniques in metrology and electrical phenomena.
- Application of lasers in engineering and technology.
- Atomic and Nuclear related theories.

CRYSTAL PHYSICS

APPLIED OPTICS

QUANTUM PHYSICS
Plancks quantum theory of black body radiation (derivation) – Photo electric effect – Compton effect (derivation) and experimental verification of Compton effect – De-broglies concept - Schrodinger wave equation – time independent and time dependent equations (derivations) – physical significance of wave function – particle in a box ( one dimensional case) – Electron microscope – Scanning electron microscope – Transmission electron microscope.

ULTRASONICS AND NDT
ATOMIC AND NUCLEAR PHYSICS

Introduction – Atomic spectra – Molecular spectra – Applications – Raman effect – Stokes lines and anti stokes lines – Applications – Nuclear models – Liquid drop model – The Shell model – Nuclear fission – Theory – Energy released per fission – Chain reaction – Controlled chain reaction – Nuclear reactors – Condition for sustained chain reaction – Types of Nuclear reactors – Nuclear fusion – Thermo nuclear reactions – Differences between fission and fusion

TOTAL: 45 HOURS

REFERENCES

COURSE OUTCOMES
- Analyze and identify the crystal structure in materials
- Categorize and illustrate the optical materials and its application to engineering
- Examine and compare samples at nano level
- Apply the NDT techniques and modern engineering tools necessary for engineering practice.
- Discuss the role of nuclear physics in energy production
OBJECTIVES

- To inculcate an understanding of the importance of chemistry by providing an overall perspective of theoretical and modern technological aspects of applied chemistry before beginning their more specialized courses.
- To embellish the usage of chemistry to exhibit engineering and technical concepts

ELECTROCHEMISTRY  
9 Hours
Introduction - Electrode potential – Nernst equation and problems - Electrochemical series - Application of EMF measurements & problems - Kohlrausch law of independent migration of ions & its application - Conductometric titrations (acid-base & precipitation titration)
Electrodes: Standard and reference electrode (Hydrogen & Calomel) – Types of electrodes (Metal – Metal ion; Metal – Metal insoluble salt, Redox electrode) - Ion selective (glass electrode) – determination of pH using glass electrode
Cells: Galvanic cell – Types of concentration cells

ENERGY STORING DEVICES  
9 Hours
Batteries: Primary Battery (Leclanche & Alkaline battery) - Secondary Battery (Lead acid storage battery, Nickel - Cadmium battery & Lithium – Polymer battery) – Flow battery (Hydrogen and Oxygen Fuel Cell)
Solar Cells: Hybrid Solar cells
Nuclear Reactors: Light water nuclear power plant (nuclear fission) - ICF (nuclear fusion)

THERMODYNAMICS  
9 Hours
Introduction - Thermodynamic process (isothermic, isobaric, isochoric and adiabatic processes) - Internal energy – first law of thermodynamics (Mathematical derivation & limitation) - Enthalpy - Second law of thermodynamics - Entropy - Entropy change of an ideal gas & problems - Free energy - work function - Gibbs Helmholtz equation (derivation, applications & problems) - Van’t Hoff isotherm (derivation & problems) - Van’t Hoff isochore - (derivation & problems) - Third law and zeroeth law (Only statements)

SURFACE CHEMISTRY  
9 Hours
Introduction of adsorption - Types of Adsorption - Adsorption isotherm (Freundlich isotherm, Langmuir adsorption isotherm, BET isotherm) - Applications of adsorption: Role of adsorption in catalytic reactions, Ion exchange adsorption, adsorption chromatography (Column chromatography)
SPECTROSCOPY  
9 Hours
Introduction to spectroscopy - Beer Lambert’s Law - Colorimetric analysis (principle, instrumentation (block diagram only) & application (Estimation of concentration of Ferrous and copper ions a solution by colorimetry) - UV – visible spectroscopy (principles, instrumentation (block diagram only) & simple Applications) - IR spectroscopy (principles, instrumentation (block diagram only) & simple applications) - Flame photometry (Principle, instrumentation (block diagram only) & simple Applications)

TOTAL: 45 HOURS

REFERENCE

COURSE OUTCOMES
➢ Assemble a battery and illustrate the phenomenon of production of electric current
➢ Discuss the thermodynamic concepts and predict the feasibility of chemical reaction
➢ Apply the theory of adsorption in real life situations
➢ Outline the principles and instrumentation of spectroscopic techniques
OBJECTIVES

- To enable students to learn about the basics of computers and problem solving methods
- To learn the various features of C
- To learn how to program using C language

INTRODUCTION


C LANGUAGE BASICS


ARRAYS AND STRINGS


FUNCTIONS, STORAGE CLASSES AND POINTERS

Storage classes – auto, static, extern, register- scope rules.
Pointers: Definition – Initialization – Pointers arithmetic – Pointers and arrays - Dynamic memory allocation - Example Problems

STRUCTURES, UNIONS AND FILES


L: 45 Hr, T: 15 Hr, TOTAL: 60 Hours
REFERENCES

COURSE OUTCOMES
- Explain the basics of programs and programming
- Select appropriate data types and control structures for solving a given problem.
- Illustrate the representation of arrays, strings and usage of string operations.
- Illustrate the importance of pointers and dynamic memory allocation.
- Explain the basics of file handling mechanism.
OBJECTIVES
- To understand the principle of orthographic projection of points, lines, surfaces and solids.
- To understand the principle of section and development of solids.
- To understand the principle of Isometric and Perspective projections.
- To study the principle of free-hand sketching techniques.

PLANE CURVES, PROJECTION OF POINTS AND LINES 15 Hours
Importance of graphics in design process, visualization, communication, documentation and drafting tools. Construction of curves - ellipse, parabola, and hyperbola by eccentricity method only. Orthographic projection of points.
Projections of straight lines located in first quadrant - determination of true length and true inclinations.

PROJECTIONS OF SURFACES AND SOLIDS 15 Hours
Projections of plane surfaces - polygonal lamina and circular lamina, located in first quadrant and inclined to one reference plane., Projection of simple solids - prism, pyramid, cylinder and cone. Drawing views when the axis of the solid is inclined to one reference plane.

SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 15 Hours
Sectioning of simple solids - prisms, pyramids, cylinder and cone. Obtaining sectional views and true shape when the axis of the solid is vertical and cutting plane inclined to one reference plane.
Development of lateral surfaces of truncated prisms, pyramids, cylinders and cones.

PICTORIAL PROJECTIONS 15 Hours
Isometric projection, Isometric scale, Isometric views of simple solids, truncated prisms, pyramids, cylinders and cones.
Perspective projection of prisms and pyramids when its base resting on the ground by vanishing point method.

FREE-HAND SKETCHING 15 Hours
Free hand sketching techniques, sketching of orthographic views from given pictorial views of objects, including free-hand dimensioning.
Sketching pictorial views from given orthographic views.

L: 30 Hr, P: 45 Hr, TOTAL: 75 Hours
REFERENCES

COURSE OUTCOMES
- Construct various plane curves and projection of lines and surfaces.
- Develop projection of solids, sections of solids and surfaces.
- Apply the concepts of isometric, perspective and free hand sketching in engineering practice.
OBJECTIVES

- To apply the theoretical principles and perform experiments
- Experience the importance of theory by using analytical equipments and quantitative and qualitative procedures.

LIST OF EXPERIMENTS

PREPARATION OF SOLUTIONS (STANDARD)
1. Preparation of normal solutions of the following substances - oxalic acid, sodium carbonate, hydrochloric acid.
2. Preparation of phosphate buffer using Henderson equation.

WATER TESTING
3. Determination of total, temporary and permanent hardness by EDTA method.
4. Estimation of DO by Winkler’s method.
5. Estimation of alkalinity by Indicator method.

ELECTRO CHEMICAL ANALYSIS
7. Estimation of hydrochloric acid by pH metry.
8. Conductometric titration of mixture of acids and strong base
9. Conductometric precipitation titration using BaCl\(_2\) and Na\(_2\)SO\(_4\).
10. Estimation of Iron by Potentiometry

PHOTOMETRY
11. Estimation of the Ferrous ions (Thiocyanate method) by Spectrophotometry.
12. Estimation of sodium and potassium by Flame photometry.

TOTAL: 45 HOURS

REFERENCES

COURSE OUTCOMES

- Prepare normal solutions
- Analyse the properties of water by applying the chemical concepts
- Estimate the concentration of solutions by electrochemical methods and apply it in real life situations like blood testing etc
OBJECTIVES

- The experiments are designed to illustrate phenomena in different areas of Physics and to expose you to measuring instruments.
- The laboratory provides a unique opportunity to validate physical theories in a quantitative manner.
- Laboratory experience demonstrates the limitations in the application of physical theories to real physical situations.
- In general, the purpose of these laboratory exercises is both to demonstrate some physical principle and to teach techniques of careful measurement.

LIST OF EXPERIMENTS

Any Ten Experiments

1. Lee’s disc - determination of thermal conductivity of a bad conductor
2. Air wedge - determination of thickness of a given specimen.
4. Compound pendulum - determination of acceleration due to gravity.
5. Carey foster bridge – determination of specific resistance of a given coil of wire.
7. Non-uniform bending – determination of Young’s modulus
8. Ultrasonic interferometer – determination of velocity of sound and compressibility of liquid.
9. Band gap determination of a semiconductor using post office box
10. Semiconductor laser:
    a. Determination of wavelength of laser using grating
    b. Particle size determination
    c. Acceptance angle of optical fibre
11. Torsional pendulum - determination of Rigidity modulus of the wire
12. Field along the axis of a coil – Determination of magnetic moment.

Demonstration experiments:

1. Determination of solar cell parameters
2. Hall effect
3. Four probe apparatus
4. Animations – (Laser, Fiber optics and hysteresis curve)

TOTAL: 45 HOURS

COURSE OUTCOMES

- Determine different physical properties of a material like the thermal conductivity thickness of the material, etc.
- Perform experiments involving the physical phenomena like interference and diffraction.
- Apply physical theories in real life situations by also taking into account its limitations.
OBJECTIVES
- To enable students to solve problems using C
- To apply the various features of C

LIST OF EXPERIMENTS
1. Simple programs
   - To find whether the given number is prime or not
   - Factorial of the given number
2. Programs involving Control and Looping Structures
   - Arithmetic Progression
   - Trigonometric series evaluation
3. Programs using Arrays
   - Sorting
   - Matrix addition and Multiplication
4. Calculation of median of a frequency distribution.
5. Evaluation of integrals
   - Trapezoidal Rule
6. String Processing
7. Program using Recursive function
8. Using pointers in C
9. Program using Functions, Structures and Files
   - Students Mark Analysis
10. Iterative method for finding Roots of the polynomials
    - Lagrange interpolation method

TOTAL: 45 HOURS

COURSE OUTCOMES
- Develop algorithms, flowcharts and programs to solve a given problem.
- Demonstrate code reusability using recursive and non-recursive functions.
- Implement pointers, memory allocation techniques and files in ‘C’ language.
- Apply and practice logical ability to solve simple problems.
- Demonstrate ‘C’ programs for statistical and scientific problem solving.
LIST OF EXPERIMENTS

GROUP – I
A. CIVIL ENGINEERING
1. Carpentry
   - Study of carpentry tools
   - Preparation of T joint
   - Preparation of dovetail joint

2. Plumbing
   - Study of pipeline joints

B. MECHANICAL ENGINEERING
1. Fitting
   - Study of fitting tools
   - Preparation of L joint
   - Preparation of square joint

2. Sheet Metal Working
   - Study of sheet metal working tools
   - Preparation of cone and tray

3. Welding
   - Study of arc welding tools and equipment
   - Preparation of butt joint

GROUP - II (ELECTRICAL & ELECTRONICS ENGINEERING)
C. ELECTRICAL ENGINEERING PRACTICE
   - Basic household wiring using switches, fuse, indicator-lamp, etc.,
   - Preparation of wiring diagrams.
   - Stair case light wiring.
   - Tube light wiring
   - Study of iron-box, fan with regulator, emergency lamp and microwave oven.
D. ELECTRONIC ENGINEERING PRACTICE

1. Assembling simple electronic component on a small PCB and Testing.
2. Soldering simple electronic circuits and checking continuity.
   - DC and AC voltage measurement
   - DC and AC current measurements.
   - Resistance Measurement.
   - Continuity measurement.
4. Testing of Electronic components
   - Resistors
   - Inductors and capacitors
   - Diodes (resistance in forward bias and reverse bias)
   - Transistors
5. Study of CRO and Function generator
   - Study of Panel Controls
   - Measurement of Amplitude, Frequency, phase difference

TOTAL: 45 HOURS

COURSE OUTCOMES

- Select the various tools and equipments used in the fabrication workshop.
- Develop various models in carpentry, fitting, sheet metal work and welding.
- Demonstrate and evaluate the parameters of basic electronic components (wires, resistors, capacitors, diodes etc.) and test the components.
- Estimate DC and AC Voltage and currents using appropriate measuring instruments.
U14GHP101/ PERSONAL VALUES
(Common to all branches of Engineering and Technology)

OBJECTIVE
- To inspire students to become best Humans.
- To know about self.
- To overcome evil temperaments.
- To live with sound health.
- To reach Intuition.

HUMAN LIFE & EXCELLENCE
4 Hours
Body, Soul, Mind & Their Functional Relationship: Panchboothas and it’s association – Form of the body: physical body, astral body, causal body - Effect: Pain, Disease, Death; Soul – Life force – Bio magnetism – Genetic Centre – Mind: Origin & it’s ten stages.

INTROSPECTION & THOUGHT ANALYSIS
4 Hours
Introduction – Importance – Blemishes – Six evil temperaments & their maneuvering.
Thought analysis: Introduction - process of thought – Mind & Thought relationship – causes for origin of thoughts
Exercise: Training & Practice of Thought analysis

MORALIZATION OF DESIRE
2 Hours
Training: Moralization of Desire.

NEUTRALIZATION OF ANGER
2 Hours
Introduction – Origin of Anger – Alternative forms of Anger – A chain action – Consequence of anger on self & others – Neutralization of anger – the point where anger is won.
Training: Neutralizing anger.

ERADICATION OF WORRIES
2 Hours
Training – Eradication of Worries.

REALIZATION OF SELF
2 Hours
Training: Realization of self.
THEORY & PRACTICAL SESSION ON PHYSICAL EXERCISE:  9 Hours

MEDITATION  5 Hours
Meditation: Agna Meditation – Shanthi Meditation.

Total: 30 Hours

COURSE OUTCOMES
- Acquire knowledge on the individual in relation to Nature and Society.
- Analysis purity of Thoughts, Moralization of Desire
- Learn about Neutralization of Anger.
- Develop skills in Sky yoga and Kaya kalpa.
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**PRACTICAL**

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**TOTAL – 33 HOURS**  
**TOTAL CREDIT – 25**
OBJECTIVES

- To develop reading accuracy and English fluency
- To employ appropriate formats in writing and effective
- To compare and relate words/sounds and listen for specific information.
- To maximize the elements of spoken ability

INTERPRETATIONAL DEXTERITY 15 Hours
Homophones and homonyms - Encoding and decoding advertisements - Transcoding
Graphical Representations – Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree
diagram - Reading brochures, leaflets, instruction manual - Cloze test - Reading
Comprehension- Note Making – Linear and non-linear - Book review, Article review

STYLES OF SCRIPTING 15 Hours
Types of sentences - Concord - Framing Questions – “Wh” questions, Yes/No questions and
Question Tags- Modifiers – Dangling, Misplaced, Squinting- Phrasal Expressions- Editing a
passage – Punctuation, Spelling, and Common errors - Paragraph Writing – Narrative,
Descriptive, Argumentative, Comparative / Contrastive. - Letter Writing – requesting
information, explaining a situation, letter of acceptance, declining letter, letter of application
and resume - Essay Writing

AUDITORY PROFICIENCY 15 Hours
Listening to monologues, Listening for general content - Listening to dialogues - Listening to
a telephonic conversation - Listening for specific information, numbers, time, duration -
Listening to conversations between three or more people- Listening to a group discussion and
providing factual information, Intensive listening

ORATORICAL EFFICIENCY 15 Hours
Discussing studies/interests/friends/families-Describe an object or event - Describing a
working mechanism - Justify an opinion / Negotiating views - Argumentative speech about a
public issue - Responding to situations and providing solutions - Picture Perception

L: 30 Hr, P: 30 Hr, TOTAL: 60 HOURS

REFERENCES
1. Mark Ibbotson, Cambridge English for Engineering Published by Cambridge University
3. Jeremy Comfort, Pamela Rogerson, Trish Stott and Derek Utley, Speaking Effectively,
   Cambridge University Press, 1994
5. Dorothy Adams, Everyday English: A Course on Communicative English, Cengage
   learning, 2009
COURSE OUTCOMES

- Distinguish the application of technical diction for the data interpretation while reading
- Construct technical sentences and compose corporate letters
- Improve listening for inferring technical information
- Develop spoken communication needed for presentations and discussions
U14MAT201/ ENGINEERING MATHEMATICS - II
(Common to all branches of Engineering and Technology)

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**OBJECTIVES**

On completion of the course, the students are expected

- To understand double and triple integrations and enable them to find area and volume using multiple integrals.
- To know the basics of vector calculus comprising gradient, divergence and curl and line, surface and volume integrals.
- To understand analytic functions of complex variables and conformal mappings.
- To know the basics of residues, complex integration and contour integration.
- To understand Laplace transform and use it to represent system dynamic models and evaluate their time responses.

**MULTIPLE INTEGRALS**

9 Hours

Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between cartesian and polar coordinates - Triple integration in cartesian coordinates – Application : Area as double integral – Volume as triple integral.

**VECTOR CALCULUS**

9 Hours

Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields - Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

**ANALYTIC FUNCTION**

9 Hours

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy-Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping : $w = z + c, cz, 1/z$ and bilinear transformation.

**COMPLEX INTEGRATION**

9 Hours

Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Residues – Cauchy’s residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals - Unit circle and semi-circular contours (excluding poles on real axis).
**LAPLACE TRANSFORM**

9 Hours


L: 45 + T: 15 = 60

**REFERENCES**


**Course Outcomes**

**After pursuing the above mentioned course, the students will be able to:**

- Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure.
- Know the gradient, divergence and curl, related theorems useful for engineering applications.
- Test the analyticity and to construct the analytic function and transform complex functions from one plane to another plane graphically.
- Evaluate real and complex integrals over suitable closed paths or contours.
- Know the Applications of Laplace transform and its properties & to solve certain linear differential equations using Laplace transform technique.
OBJECTIVES
At the end of the course students would be exposed to
- Types of defects in engineering materials and mechanisms of strengthening
- Properties of conducting, super conducting, magnetic and dielectric materials.
- Properties of Semi conducting, optical and new engineering materials.

CONDUCTING AND SUPERCONDUCTING MATERIALS 9 Hours

Superconducting Materials: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I &Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

SEMICONDUCTING MATERIALS 9 Hours
Origin of band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semi conductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC & DIELECTRIC MATERIALS 9 Hours


NANOTECHNOLOGY AND NEW ENGINEERING MATERIALS 9 Hours
New Engineering Materials: Metallic glasses – preparation, properties and applications – shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications advantages and disadvantages of SMA.

Nano Materials: synthesis - plasma arcing – Chemical vapour deposition – sol-gel - Electro deposition – ball milling – properties of nanoparicles and applications. – Carbon nano tubes –
fabrication - arc method – pulsed laser deposition - Chemical vapour deposition - structure, properties & applications.

**STRENGTHENING OF MATERIALS**

9 Hours

Strengthening mechanisms for the improvement of mechanical properties - cold working precipitation hardening, solute hardening and diffusion hardening - Fracture-Mechanism of brittle fracture (Griffith’s theory ) and Ductile fracture - difference between brittle and ductile fracture - fatigue failure and its prevention - creep different stages in creep curve-Factors affecting mechanical properties Grain size and heat treatment - Mechanical test Tensile, compression, hardness, impact creep, fatigue and stress.

**REFERENCE BOOKS**

2. Avadhanalu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S. Chand & Company Ltd, New Delhi, 2005

**COURSE OUTCOMES**

- Apply core concepts in Materials Science to solve engineering problems
- Determine the position of the acceptor or donor levels and the brand gap of an extrinsic semiconductor
- Classify & differentiate the structure and physical properties of conducting materials
- Apply the techniques to manufacturing of modern materials and nano materials for engineering applications
- Recognize the basic concepts of strengthening of materials in technological applications
OBJECTIVES

- To inculcate essential knowledge on theoretical and modern technological aspects of fuels and combustion, specialty materials, water technology, corrosion studies and powder metallurgy.

FUELS AND COMBUSTION

Classification of fuels - coal varieties - analysis of coal (proximate and ultimate analysis) - coke manufacture (Otto-Hoffman byproduct coke oven method) - characteristics of metallurgical coke - cracking (thermal and catalytic cracking definition only) – manufacturing of synthetic petrol (Fischer Tropsch method, Bergius process) – knocking (octane number, cetane number) - gaseous fuels (production, composition and uses of producer gas, water gas and natural gas).

Combustion: gross and net calorific value - determination of calorific value by bomb calorimeter - explosive range - spontaneous ignition temperature - flue gas analysis (Orsat apparatus).

MECHANICAL ENGINEERING MATERIALS

Abrasives: Moh’s scale of hardness - natural abrasives (diamond, corundum, emery, garnets and quartz) - artificial abrasives (silicon carbide, boron carbide).

Refractories: Characteristics - classification (acid, basic and natural refractories) - properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) - General manufacturing methods of refractories - preparation, properties and uses of high alumina bricks, magnesite and zirconia bricks.

Lubricants: Classification - Functions - properties (viscosity index, flash and fire point, oiliness, carbon residue, aniline point, cloud and pour point) - greases (calcium based, sodium based, lithium based) - solid lubricants (graphite, molybdenum disulphide).

CORROSION SCIENCE

Corrosion - Principles of electrochemical corrosion - difference between chemical and electrochemical corrosion - factors influencing corrosion.

Types of corrosion: galvanic corrosion - differential aeration corrosion (soil (microbial) corrosion, pitting corrosion, water line corrosion) - stress corrosion.

Corrosion control: cathodic protection (sacrificial anode) - Protective Coatings (Paint, Electroplating of Copper).

WATER TECHNOLOGY

9 Hours
**Boiler feed water:** requirements - disadvantages of hard water (formation of deposits in steam boilers, priming, foaming, caustic embrittlement & boiler corrosion).

**Prevention of scale formation:** external treatment (ion exchange method) - internal treatment (phosphate, calgon, carbonate, colloidal) - desalination by reverse osmosis - Treatment of Domestic water

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**PHASE RULE AND POWDER METALLURGY**

9 Hours

Phase rule - condensed phase rule - construction of phase diagram (thermal analysis) – Applications of phase rule: Simple eutectic system (Ag - Pb, Fe - C system).

**POWDER METALLURGY :** Preparation of metal powders (mechanical pulverization, atomization, chemical reduction, electrolytic process, decomposition) - mixing and blending - compacting - sintering - advantages and limitations of powder metallurgy.

**TOTAL: 45 HOURS**

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**REFERENCES**


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**COURSE OUTCOMES**

- Classify the different types of fuels and their properties
- Categorize the engineering materials and their uses
- Defend the Corrosion problems
- Design a water purifier
- Identify the techniques of preparing metal powder
OBJECTIVES
- To understand the concept of equilibrium of particles and rigid bodies.
- To understand the concept of first and second moment of area.
- To understand the concept of various types of frictions.
- To understand the principle of work energy method, Newton’s law and impact of elastic bodies.

BASICS & STATICS OF PARTICLES 9 Hours

EQUILIBRIUM OF RIGID BODIES 9 Hours
Moment of a force about point – Varignon s theorem- Moment of a couple-Resolution of force in to force couple system-Resultant of coplanar non concurrent system - Types of supports and their reactions- Requirements of stable equilibrium - Equilibrium of Rigid bodies in two dimensions.

PROPERTIES OF SURFACES AND SOLIDS 9 Hours
First moment of area and the Centroid of sections Rectangle, circle, triangle, T section, I section Angle section and Hollow section. Second and product moments of plane area Rectangle, triangle, circle, T Section, I section, Angle section and Hollow section, Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia.

FRICTION 9 Hours
Frictional force-Law of coloumb friction , simple contact friction, Rolling resistance and Belt friction, Ladder friction, Wedge friction.

DYNAMICS OF PARTICLES 9 Hours
Kinematics: Rectilinear & Curvilinear motion of particles, Displacements Velocity and acceleration.

L: 45 Hr, T: 15 Hr, TOTAL: 60 HOURS

REFERENCES

**COURSE OUTCOMES**

- Explain the concept of equilibrium of particles and rigid bodies.
- Apply the concepts of equilibrium and moment of inertia for various shapes sections.
- Make use of various concepts of friction.
- Solve problems using the concepts in kinematics and kinetics.
OBJECTIVES

- To promote an understanding of the aeronautical field and a higher level of motivation among students by providing an overall perspective before they begin their more specialized courses. A broad base is developed into which subsequent courses can be integrated in depth.

INTRODUCTION TO AIRPLANES  9 Hours

AIRPLANE STRUCTURES AND MATERIALS  9 Hours
Introduction to structural design of Aircraft and spacecraft, flight loads, general types of construction, Monocoque, Semi-monocoque and composite structure construction, Typical wing and fuselage structure, Metallic and Non metallic materials, Use of aluminium alloy, titanium, stainless steel and composite materials in aerospace.

AIRCRAFT ENGINES  9 Hours
Selection of power plants: piston, turbo-propeller, turbofan, and jet engines with after burner / thrust augmentation thrust vector control, FADEC. Use of propeller and jets for thrust production, Comparative merits. Theory of Propellers.

SPACE SYSTEM DESIGN  9 Hours
Overview on space environment, introduction to space debris, Launch site selection, Brief introduction to rockets, ramjet, and SCRAMJET, Thrust vector control mechanisms, staging of rockets, space mission, re-entry vehicles, life support systems for manned space missions, Fuel cells, Introduction to space mechanics: Kepler’s laws of planetary motion, introduction to satellites, Interplanetary missions, Space exploration.

ROTORCRAFT, UAVs, AND AIRCRAFT SYSTEMS  9 Hours
Introduction to Helicopters and Micro-lights. Introduction to UAVs and MAVs. Types and applications, Maintenance, safety and operations. Basic principles and lay out of various aircraft systems: Hydraulic system, Aircraft Fuel system, Engine fuel system, Air conditioning and Pressurization system Flight control system, Navigation and Weapon control system, Under carriage and Brake system, High lift devices.

L: 45 Hr, T: 15 Hr, TOTAL: 60 HOURS
REFERENCES

COURSE OUTCOMES
➢ To provide students with an introduction to the aerospace field.
➢ To teach students about the fundamentals of vehicle flight in the atmosphere
➢ To teach students about the fundamentals of vehicle flight in space
➢ To provide students with an understanding of performance
➢ To provide students with engineering background suitable for subsequent course work in aerospace engineering.
OBJECTIVES
- To apply the theoretical principles and perform experiments
- Experience the importance of theory by using analytical equipments and quantitative and qualitative procedures.

LIST OF EXPERIMENTS

PREPARATION OF SOLUTIONS (STANDARD)
1. Preparation of normal solutions of the following substances - oxalic acid, sodium carbonate, hydrochloric acid.
2. Preparation of phosphate buffer using Henderson equation.

WATER TESTING
3. Determination of total, temporary and permanent hardness by EDTA method.
4. Estimation of DO by Winkler’s method.
5. Estimation of alkalinity by Indicator method.

ELECTRO CHEMICAL ANALYSIS
7. Estimation of hydrochloric acid by pH metry.
8. Conductometric titration of mixture of acids and strong base
9. Conductometric precipitation titration using \( \text{BaCl}_2 \) and \( \text{Na}_2\text{SO}_4 \).
10. Estimation of Iron by Potentiometry

PHOTOMETRY
11. Estimation of the Ferrous ions (Thiocyanate method) by Spectrophotometry.
12. Estimation of sodium and potassium by Flame photometry.

TOTAL: 45 HOURS

REFERENCES

COURSE OUTCOMES
- Prepare normal solutions
- Analyse the properties of water by applying the chemical concepts
- Estimate the concentration of solutions by electrochemical methods and apply it in real life situations like blood testing etc
OBJECTIVES

- To analyze webpage and identify its elements and attributes
- Learn the basic language of the web: HTML.
- Be able to embed social media content into web pages.
- Implement and understand how to get used with MATLAB

List of Experiments

1. Study of HTML tags
2. Design a web page using basic html tags
3. Design a webpage using table tags
4. Design a webpage using forms and frames
5. Design a webpage using list tags
6. Develop a website of your interest (include a minimum of 3 web pages)
7. Study of MATLAB functions
8. Working with matrix operations
9. Working with image arithmetic
   a. Addition of two images
   b. Subtraction of two images
10. Write a Matlab program for the following
    a. Read an image and crop
    b. Read an image and resize
11. Working with Integration and Differentiation
12. Working with graphs

COURSE OUTCOMES

On successful completion of this course the student should be able to

1. Develop static web pages using HTML. [S]
2. Perform basic MATLAB operations. [S]
3. Make use of MATLAB to work with images and graphs. [S]
4. Perform integration and differentiation using MATLAB. [S]
5. Develop team spirit and professional attitude towards the development of simple web applications [A]
OBJECTIVES

- To introduce the concept of 2-D drafting using CAD packages.

LIST OF EXERCISES

1. Study of drafting software.
3. Development of Isometric drawing for Simple components.
5. Development of Assembled drawing for Landing Gear.
8. Development of three view diagram of a typical Helicopter.

TOTAL: 45 HOURS

List of Tools required
- Drafting & modeling software (Like AUTOCAD)

COURSE OUTCOMES

- Use the AutoCAD software program to create drawings from scratch and to modify, manipulate, copy, delete, save, and plot drawings.
- Use the full range of AutoCAD commands and options and employ shortcuts and time-saving strategies to operate the program at a level of efficiency acceptable for employment as a CAD Engineer.
- Create, render, and manipulate 3D AutoCAD drawings and convert 2D drawings to 3D drawings.
- Identify or roughly define the terms, concepts, and standards associated with the topics of the course.
- Report to a workplace regularly and punctually, engage effectively and congenially with peers and supervisors, work from written as well as oral instructions, use assigned time efficiently for productive work, and meet production deadlines.
- Demonstrate graphical and computational problem-solving skills appropriate to the level of the coursework.
OBJECTIVES
- To inculcate the basic need for family life and need to maintain peace in it.
- To lead spiritual development through good family life.
- To know the 5C’s & 5E’s.
- To know the examples for Self Control.
- To practice meditation & Pranayamam.

PEACE IN FAMILY 4 Hours

Greatness of womanhood: Good culture – Cultured behavioral patterns – Love and Compassion.

BLESSING – EFFECTS IN FAMILY 2 Hours
Introduction - Benefits – Mental Frequency level - Effect of vibrations – Make blessings a daily habit.
Training: Method of blessings.

FOOD IS MEDICINE 2 Hours
Food is medicine - Healthy food habits- Method of Medicinal food preparations – Food based on character.

PERSONALITY DEVELOPMENT CONCEPTS - 5C’S & 5E’S 4 Hours
Personality Concepts: Definition - Types of Personality- Personality development activities- Factors affecting personality development - Tools to improve personality- Steps to a dynamic personality-5 C’s and 5 E’s.
Time Management: Importance –Training.

LEADERSHIP TRAITS & SELF DEVELOPMENT 4 Hours
Leadership Traits – Carrying oneself - Factors of leadership – Principles of leadership.


Training: Method of Self-Control.

SPIRITUAL DEVELOPMENT THROUGH KAYA KALPA YOGA 4 Hours
Spiritual development: Need – Development through Kaya Kalpa - Responsibility of men and women – Need of morality.
KayaKalpa yoga: Aim - kayakalpa philosophy - Importance of kayakalpa training.
Training: Kaya Kalpa Yoga.

EXERCISE & MEDITATION
Simplified Physical Exercise & Meditation Practice.

| L: 16 Hr, P: 14, Total: 30 Hrs |

REFERENCES BOOKS:
1. Dr. A. Chandra Mohan, “Leadership and Management”, Himalaya Publication House,

COURSE OUTCOMES:
- Behaves as a responsible family member.
- Develop skills for personality improvement.
- Acquire practical knowledge on self-control technique for teenagers.
- Identify the significant of Genetic Centre for the Soul functional base operation.
### B.E – AUTOMOBILE ENGINEERING

**SEMESTER – II**

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**TOTAL – 32 HOURS**

**TOTAL CREDITS – 24**
OBJECTIVES
- To develop reading accuracy and English fluency
- To employ appropriate formats in writing and effective
- To compare and relate words/sounds and listen for specific information.
- To maximize the elements of spoken ability

INTERPRETATIONAL DEXTERITY  
15 Hours
Homophones and homonyms - Encoding and decoding advertisements - Transcoding
Graphical Representations – Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree
diagram - Reading brochures, leaflets, instruction manual - Cloze test - Reading
Comprehension - Note Making – Linear and non-linear - Book review, Article review

STYLES OF SCRIPTING  
15 Hours
Types of sentences - Concord - Framing Questions – “Wh” questions, Yes/No questions and
Question Tags- Modifiers – Dangling, Misplaced, Squinting- Phrasal Expressions- Editing a
passage – Punctuation, Spelling, and Common errors - Paragraph Writing – Narrative,
Descriptive, Argumentative, Comparative / Contrastive. - Letter Writing – requesting
information, explaining a situation, letter of acceptance, declining letter, letter of application
and resume - Essay Writing

AUDITORY PROFICIENCY  
15 Hours
Listening to monologues, Listening for general content - Listening to dialogues - Listening to
a telephonic conversation - Listening for specific information, numbers, time, duration -
Listening to conversations between three or more people- Listening to a group discussion and
providing factual information, Intensive listening

ORATORICAL EFFICIENCY  
15 Hours
Discussing studies/interests/friends/families-Describe an object or event - Describing a
working mechanism - Justify an opinion / Negotiating views - Argumentative speech about a
public issue - Responding to situations and providing solutions - Picture Perception

L: 30 Hr, P: 30 Hr, TOTAL: 60 HOURS

REFERENCES
1. Mark Ibbotson, Cambridge English for Engineering Published by Cambridge University
3. Jeremy Comfort, Pamela Rogerson, Trish Stott and Derek Utley, Speaking Effectively,
   Cambridge University Press, 1994
5. Dorothy Adams, Everyday English: A Course on Communicative English, Cengage
   learning, 2009
COURSE OUTCOMES

- Distinguish the application of technical diction for the data interpretation while reading
- Construct technical sentences and compose corporate letters
- Improve listening for inferring technical information
- Develop spoken communication needed for presentations and discussions
OBJECTIVES

On completion of the course, the students are expected

- To understand double and triple integrations and enable them to find area and volume using multiple integrals.
- To know the basics of vector calculus comprising gradient, divergence and curl and line, surface and volume integrals.
- To understand analytic functions of complex variables and conformal mappings.
- To know the basics of residues, complex integration and contour integration.
- To understand Laplace transform and use it to represent system dynamic models and evaluate their time responses.

MULTIPLE INTEGRALS 9 Hours

Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between cartesian and polar coordinates - Triple integration in cartesian coordinates – Application : Area as double integral – Volume as triple integral.

VECTOR CALCULUS 9 Hours

Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields - Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

ANALYTIC FUNCTION 9 Hours

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy-Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping : \( w = z + c \), \( cz \), \( 1/z \) and bilinear transformation.

COMPLEX INTEGRATION 9 Hours

Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Residues – Cauchy’s residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals - Unit circle and semi-circular contours (excluding poles on real axis).
LAPLACE TRANSFORM


L: 45 + T: 15 = 60

REFERENCES


Course Outcomes

After pursuing the above mentioned course, the students will be able to:

- Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure.
- Know the gradient, divergence and curl, related theorems useful for engineering applications.
- Test the analyticity and to construct the analytic function and transform complex functions from one plane to another plane graphically.
- Evaluate real and complex integrals over suitable closed paths or contours.
- Know the Applications of Laplace transform and its properties & to solve certain linear differential equations using Laplace transform technique.
OBJECTIVES
At the end of the course students would be exposed to
- Types of defects in engineering materials and mechanisms of strengthening
- Properties of conducting, super conducting, magnetic and dielectric materials.
- Properties of Semi conducting, optical and new engineering materials.

CONDUCTING AND SUPERCONDUCTING MATERIALS 9 Hours

Superconducting Materials: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I &Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

SEMICONDUCTING MATERIALS 9 Hours
Origin of band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semi conductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC & DIELECTRIC MATERIALS 9 Hours


NANOTECHNOLOGY AND NEW ENGINEERING MATERIALS 9 Hours
New Engineering Materials: Metallic glasses – preparation, properties and applications – shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications advantages and disadvantages of SMA.

Nano Materials: synthesis - plasma arcing – Chemical vapour deposition – sol-gel - Electro deposition – ball milling – properties of nanoparticles and applications. – Carbon nano tubes –
fabrication - arc method – pulsed laser deposition - Chemical vapour deposition - structure, properties & applications.

**STRENGTHENING OF MATERIALS**

9 Hours

Strengthening mechanisms for the improvement of mechanical properties - cold working precipitation hardening, solute hardening and diffusion hardening - Fracture-Mechanism of brittle fracture (Griffith’s theory ) and Ductile fracture - difference between brittle and ductile fracture - fatigue failure and its prevention - creep different stages in creep curve-Factors affecting mechanical properties Grain size and heat treatment - Mechanical test Tensile, compression, hardness, impact creep, fatigue and stress.

**TOTAL: 45 HOURS**

**REFERENCE BOOKS**

2. Avadhanalu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S. Chand & Company Ltd, New Delhi, 2005

**COURSE OUTCOMES**

- Apply core concepts in Materials Science to solve engineering problems
- Determine the position of the acceptor or donor levels and the brand gap of an extrinsic semiconductor
- Classify & differentiate the structure and physical properties of conducting materials
- Apply the techniques to manufacturing of modern materials and nano materials for engineering applications
- Recognize the basic concepts of strengthening of materials in technological applications
OBJECTIVES

- To inculcate essential knowledge on theoretical and modern technological aspects of fuels and combustion, specialty materials, water technology, corrosion studies and powder metallurgy.

FUELS AND COMBUSTION  
Classification of fuels - coal varieties - analysis of coal (proximate and ultimate analysis) - coke manufacture (Otto-Hoffman byproduct coke oven method) - characteristics of metallurgical coke - cracking (thermal and catalytic cracking definition only) – manufacturing of synthetic petrol (Fischer Tropsch method, Bergius process) – knocking (octane number, cetane number) - gaseous fuels (production, composition and uses of producer gas, water gas and natural gas).

Combustion: gross and net calorific value - determination of calorific value by bomb calorimeter - explosive range - spontaneous ignition temperature - flue gas analysis (Orsat apparatus).

MECHANICAL ENGINEERING MATERIALS  
Abrasives: Moh’s scale of hardness - natural abrasives (diamond, corundum, emery, garnets and quartz) - artificial abrasives (silicon carbide, boron carbide).

Refractories: Characteristics - classification (acid, basic and natural refractories) - properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) - General manufacturing methods of refractories - preparation, properties and uses of high alumina bricks, magnesite and zirconia bricks.

Lubricants: Classification - Functions - properties (viscosity index, flash and fire point, oiliness, carbon residue, aniline point, cloud and pour point) - greases (calcium based, sodium based, lithium based) - solid lubricants (graphite, molybdenum disulphide).

CORROSION SCIENCE  
Corrosion - Principles of electrochemical corrosion - difference between chemical and electrochemical corrosion - factors influencing corrosion.

Types of corrosion: galvanic corrosion - differential aeration corrosion (soil (microbial) corrosion, pitting corrosion, water line corrosion) - stress corrosion.

Corrosion control: cathodic protection (sacrificial anode) - Protective Coatings (Paint, Electroplating of Copper).

WATER TECHNOLOGY  

**Boiler feed water:** requirements - disadvantages of hard water (formation of deposits in steam boilers, priming, foaming, caustic embrittlement & boiler corrosion).

**Prevention of scale formation:** external treatment (ion exchange method) - internal treatment (phosphate, calgon, carbonate, colloidal) - desalination by reverse osmosis - Treatment of Domestic water

**PHASE RULE AND POWDER METALLURGY**  
9 Hours
Phase rule - condensed phase rule - construction of phase diagram (thermal analysis) – Applications of phase rule: Simple eutectic system (Ag - Pb, Fe - C system).

**POWDER METALLURGY:** Preparation of metal powders (mechanical pulverization, atomization, chemical reduction, electrolytic process, decomposition) - mixing and blending - compacting - sintering - advantages and limitations of powder metallurgy.

**TOTAL: 45 HOURS**

**REFERENCES**

**COURSE OUTCOMES**
- Classify the different types of fuels and their properties
- Categorize the engineering materials and their uses
- Defend the Corrosion problems
- Design a water purifier
- Identify the techniques of preparing metal powder
OBJECTIVES

- To understand the concept of equilibrium of particles and rigid bodies.
- To understand the concept of first and second moment of area.
- To understand the concept of various types of frictions.
- To understand the principle of work energy method, Newton’s law and impact of elastic bodies.

BASICS & STATICS OF PARTICLES 9 Hours

EQUILIBRIUM OF RIGID BODIES 9 Hours
Moment of a force about point – Varignon s theorem- Moment of a couple-Resolution of force in to force couple system-Resultant of coplanar non concurrent system - Types of supports and their reactions- Requirements of stable equilibrium - Equilibrium of Rigid bodies in two dimensions.

PROPERTIES OF SURFACES AND SOLIDS 9 Hours
First moment of area and the Centroid of sections Rectangle, circle, triangle, T section, I section Angle section and Hollow section. Second and product moments of plane area Rectangle, triangle, circle, T Section, I section, Angle section and Hollow section, Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia.

FRICTION 9 Hours
Frictional force-Law of coloumb friction , simple contact friction, Rolling resistance and Belt friction, Ladder friction, Wedge friction.

DYNAMICS OF PARTICLES 9 Hours
Kinematics: Rectilinear & Curvilinear motion of particles, Displacements Velocity and acceleration.

L: 45 Hr, T: 15 Hr, TOTAL: 60 HOURS
REFERENCES

COURSE OUTCOMES
➢ Explain the concept of equilibrium of particles and rigid bodies.
➢ Apply the concepts of equilibrium and moment of inertia for various shapes sections.
➢ Make use of various concepts of friction.
Solve problems using the concepts in kinematics and kinetics
OBJECTIVES

- To study the characteristics of circuit elements
- To understand relationships among current, voltage and power in DC and AC circuits
- To study the construction, characteristics and applications of amplifiers and oscillators circuitry

ELECTRIC CIRCUITS FUNDAMENTALS  
9 Hours

ELECTROMAGNETISM  
9 Hours

AC-CIRCUITS  
9 Hours

ELECTRICAL MACHINES (Qualitative Treatment Only)  
9 Hours

ELECTRONIC CIRCUITS  
9 Hours
Semiconductor diode – Half wave and Full wave rectifier – Bipolar Junction transistors – circuit configurations – static characteristics – load line and biasing – simple introduction to amplifiers – Introduction to Binary logic gates – AND, OR, NOT, NAND, NOR, EX-OR & EX-NOR.

TOTAL: 45 HOURS
REFERENCES

COURSE OUTCOMES
- Acquire the knowledge of fundamental laws of electrical and electronics engineering.
- State the definition of magnetic circuits.
- Choose suitable motor for desired application.
- The students have the ability to apply the fundamental laws of magnetic circuits to electrical machines.
- The learners can verify the truth table of digital logic gates.
OBJECTIVES

- The experiments are designed to illustrate phenomena in different areas of Physics and to expose you to measuring instruments.
- The laboratory provides a unique opportunity to validate physical theories in a quantitative manner.
- Laboratory experience demonstrates the limitations in the application of physical theories to real physical situations.
- In general, the purpose of these laboratory exercises is both to demonstrate some physical principle and to teach techniques of careful measurement.

LIST OF EXPERIMENTS

Any Ten Experiments
1. Lee’s disc - determination of thermal conductivity of a bad conductor
2. Air wedge - determination of thickness of a given specimen.
3. Spectrometer - determination of wavelength of mercury source using grating
4. Compound pendulum - determination of acceleration due to gravity.
5. Carey foster bridge – determination of specific resistance of a given coil of wire.
7. Non-uniform bending – determination of Young’s modulus
8. Ultrasonic interferometer – determination of velocity of sound and compressibility of liquid.
9. Band gap determination of a semiconductor using post office box
10. Semiconductor laser:
   a. Determination of wavelength of laser using grating
   b. Particle size determination
   c. Acceptance angle of optical fibre
11. Torsional pendulum - determination of Rigidity modulus of the wire
12. Field along the axis of a coil – Determination of magnetic moment.

Demonstration experiments:
1. Determination of solar cell parameters
2. Hall effect
3. Four probe apparatus
4. Animations –(Laser, Fiber optics and hysteresis curve)

TOTAL: 45 HOURS

COURSE OUTCOMES

- Determine different physical properties of a material like the thermal conductivity thickness of the material, etc.
- Perform experiments involving the physical phenomena like interference and diffraction.
- Apply physical theories in real life situations by also taking into account its limitations.
LIST OF EXPERIMENTS

1. Introduction to CAD Commands
2. Creation of simple objects
3. Special curves
4. Projection & Section of simple solids
5. Orthographic views of solids
6. Isometric views of objects
7. Simple trusses
8. 3D modeling of simple solids
9. 2D multiple views from 3D model

TOTAL: 45 HOURS

COURSE OUTCOMES

- Draw 2D and 3D drawings using drafting software
- Convert orthographic view into isometric view
- Become familiar to draw Special curves
AIM
To provide experimental skill in the operation of DC, AC machines and Hands on experience in the development of electronic circuits.

OBJECTIVES
- To experimentally verify the principle of operation, performance characteristics of DC Motors and AC Motors.
- To obtain the characteristics of electronic devices and its applications.

LIST OF EXPERIMENTS
1. Load Test on DC Shunt Motor
2. Load Test on DC Series Motor
3. Speed Control of DC Shunt Motor
4. Load Test on three phase Induction Motor
5. Load Test on single phase Induction Motor
6. Load test on single phase transformer
7. Half wave and full wave rectifier
8. Characteristics of CE transistor configuration
9. Characteristics of PN diode
10. Verification of truth table of logic gates

TOTAL: 45 HOURS

COURSE OUTCOMES
- The Students will gain the basic knowledge and understanding the concept of AC and DC machines.
- Students will know the working principle, performance characteristics, (Torque, Speed, Efficiency) control and applications of Electrical Machines.
- Students will be able to design and conduct performance experiments in machines and Rectifiers.
- To familiarize the starting methods of all rotating machines.
- Students will be exposed to the practical applications of identify and solve machines related problems.
OBJECTIVES
• To inculcate the basic need for family life and need to maintain peace in it.
• To lead spiritual development through good family life.
• To know the 5C’s & 5E’s.
• To know the examples for Self Control.
• To practice meditation & Pranayamam.

PEACE IN FAMILY
4 Hours

Greatness of womanhood: Good culture – Cultured behavioral patterns – Love and Compassion.

BLESSING – EFFECTS IN FAMILY
2 Hours
Introduction - Benefits – Mental Frequency level - Effect of vibrations – Make blessings a daily habit.
Training: Method of blessings.

FOOD IS MEDICINE
2 Hours
Food is medicine - Healthy food habits- Method of Medicinal food preparations – Food based on character.

PERSONALITY DEVELOPMENT CONCEPTS - 5C’S & 5E’S
4 Hours
Personality Concepts: Definition - Types of Personality- Personality development activities- Factors affecting personality development - Tools to improve personality- Steps to a dynamic personality-5 C’s and 5 E’s.


LEADERSHIP TRAITS & SELF DEVELOPMENT
4 Hours
Leadership Traits – Carrying oneself - Factors of leadership – Principles of leadership.


Training: Method of Self-Control.

SPIRITUAL DEVELOPMENT THROUGH KAYA KALPA YOGA
4 Hours
Spiritual development: Need – Development through Kaya Kalpa - Responsibility of men and women – Need of morality.

KayaKalpa yoga: Aim - kayakalpa philosophy - Importance of kayakalpa training.

Training: Kaya Kalpa Yoga.
EXERCISE & MEDITATION
Simplified Physical Exercise & Meditation Practice.

L: 16 Hr, P: 14, Total: 30 Hours

REFERENCES BOOKS:
1. Dr. A. Chandra Mohan, “Leadership and Management”, Himalaya Publication House,

COURSE OUTCOMES:
- Behaves as a responsible family member.
- Develop skills for personality improvement.
- Acquire practical knowledge on self-control technique for teenagers.
- Identify the significant of Genetic Centre for the Soul functional base operation.
### B.Tech – BIOTECHNOLOGY

#### SEMESTER – II

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**TOTAL CREDITS – 23**
OBJECTIVES

- To develop reading accuracy and English fluency
- To Employ appropriate formats in writing and effective
- To compare and relate words/sounds and listen for specific information.
- To maximize the elements of spoken ability

INTERPRETATIONAL DEXTERITY  
15 Hours
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Graphical Representations – Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree
diagram - Reading brochures, leaflets, instruction manual - Cloze test - Reading
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STYLES OF SCRIPTING  
15 Hours
Types of sentences - Concord - Framing Questions – “Wh” questions, Yes/No questions and
Question Tags- Modifiers – Dangling, Misplaced, Squinting- Phrasal Expressions- Editing a
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information, explaining a situation, letter of acceptance, declining letter, letter of application
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AUDITORY PROFICIENCY  
15 Hours
Listening to monologues, Listening for general content - Listening to dialogues - Listening to
a telephonic conversation - Listening for specific information, numbers, time, duration -
Listening to conversations between three or more people- Listening to a group discussion and
providing factual information, Intensive listening

ORATORICAL EFFICIENCY  
15 Hours
Discussing studies/interests/friends/families-Describe an object or event - Describing a
working mechanism - Justify an opinion / Negotiating views - Argumentative speech about a
public issue - Responding to situations and providing solutions - Picture Perception

L: 30 Hr, P: 30 Hr, TOTAL: 60 HOURS

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COURSE OUTCOMES

➢ Distinguish the application of technical diction for the data interpretation while reading
➢ Construct technical sentences and compose corporate letters
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➢ Develop spoken communication needed for presentations and discussions
OBJECTIVES
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- To understand analytic functions of complex variables and conformal mappings.
- To know the basics of residues, complex integration and contour integration.
- To understand Laplace transform and use it to represent system dynamic models and evaluate their time responses.

MULTIPLE INTEGRALS
9 Hours
Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between cartesian and polar coordinates - Triple integration in cartesian coordinates – Application: Area as double integral – Volume as triple integral.

VECTOR CALCULUS
9 Hours
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields - Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

ANALYTIC FUNCTION
9 Hours
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy-Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping: $w = z + c$, $cz$, $1/z$ and bilinear transformation.

COMPLEX INTEGRATION
9 Hours
Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Residues – Cauchy’s residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals - Unit circle and semi-circular contours (excluding poles on real axis).
LAPLACE TRANSFORM

Definition - Properties – Superposition - Shift in t - Shift in s - Time Derivatives - Time
Integral – Initial and Final Value Theorems – Periodic functions: sine wave, saw-tooth,
square and triangular waves - Inverse Laplace Transform – Simple system dynamic models –
Transfer Functions – Poles and Zeroes - Response of First-Order Systems - Solution of RC
Free, Step and Sinusoidal Responses; Response of Second-Order Systems - Free Response,
step Response - Convolution theorem.

L: 45 + T: 15 = 60

REFERENCES

1 Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, Delhi, 42nd
2 Philip D. Cha, James J. Rosenberg, Clive L. Dym, Fundamentals of Modelling and
Analyzing Engineering Systems, Cambridge University Press, United Kingdom,
2000. (for Unit – V)
3 Kreyszig E., Advanced Engineering Mathematics, John Wiley & Sons (Asia), Pvt,
6 Kandasamy P., Thilagavathy K. and Gunavathy K., Engineering
7 Arunachalam T. and Sumathi K., Engineering Mathematics II, Sri Vignesh

Course Outcomes

After pursuing the above mentioned course, the students will be able to:

- Evaluate double integral and triple integral to compute area, volume for two
dimensional and three dimensional solid structure.
- Know the gradient, divergence and curl, related theorems useful for engineering
applications.
- Test the analyticity and to construct the analytic function and transform complex
functions from one plane to another plane graphically.
- Evaluate real and complex integrals over suitable closed paths or contours.
- Know the Applications of Laplace transform and its properties & to solve certain
linear differential equations using Laplace transform technique.
OBJECTIVES
At the end of the course the students would be exposed to
- Properties of conducting, super conducting, magnetic and dielectric materials.
- Properties of Semi conducting, optical and new engineering materials.
- Application of ultrasonic and nuclear physics in medicine.

CONDUCTING AND SUPERCONDUCTING MATERIALS 9 Hours

Superconducting Materials: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I &Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

SEMICONDUCTING MATERIALS 9 Hours
Origin of band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semi conductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC & DIELECTRIC MATERIALS 9 Hours


NANOTECHNOLOGY AND NEW ENGINEERING MATERIALS 9 Hours
New Engineering Materials: Metallic glasses – preparation, properties and applications – shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications advantages and disadvantages of SMA.

Nano Materials: synthesis - plasma arcing – Chemical vapour deposition – sol-gel - Electro deposition – ball milling – properties of nanoparicles and applications. – Carbon nano tubes –
fabrication - arc method – pulsed laser deposition - Chemical vapour deposition - structure, properties & applications.

MEDICAL PHYSICS
9 Hours
Ultrasound picture of human body – Block diagram of basic pulse Echo system – A Scan – B scan & M Scan
Psychological effect - ultrasound therapy – Phonocardiograph (PCG) source of radioactivity for nuclear medicine - statistical aspects – Basic instrumentation (Geiger Muller counter, Photo multiplier Tube & Scintillation detector (Renogram) and its clinical applications (Thyroid and Kidney function) – Nuclear medicine imaging devices - Gamma Camera - Positron camera.

TOTAL: 45 HOURS

REFERENCE BOOKS
5. Avadhanalu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S. Chand & Company Ltd, New Delhi, 2005 (Units: 1,2,3,4).
6. Arumugam M., Physics-II (For Civil, Chemical, Textile, Biotechnology, Polymer and Fashion technology), Anuradha agencies, Kumbakonam, 2005 (Units: 5).

COURSE OUTCOMES
- Apply core concepts in Materials Science to solve engineering problems
- Determine the position of the acceptor or donor levels and the brand gap of an extrinsic semiconductor
- Classify & differentiate the structure and physical properties of conducting materials
- Apply the techniques to manufacturing of modern materials and nano materials for engineering applications
- Sketch the skills and techniques for biotechnological and medical applications
OBJECTIVES

- To correlate theoretical principles with application oriented studies
- To inculcate a basic foundation in stereochemistry of Biomolecules
- To embellish the usage of chemistry to exhibit engineering and technical concepts by presenting an overview on theoretical and modern technological aspects in polymers, water technology and biomolecular analysis as required for the Bio technology students.

CHEMICAL BONDING IN BIOMOLECULES  9 Hours
Ionic, covalent and co-ordinate covalent bonds (overview only), hybridization (sp, sp², sp³, sp³d, sp³d² in simple molecules), hydrogen bonding and its consequences, Van der Waal’s forces (dipole – dipole, dipole – induced dipole, induced dipole – induced dipole interactions) - dipole moment (applications).

INTRODUCTION TO STEREOCHEMISTRY  9 Hours
Isomerism : Introduction and classification of isomerism.
Structure isomerism : Definition, chain, position, functional, mesomerism, tautomerism, Conformational isomerism in simple organic molecules
Notation : d and l; R and S ; E and Z notation of simple organic molecules
Configurational isomerism or geometrical isomerism: definition – in alkenes and cyclopropanes
Optical isomerism : Definition and conditions of optical isomerism - Optical activity – Chirality – Optical isomerism in tartaric and lactic acids - optical activity without asymmetric carbon (allelenes, Biphenyl derivatives) – definition of Enantiomers, diastereomers, Mesocompounds, racemic mixture, asymmetric synthesis – Walden inversion

WATER TECHNOLOGY  9 Hours

CHEMISTRY OF POLYMERS  9 Hours
Introduction - classification based on source, application, thermal properties (thermosetting and thermoplastics) - effect of polymer structure on properties – types of polymerization (addition, condensation, co-polymerization and Ring polymerisation) - mechanism of polymerization (free radical mechanism and coordination mechanism - monometallic)
Bio Polymers and its applications : Cellulose, Starch, Collagen, Lignins and Chitosins
QUANTITATIVE ANALYSIS

9 Hours

Determination of the amount of calcium in milk powder by EDTA Complexometry - Estimation of iodine in iodized common salt by Iodometry - Estimation of phosphoric acid in soft drinks (coca cola) by molybdenum blue method - Synthesis of fluorescein, and its use in angiogram techniques - Super absorbent polymers: preparation, properties and uses

TOTAL: 45 HOURS

REFERENCES

1. Finar I.L., Organic chemistry, Publishing house, UK.
4. Seymour R.B. and Carraher, Polymer Chemistry, Plenum publishing corporation, New york,
6. Amarika Singh, Vairam S., and Suba Ramesh, Chemistry for Engineers, Wiley India Ltd., New Delhi

COURSE OUTCOMES

- Outline basic concepts of stereochemistry
- Discuss the mechanism of polymer formation
- Paraphrase an experiment in required sequence
- Design a waste water purifier
OBJECTIVES

- To study the characteristics of circuit elements
- To understand relationships among current, voltage and power in DC and AC circuits
- To study the construction, characteristics and applications of amplifiers and oscillators circuitry

ELECTRIC CIRCUITS FUNDAMENTALS 9 Hours

ELECTROMAGNETISM 9 Hours

AC-CIRCUITS 9 Hours

ELECTRICAL MACHINES (Qualitative Treatment Only) 9 Hours

ELECTRONIC CIRCUITS 9 Hours
Semiconductor diode – Half wave and Full wave rectifier – Bipolar Junction transistors – circuit configurations – static characteristics – load line and biasing – simple introduction to amplifiers – Introduction to Binary logic gates – AND, OR, NOT, NAND, NOR, EX-OR & EX-NOR.

TOTAL: 45 HOURS
REFERENCES

COURSE OUTCOMES
➢ Acquire the knowledge of fundamental laws of electrical and electronics engineering.
➢ State the definition of magnetic circuits.
➢ Choose suitable motor for desired application.
➢ The students have the ability to apply the fundamental laws of magnetic circuits to electrical machines.
➢ The learners can verify the truth table of digital logic gates.
OBJECTIVES

- To expose the students to the area of biochemistry/cell biology and basic genetics. This knowledge is required to understand Biochemistry, molecular biology and genetic engineering.

CARBOHYDRATES  9 Hours
Definition; Carbohydrates-; Classification- Monosaccharides - Structure, and function, Disaccharides- Structure and function- Sucrose, Lactose, Polysaccharides- Starch, cellulose, heparin, hyaluronic acid.

LIPIDS  9 Hours
Definition: Classification of lipids- Simple lipids -Physical and chemical properties of fats. Saponification number; Compound lipids-Structure and function of phospholipids and Glycolipids. Fatty acids (C16, C18) - Saturated and unsaturated fatty acids; Essential fatty acids. Steroids : Cholesterol Structure and functions.

AMINO ACIDS, PEPTIDES, VITAMINS AND MINERALS  9 Hours
Amino acid- Definition, Structure and classification; Essential amino acids; Peptides- Definition, Structure and properties. Vitamins- Definition, Structure; Physiological functions of fat and water soluble vitamins. Minerals - Essential macro and micro minerals, sources and functions.

CLASSICAL GENETICS  9 Hours
Mendelian genetics- Introduction, Principles; Monohybrid, Dihybrid and Trihybrid crosses; Backcross and testcross; Linkage, Crossing over, Genetic mapping, recombination; Multiple alleles- Blood group antigens.

CHROMOSOME STRUCTURE AND ORGANIZATION  9 Hours
Nucleic acids: structure of DNA, RNA; Chromosome organization of eukaryotes. Ploidy-polyploidy and Aneuploidy; Human karyotypes; Human sex Chromosome-linked disorders - Hemophilia, Fragile X; Special chromosomes - Polytene chromosomes and Lamp Brush chromosome.

TOTAL: 45 HOURS
REFERENCES

COURSE OUTCOMES
- Draw the structure and explain the classification and functions of carbohydrates
- Describe the structure and functions of lipids, and cholesterol
- Classify and discuss the properties and functions of amino acids, vitamins and minerals
- Recall the concepts of mendelian genetics and multiple allelism
- Understand and explain the structure of chromosomes and related disorders
OBJECTIVES
- The experiments are designed to illustrate phenomena in different areas of Physics and to expose you to measuring instruments.
- The laboratory provides a unique opportunity to validate physical theories in a quantitative manner.
- Laboratory experience demonstrates the limitations in the application of physical theories to real physical situations.
- In general, the purpose of these laboratory exercises is both to demonstrate some physical principle and to teach techniques of careful measurement.

LIST OF EXPERIMENTS

Any Ten Experiments
1. Lee’s disc - determination of thermal conductivity of a bad conductor
2. Air wedge - determination of thickness of a given specimen.
3. Spectrometer - determination of wavelength of mercury source using grating
4. Compound pendulum - determination of acceleration due to gravity.
5. Carey foster bridge – determination of specific resistance of a given coil of wire.
7. Non-uniform bending – determination of Young’s modulus
8. Ultrasonic interferometer – determination of velocity of sound and compressibility of liquid.
9. Band gap determination of a semiconductor using post office box
10. Semiconductor laser:
   a. Determination of wavelength of laser using grating
   b. Particle size determination
   c. Acceptance angle of optical fibre
11. Torsional pendulum - determination of Rigidity modulus of the wire
12. Field along the axis of a coil – Determination of magnetic moment.

Demonstration experiments:
1. Determination of solar cell parameters
2. Hall effect
3. Four probe apparatus
4. Animations – (Laser, Fiber optics and hysteresis curve)

TOTAL: 45 HOURS

COURSE OUTCOMES
- Determine different physical properties of a material like the thermal conductivity, thickness of the material, etc.
- Perform experiments involving the physical phenomena like interference and diffraction.
- Apply physical theories in real life situations by also taking into account its limitations.
OBJECTIVES

- To analyze webpage and identify its elements and attributes
- Learn the basic language of the web: HTML.
- Be able to embed social media content into web pages.
- Implement and understand how to get used with MATLAB

List of Experiments

1. Study of HTML tags
2. Design a web page using basic html tags
3. Design a webpage using table tags
4. Design a webpage using forms and frames
5. Design a webpage using list tags
6. Develop a website of your interest (include a minimum of 3 web pages)
7. Study of MATLAB functions
8. Working with matrix operations
9. Working with image arithmetic
   a. Addition of two images
   b. Subtraction of two images
10. Write a Matlab program for the following
    a. Read an image and crop
    b. Read an image and resize
11. Working with Integration and Differentiation
12. Working with graphs

COURSE OUTCOMES

On successful completion of this course the student should be able to

1. Develop static web pages using HTML. [S]
2. Perform basic MATLAB operations. [S]
3. Make use of MATLAB to work with images and graphs. [S]
4. Perform integration and differentiation using MATLAB. [S]
5. Develop team spirit and professional attitude towards the development of simple web applications [A]
OBJECTIVES

- To teach basic skills required for analysis of biomolecules such as carbohydrates, proteins, lipids, etc.
- To enable the student to perform simple experiments in Genetics.

LIST OF EXPERIMENTS

1. Qualitative analysis of Carbohydrates (glucose, galactose, fructose, maltose, sucrose and starch)
2. Qualitative analysis of amino acids (tyrosine, tryptophan, methionine, alanine and proline)
3. Qualitative analysis of lipids (general lipids)
4. Qualitative analysis of Proteins (simple and glycoproteins)
5. Qualitative analysis of minerals.
6. Blood grouping
7. Isolation of starch from potato
8. Identification of mitotic stages in onion root tip
9. Identification of polytene chromosomes
10. Genetic Mapping (Problems to be worked out)

TOTAL 45 HOURS

REFERENCES


COURSE OUTCOMES

- Ability to perform experiments for qualitative analysis of biomolecules.
- Ability to carry out simple experiments related to Cell Biology and Genetics
OBJECTIVES

- To inculcate the basic need for family life and need to maintain peace in it.
- To lead spiritual development through good family life.
- To know the 5C’s & 5E’s.
- To know the examples for Self Control.
- To practice meditation & Pranayamam.

PEACE IN FAMILY 4 Hours


Greatness of womanhood: Good culture – Cultured behavioral patterns – Love and Compassion.

BLESSING – EFFECTS IN FAMILY 2 Hours

Introduction - Benefits – Mental Frequency level - Effect of vibrations – Make blessings a daily habit.

Training: Method of blessings.

FOOD IS MEDICINE 2 Hours

Food is medicine - Healthy food habits- Method of Medicinal food preparations – Food based on character.

PERSONALITY DEVELOPMENT CONCEPTS - 5C’S & 5E’S 4 Hours

Personality Concepts: Definition - Types of Personality- Personality development activities- Factors affecting personality development - Tools to improve personality- Steps to a dynamic personality-5 C’s and 5 E’s.

Time Management: Importance –Training.

LEADERSHIP TRAITS & SELF DEVELOPMENT 4 Hours

Leadership Traits – Carrying oneself - Factors of leadership – Principles of leadership.


Training: Method of Self-Control.

SPIRITUAL DEVELOPMENT THROUGH KAYA KALPA YOGA 4 Hours

Spiritual development: Need – Development through Kaya Kalpa - Responsibility of men and women – Need of morality.
**KayaKalpa yoga:** Aim - kayalpa philosophy - Importance of kayalpa training.

**Training:** Kaya Kalpa Yoga.

**EXERCISE & MEDITATION**
Simplified Physical Exercise & Meditation Practice.

| L: 16 Hr, P: 14, Total: 30 Hours |

**REFERENCES BOOKS:**
1. Dr. A. Chandra Mohan, *Leadership and Management*, Himalaya Publication House,

**COURSE OUTCOMES:**
- Behaves as a responsible family member.
- Develop skills for personality improvement.
- Acquire practical knowledge on self-control technique for teenagers.
- Identify the significant of Genetic Centre for the Soul functional base operation.
## B.E CIVIL ENGINEERING

### SEMESTER – II

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**TOTAL – 32 HOURS**

**TOTAL CREDITS – 24**
OBJECTIVES
- To develop reading accuracy and English fluency
- To Employ appropriate formats in writing and effective
- To compare and relate words/sounds and listen for specific information.
- To maximize the elements of spoken ability

INTERPRETATIONAL DEXTERITY 15 Hours
Homophones and homonyms - Encoding and decoding advertisements - Transcoding
Graphical Representations – Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree
diagram - Reading brochures, leaflets, instruction manual - Cloze test - Reading
Comprehension- Note Making – Linear and non-linear - Book review, Article review

STYLES OF SCRIPTING 15 Hours
Types of sentences - Concord - Framing Questions – “Wh” questions, Yes/No questions and
Question Tags- Modifiers – Dangling, Misplaced, Squinting- Phrasal Expressions- Editing a
passage – Punctuation, Spelling, and Common errors - Paragraph Writing – Narrative,
Descriptive, Argumentative, Comparative / Contrastive. - Letter Writing – requesting
information, explaining a situation, letter of acceptance, declining letter, letter of application
and resume - Essay Writing

AUDITORY PROFICIENCY 15 Hours
Listening to monologues, Listening for general content - Listening to dialogues - Listening to
a telephonic conversation - Listening for specific information, numbers, time, duration -
Listening to conversations between three or more people- Listening to a group discussion and
providing factual information, Intensive listening

ORATORICAL EFFICIENCY 15 Hours
Discussing studies/interests/friends/families-Describe an object or event - Describing a
working mechanism - Justify an opinion / Negotiating views - Argumentative speech about a
public issue - Responding to situations and providing solutions - Picture Perception

L: 30 Hr, P: 30 Hr, TOTAL: 60 HOURS

REFERENCES
1. Mark Ibbotson, Cambridge English for Engineering Published by Cambridge University
3. Jeremy Comfort, Pamela Rogerson, Trish Stott and Derek Utley, Speaking Effectively,
Cambridge University Press, 1994
5. Dorothy Adams, Everyday English: A Course on Communicative English, Cengage
learning, 2009
COURSE OUTCOMES

- Distinguish the application of technical diction for the data interpretation while reading
- Construct technical sentences and compose corporate letters
- Improve listening for inferring technical information
- Develop spoken communication needed for presentations and discussions
OBJECTIVES
On completion of the course, the students are expected

- To understand double and triple integrations and enable them to find area and volume using multiple integrals.
- To know the basics of vector calculus comprising gradient, divergence and curl and line, surface and volume integrals.
- To understand analytic functions of complex variables and conformal mappings.
- To know the basics of residues, complex integration and contour integration.
- To understand Laplace transform and use it to represent system dynamic models and evaluate their time responses.

MULTIPLE INTEGRALS
Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between cartesian and polar coordinates - Triple integration in cartesian coordinates – Application: Area as double integral – Volume as triple integral.

VECTOR CALCULUS
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields - Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelepipeds.

ANALYTIC FUNCTION
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy-Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping: \( w = z + c \), \( cz \), \( \frac{1}{z} \) and bilinear transformation.

COMPLEX INTEGRATION
Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Residues – Cauchy’s residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals - Unit circle and semi-circular contours (excluding poles on real axis).
LAPLACE TRANSFORM


9 Hours

L: 45 + T: 15 = 60

REFERENCES


Course Outcomes

After pursuing the above mentioned course, the students will be able to:

- Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure.
- Know the gradient, divergence and curl, related theorems useful for engineering applications.
- Test the analyticity and to construct the analytic function and transform complex functions from one plane to another plane graphically.
- Evaluate real and complex integrals over suitable closed paths or contours.
- Know the Applications of Laplace transform and its properties & to solve certain linear differential equations using Laplace transform technique.
OBJECTIVES
At the end of the course the students would be exposed to fundamental knowledge in
- Design of acoustically good buildings
- Properties and applications of conducting materials, Superconducting materials, magnetic and dielectric materials.
- Preparation, properties and applications of Metallic glasses, Shape memory alloys and Nano materials.

ACOUSTICS

CONDUCTING AND SUPERCONDUCTING MATERIALS
Superconducting Materials: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I &Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

SEMICONDUCTING MATERIALS
Origin of band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap of a semiconductor – carrier concentration in n-type and p-type semi conductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC & DIELECTRIC MATERIALS
Dielectric Materials: Electronics, ionic, orientation and space charge polarization - Frequency and temperature dependence of polarization – Dielectric loss – Dielectric breakdown – different types of break down mechanism - Ferro electric materials - properties and applications.
NEW ENGINEERING MATERIALS AND NANOTECHNOLOGY  9 Hours

New Engineering Materials: Metallic glasses – preparation, properties and applications – shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications advantages and disadvantages of SMA.


TOTAL: 45 HOURS

REFERENCE BOOKS
5. Avadhanalu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S. Chand & Company Ltd., New Delhi, 2005

COURSE OUTCOMES
➢ Apply core concepts in Materials Science to solve engineering problems
➢ Describe the impact of acoustic engineering solutions in a constructional environmental, and societal context
➢ Determine the position of the acceptor or donor levels and the brand gap of an extrinsic semiconductor,
➢ Classify & differentiate the structure and physical properties of conducting materials
➢ Apply the techniques to manufacturing of modern materials for engineering practice.
OBJECTIVES

- To impart a sound knowledge of theoretical and modern technological aspects of, water technology, corrosion studies and specialty engineering materials as required for the civil engineers.

WATER TECHNOLOGY

9 Hours

Water hardness - Boiler feed water - boiler corrosion - priming and foaming - formation of deposits in steam boilers and heat exchangers – caustic embrittlement - disadvantages (wastage of fuel, decrease in efficiency, boiler explosion) - prevention of scale formation: Internal treatment (phosphate, calgon, carbonate, colloidal), external treatment (ion exchange method) - desalination by reverse osmosis - Treatment of common effluents.

CORROSION SCIENCE

9 Hours

Corrosion: principles of electrochemical corrosion - difference between chemical and electrochemical corrosion - factors influencing corrosion.

Types of corrosion: galvanic corrosion, differential aeration corrosion (soil (microbial) corrosion, pitting corrosion, water line corrosion) , stress corrosion

Corrosion control: cathodic protection (sacrificial anode) - electroplating (Copper plating).

ENGINEERING MATERIALS

9 Hours

Abrasives: Moh’s scale of hardness - natural abrasives (diamond, corundum, emery, garnets and quartz) - artificial abrasives (silicon carbide, boron carbide).

Refractories: characteristics - classification (acid, basic and natural refractories) - properties (refractoriness, refractoriness under load, dimensional stability, porosity thermal spalling) - general manufacturing methods of refractories - preparation, properties and uses of high alumina bricks, magnesite and zirconia bricks only.

Lubricants: functions - classification with examples - properties (viscosity index, flash and fire point, oiliness, carbon residue, aniline point, cloud and pour point) – greases (calcium based, sodium based, lithium based only) - solid lubricants (graphite, molybdenum sulphide).

CHEMISTRY OF CONSTRUCTION MATERIALS

9 Hours

Cement: Chemical composition – setting and hardening — special cements (high alumina cement, sorel cement, white Portland cement, water proof cement).

Paint: constituents – functions – special paints (fire retardant, water repellant, temperature indicating and luminous paints) - Varnishes and lacquers

COMPOSITE MATERIALS

9 Hours

Composites: definition – characteristics – constituents – types: properties and applications of fibre reinforced plastic (FRP), metal matrix composites (MMC), ceramic matrix composites (CMC), Engineered cementitious composites (ECC), Natural fiber reinforced composite

Engineering Plastics: Preparation (mechanism not required) and applications of polyamide, polycarbonates, polyurethanes and thermocole - polymer blends and alloys
REFERENCES

COURSE OUTCOMES
- Design a water purifier.
- Defend the Corrosion problems
- Identify the different construction materials and their constituents
- Describe the impact of composite materials and engineering plastics in construction
- Categorize the engineering materials and their uses.
OBJECTIVES
- To understand the concept of equilibrium of particles and rigid bodies.
- To understand the concept of first and second moment of area.
- To understand the concept of various types of frictions.
- To understand the principle of work energy method, Newton’s law and impact of elastic bodies.

BASICS & STATICS OF PARTICLES
9 Hours

EQUILIBRIUM OF RIGID BODIES
9 Hours
Moment of a force about point – Varignon s theorem- Moment of a couple-Resolution of force in to force couple system-Resultant of coplanar non concurrent system - Types of supports and their reactions- Requirements of stable equilibrium - Equilibrium of Rigid bodies in two dimensions.

PROPERTIES OF SURFACES AND SOLIDS
9 Hours
First moment of area and the Centroid of sections Rectangle, circle, triangle, T section, I section Angle section and Hollow section. Second and product moments of plane area Rectangle, triangle, circle. T Section, I section, Angle section and Hollow section, Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia.

FRICTION
9 Hours
Frictional force-Law of coloumb friction , simple contact friction, Rolling resistance and Belt friction, Ladder friction, Wedge friction.

DYNAMICS OF PARTICLES
9 Hours
Kinematics: Rectilinear & Curvilinear motion of particles, Displacements Velocity and acceleration.

L: 45 Hr, T: 15 Hr, TOTAL: 60 HOURS

REFERENCES

COURSE OUTCOMES

- Explain the concept of equilibrium of particles and rigid bodies.
- Apply the concepts of equilibrium and moment of inertia for various shapes sections.
- Make use of various concepts of friction.
- Solve problems using the concepts in kinematics and kinetics.
OBJECTIVES

At the end of this course the student should have learnt about the various materials, both conventional and modern, that are commonly used in Civil Engineering construction. Further he should be able to appreciate the criteria for choice of the appropriate material and the various tests for quality control in the use of these materials.

STONES-BRICKS-CONCRETE BLOCKS 9 Hours

LIME-CEMENT-AGGREGATES-MORTAR 9 Hours

CONCRETE 9 Hours

TIMBER AND OTHER MATERIALS 9 Hours

MODERN MATERIALS 9 Hours

TOTAL: 45 HOURS
REFERENCES
4. Shetty M.S., Concrete Technology (Theory and Practice), S. Chand & Co Ltd.

COURSE OUTCOMES
➢ Compare the properties of most common and advanced building materials.
➢ Understand the typical and potential applications of these materials
➢ Understand the quality test procedures for various materials
➢ Know about the structural forms of various materials
➢ Acquire knowledge on advanced materials used in civil engineering field.
OBJECTIVES

- To apply the theoretical principles and perform experiments
- Experience the importance of theory by using analytical equipments and quantitative and qualitative procedures.

LIST OF EXPERIMENTS

PREPARATION OF SOLUTIONS (STANDARD)
1. Preparation of normal solutions of the following substances - oxalic acid, sodium carbonate, hydrochloric acid.
2. Preparation of phosphate buffer using Henderson equation.

WATER TESTING
3. Determination of total, temporary and permanent hardness by EDTA method.
4. Estimation of DO by Winkler’s method.
5. Estimation of alkalinity by Indicator method.

ELECTRO CHEMICAL ANALYSIS
7. Estimation of hydrochloric acid by pH metry.
8. Conductometric titration of mixture of acids and strong base
9. Conductometric precipitation titration using BaCl₂ and Na₂SO₄.
10. Estimation of Iron by Potentiometry

PHOTOMETRY
11. Estimation of the Ferrous ions (Thiocyanate method) by Spectrophotometry.
12. Estimation of sodium and potassium by Flame photometry.

TOTAL: 45 HOURS

REFERENCES

COURSE OUTCOMES

- Prepare normal solutions
- Analyse the properties of water by applying the chemical concepts
- Estimate the concentration of solutions by electrochemical methods and apply it in real life situations like blood testing etc
OBJECTIVES

- To analyze webpage and identify its elements and attributes
- Learn the basic language of the web: HTML.
- Be able to embed social media content into web pages.
- Implement and understand how to get used with MATLAB

List of Experiments

1. Study of HTML tags
2. Design a web page using basic html tags
3. Design a webpage using table tags
4. Design a webpage using forms and frames
5. Design a webpage using list tags
6. Develop a website of your interest (include a minimum of 3 web pages)
7. Study of MATLAB functions
8. Working with matrix operations
9. Working with image arithmetic
   a. Addition of two images
   b. Subtraction of two images
10. Write a Matlab program for the following
    a. Read an image and crop
    b. Read an image and resize
11. Working with Integration and Differentiation
12. Working with graphs

COURSE OUTCOMES

On successful completion of this course the student should be able to

1. Develop static web pages using HTML. [S]
2. Perform basic MATLAB operations. [S]
3. Make use of MATLAB to work with images and graphs. [S]
4. Perform integration and differentiation using MATLAB. [S]
5. Develop team spirit and professional attitude towards the development of simple web applications [A]
LIST OF EXPERIMENTS

1. Tests on Aggregate
2. Moisture Content of Concrete Aggregate”
3. Specific Gravity and Absorption of Coarse Aggregate
4. Specific Gravity and Absorption of fine Aggregate”
5. Resistance to Degradation of Small-size coarse Aggregate by Abrasion in the Los Angeles Machine
6. Aggregate crushing strength test
7. Abrasion test
8. Shape Test (Flakiness Index)
9. Shape test (Elongation Index)
10. Shape Test (Angularity Number)
11. Unit Weight and Voids in Aggregate in its compacted or loose condition”
12. Sieve analysis of fine and coarse aggregate

Tests on Cement

1. Blaine’s Air Permeability test
2. Fineness of Hydraulic Cement by No.100 or No. 200 Sieve”
3. Normal Consistency of Hydraulic Cement”
4. Initial and Final Time of Setting of Cement”
5. Density and Specific Gravity of cement”
6. Compressive Strength of Hydraulic Cement Mortars"
7. Tensile Strength of Cement Mortar
8. Compressive strength of brick
9. Strength tests on Flooring tiles

TOTAL: 45 HOURS

COURSE OUTCOMES

➢ Find the physical and mechanical properties of construction materials like cement, sand and aggregates by conducting various laboratory tests.
OBJECTIVES

- To inculcate the basic need for family life and need to maintain peace in it.
- To lead spiritual development through good family life.
- To know the 5C’s & 5E’s.
- To know the examples for Self Control.
- To practice meditation & Pranayamam.

PEACE IN FAMILY 4 Hours

Greatness of womanhood: Good culture – Cultured behavioral patterns – Love and Compassion.

BLESSING – EFFECTS IN FAMILY 2 Hours
Introduction - Benefits – Mental Frequency level - Effect of vibrations – Make blessings a daily habit.
Training: Method of blessings.

FOOD IS MEDICINE 2 Hours
Food is medicine - Healthy food habits- Method of Medicinal food preparations – Food based on character.

PERSONALITY DEVELOPMENT CONCEPTS - 5C’S & 5E’S 4 Hours
Personality Concepts: Definition - Types of Personality- Personality development activities- Factors affecting personality development - Tools to improve personality- Steps to a dynamic personality-5 C’s and 5 E’s.
Time Management: Importance –Training.

LEADERSHIP TRAITS & SELF DEVELOPMENT 4 Hours
Leadership Traits – Carrying oneself - Factors of leadership – Principles of leadership.


Training: Method of Self-Control.

SPIRITUAL DEVELOPMENT THROUGH KAYA KALPA YOGA 4 Hours
Spiritual development: Need – Development through Kaya Kalpa - Responsibility of men and women – Need of morality.
KayaKalpa yoga: Aim - kayakalpa philosophy - Importance of kayakalpa training.
Training: Kaya Kalpa Yoga.

EXERCISE & MEDITATION
Simplified Physical Exercise & Meditation Practice.

10 Hours

L: 16 Hr, P: 14, Total: 30 Hours

REFERENCES BOOKS:
1. Dr. A. Chandra Mohan, “Leadership and Management”, Himalaya Publication House,

COURSE OUTCOMES:
- Behaves as a responsible family member.
- Develop skills for personality improvement.
- Acquire practical knowledge on self-control technique for teenagers.
- Identify the significant of Genetic Centre for the Soul functional base operation.
## B.E - COMPUTER SCIENCE AND ENGINEERING

**SEMESTER – II**

### THEORY

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### PRACTICAL

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**TOTAL – 33 HOURS**

**TOTAL CREDITS – 25**
OBJECTIVES

- To develop reading accuracy and English fluency
- To employ appropriate formats in writing and effective
- To compare and relate words/sounds and listen for specific information.
- To maximize the elements of spoken ability

INTERPRETATIONAL DEXTERITY  
15 Hours

Homophones and homonyms - Encoding and decoding advertisements - Transcoding
Graphical Representations – Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree
diagram - Reading brochures, leaflets, instruction manual - Cloze test - Reading
Comprehension- Note Making – Linear and non-linear - Book review, Article review

STYLES OF SCRIPTING  
15 Hours

Types of sentences - Concord - Framing Questions – “Wh” questions, Yes/No questions and
Question Tags- Modifiers – Dangling, Misplaced, Squinting- Phrasal Expressions- Editing a
passage – Punctuation, Spelling, and Common errors - Paragraph Writing – Narrative,
Descriptive, Argumentative, Comparative / Contrastive. - Letter Writing – requesting
information, explaining a situation, letter of acceptance, declining letter, letter of application
and resume - Essay Writing

AUDITORY PROFICIENCY  
15 Hours

Listening to monologues, Listening for general content - Listening to dialogues - Listening to
a telephonic conversation - Listening for specific information, numbers, time, duration -
Listening to conversations between three or more people- Listening to a group discussion and
providing factual information, Intensive listening

ORATORICAL EFFICIENCY  
15 Hours

Discussing studies/interests/friends/families-Describe an object or event - Describing a
working mechanism - Justify an opinion / Negotiating views - Argumentative speech about a
public issue - Responding to situations and providing solutions - Picture Perception

L: 30 Hr, P: 30 Hr, TOTAL: 60 HOURS

REFERENCES

1. Mark Ibbotson, Cambridge English for Engineering Published by Cambridge University
3. Jeremy Comfort, Pamela Rogerson, Trish Stott and Derek Utley, Speaking Effectively,
   Cambridge University Press, 1994
5. Dorothy Adams, Everyday English: A Course on Communicative English, Cengage
   learning, 2009
COURSE OUTCOMES

- Distinguish the application of technical diction for the data interpretation while reading
- Construct technical sentences and compose corporate letters
- Improve listening for inferring technical information
- Develop spoken communication needed for presentations and discussions
OBJECTIVES

On completion of the course, the students are expected

- To understand double and triple integrations and enable them to find area and volume using multiple integrals.
- To know the basics of vector calculus comprising gradient, divergence and curl and line, surface and volume integrals.
- To understand analytic functions of complex variables and conformal mappings.
- To know the basics of residues, complex integration and contour integration.
- To understand Laplace transform and use it to represent system dynamic models and evaluate their time responses.

MULTIPLE INTEGRALS 9 Hours
Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between cartesian and polar coordinates - Triple integration in cartesian coordinates – Application : Area as double integral – Volume as triple integral.

VECTOR CALCULUS 9 Hours
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields - Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

ANALYTIC FUNCTION 9 Hours
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy-Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping : $w = z + c$, $cz$, $1/z$ and bilinear transformation.

COMPLEX INTEGRATION 9 Hours
Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Residues – Cauchy’s residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals - Unit circle and semi-circular contours (excluding poles on real axis).
LAPLACE TRANSFORM  
9 Hours

\[ L: 45 + T: 15 = 60 \]

REFERENCES


Course Outcomes

After pursuing the above mentioned course, the students will be able to:

- Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure.  
- Know the gradient, divergence and curl, related theorems useful for engineering applications.  
- Test the analyticity and to construct the analytic function and transform complex functions from one plane to another plane graphically.  
- Evaluate real and complex integrals over suitable closed paths or contours.  
- Know the Applications of Laplace transform and its properties & to solve certain linear differential equations using Laplace transform technique.
OBJECTIVES
At end of the course students would be exposed to

- Conducting, super conducting, magnetic and dielectric materials in electrical devices.
- Semi conducting, optical and new engineering materials in switching and display devices, data storage.

CONDUCTING AND SUPERCONDUCTING MATERIALS 9 Hours

Superconducters: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I & Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

SEMICONDUCTING MATERIALS 9 Hours
Origin of band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semi conductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC & DIELECTRIC MATERIALS 9 Hours


NEW ENGINEERING MATERIALS AND NANOTECHNOLOGY 9 Hours
New Engineering Materials : Metallic glasses – preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications - advantages and disadvantages of SMA.

OPTICAL MATERIALS


TOTAL: 45 HOURS

REFERENCES

COURSE OUTCOMES
➢ Apply core concepts in Materials Science to solve engineering problems
➢ Determine the position of the acceptor or donor levels and the brand gap of an extrinsic semiconductor,
➢ Classify & differentiate the structure and physical properties of conducting materials
➢ Apply the techniques to manufacturing of modern materials for engineering practice.
➢ Recognize the various nanomaterials for engineering and technological applications
OBJECTIVES

- To study the characteristics of circuit elements
- To understand relationships among current, voltage and power in DC and AC circuits
- To study the construction, characteristics and applications of amplifiers and oscillators circuitry

DC CIRCUITS
9 Hours

AC CIRCUITS
9 Hours

SEMICONDUCTOR DIODE AND APPLICATIONS
9 Hours

TRANSISTORS AND APPLICATIONS
9 Hours

OSCILLATORS AND OPERATIONAL AMPLIFIERS
9 Hours

L: 45 Hr T: 15 Hr TOTAL: 60 HOURS

REFERENCES

COURSE OUTCOMES

- Define & identify the basic electrical quantities and also able to calculate approximately the voltage, current parameters in DC circuits using basic laws.
- Understand the phasor representation of various AC circuit parameters and acquire knowledge on fundamentals of three phase ac circuits.
- Differentiate the various semiconductor diodes and rectifiers.
- Summarize the characteristics of different types of transistors.
- Apply the achieved basic knowledge about oscillators & op-amp to different dc applications.
OBJECTIVES

- Acquire an overview of data storage and manipulation in computers
- Understand the basic concepts of operating systems, networks and database
- Know the applications of Internet and Information Technology

Computer Basics and Architecture 11 Hours
Computer Memory and Storage: Memory Hierarchy-Types of Memory-CPU interaction with memory-Secondary Storage devices and its types

Basics of Operating Systems and Databases 10 Hours
Operating systems: Evolution-Types of Operating System -Functions of Operating System-Coordinating machine activities-Handling competition among processes

Basics of Networks and Data Communication 08 Hours
Networks-Network Topologies-Communication Protocol-Network devices
Data Communication: Introduction-Data Communication-Transmission Media-Modulation-Multiplexing-Switching

Basics of Data abstraction and Software Engineering 11 Hours
Data abstraction: Basic data structures - Implementation - Classes and objects - Object Oriented Programming

Current and Future trends in IT 05 Hours

REFERENCES
1. Introduction to Information Technology, Pearson Education, ITL Education solutions Ltd., 2012
COURSE OUTCOMES

- Outline various functional components of computer system.
- Summarize the functions of operating systems.
- Define different types of network topologies and protocols.
- Explain the various internet tools and terminology.
- Explain the basic concept of data abstraction, database, software engineering.
OBJECTIVES

- To provide students in-depth theoretical base of the Digital Electronics.
- To provide the fundamental designing concepts of different types of Logic Gates, Minimization techniques etc.
- To familiarize the students regarding designing of different types of the Digital circuits.
- To provide the computational details for Digital Circuits. To introduce the basic concept of Hardware Components.

NUMBER SYSTEM AND BASIC LOGIC 10 Hours

Number systems - Binary, Octal, Hexadecimal, Number base conversions, Binary codes: Weighted codes - BCD - 8421-2421, Non Weighted codes - Gray code - Excess 3 code

COMBINATIONAL CIRCUITS 9 Hours

Problem formulation and design of combinational circuits, adder, subtractor, Serial adder/ Subtractor - Parallel adder/ Subtractor - Carry look ahead adder - BCD adder - Magnitude Comparator, parity checker, Encoder, decoder, Multiplexer/ Demultiplexer, code converters, Function realization using gates and multiplexers.

SEQUENTIAL CIRCUIT 8 Hours


DESIGN OF SEQUENTIAL CIRCUITS 10 Hours


DIGITAL LOGIC FAMILIES AND PLD 8 Hours

Memories – ROM, PROM, EEPROM, RAM – Programmable Logic Devices: Programmable Logic Array (PLA)- Programmable Array Logic (PAL) - Implementation of combinational logic using PROM, PLA and PAL. Introduction to FPGA. Digital logic families: TTL, ECL, CMOS.

L: 45 Hr, T: 15 Hr, TOTAL: 60 HOURS
REFERENCES

COURSE OUTCOMES
- Translate numerical values in various number systems and perform number conversions between number systems.
- Demonstrate the knowledge of logic gates, Boolean algebra and apply optimal minimization techniques to simplify the Boolean function.
- Analyze and design combinational and sequential circuits.
- Apply the knowledge to solve the real time problems related to digital circuits.
- Compare various programmable devices and digital logic families.
OBJECTIVES

- To study the characteristics of resonant circuits
- To obtain the characteristics of electronic devices
- To obtain the characteristics of amplifier circuits

LIST OF EXPERIMENTS

1. Verification of Kirchhoff’s Laws
2. Series & Parallel Resonance
4. Half wave and full wave rectifier
5. Zener diode Regulator
6. Common Emitter Transistor characteristics
7. JFET characteristics
8. Wein Bridge oscillator
9. Comparator, summing Amplifier using Op-Amp
10. Integrator and Differentiator using Op-Amp

TOTAL: 45 HOURS

COURSE OUTCOMES

- Understand and verify the breadboard connections.
- Check the working condition of a cathode ray oscilloscope.
- Understand the basic laws of electric circuits.
- Understand the working of various electronic devices.
- Understand the performance of an amplifier to carryout different operations.
OBJECTIVES

- Acquire in-depth practical knowledge of computer hardware.
- Understanding the connection of networks.
- Develop skills related to the troubleshooting PC.

LIST OF EXERCISES

1. Study the components through assembling and disassembling of PC.
2. Study of different types of network topologies and cables along with crimping.
4. Installation and configuration of Windows and Linux operating systems.
5. Troubleshooting frequently occurring problems.
6. Application software installation.
7. IP configuration and connecting a small LAN including file sharing.
8. Process Handling through task manager.
10. Hands on learning of the Unix/Linux commands.

TOTAL: 45 HOURS

COURSE OUTCOMES

- Explain the various computer hardware components and their functionality.
- Illustrate the assembling process of a computer system.
- Explain the local area network and file sharing methods.
- Perform the installation of Windows and Linux operating system.
- Summarize the basic Unix/Linux commands.
OBJECTIVES

- To provide students in-depth practical base of the Digital Electronics.
- To familiarize the students regarding designing of different types of the Digital circuits.
- To provide the computational details for Digital Circuits.

LIST OF EXPERIMENTS

1. Verification of Boolean theorems using digital logic gates
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters, etc.
3. Design and implementation of 4-bit binary adder / subtractor using basic gates and MSI devices
4. Design and implementation of parity generator / checker using basic gates and MSI devices
5. Design and implementation of magnitude comparator
6. Design and implementation of application using multiplexers
7. Design and implementation of shift registers
8. Design and implementation of synchronous and asynchronous counters
9. Simulation study of any combinational and sequential circuit using VHDL.

COURSE OUTCOMES

On successful completion of this course, the student should be able to

- Construct truth table for specific digital logic functionality.
- Illustrate digital logic function using optimal minimization techniques.
- Construct and troubleshoot the digital circuits.
- Solve the problems related to digital circuits.
- Experiment with digital circuits using VHDL.

TOTAL: 45 HOURS
OBJECTIVES
- To inculcate the basic need for family life and need to maintain peace in it.
- To lead spiritual development through good family life.
- To know the 5C’s & 5E’s.
- To know the examples for Self Control.
- To practice meditation & Pranayamam.

PEACE IN FAMILY 4 Hours

Greatness of womanhood: Good culture – Cultured behavioral patterns – Love and Compassion.

BLESSING – EFFECTS IN FAMILY 2 Hours
Introduction - Benefits – Mental Frequency level - Effect of vibrations – Make blessings a daily habit.
Training: Method of blessings.

FOOD IS MEDICINE 2 Hours
Food is medicine - Healthy food habits- Method of Medicinal food preparations – Food based on character.

PERSONALITY DEVELOPMENT CONCEPTS - 5C’S & 5E’S 4 Hours
Personality Concepts: Definition - Types of Personality- Personality development activities- Factors affecting personality development - Tools to improve personality- Steps to a dynamic personality-5 C’s and 5 E’s.
Time Management: Importance –Training.

LEADERSHIP TRAITS & SELF DEVELOPMENT 4 Hours
Leadership Traits – Carrying oneself - Factors of leadership – Principles of leadership.


Training: Method of Self-Control.

SPIRITUAL DEVELOPMENT THROUGH KAYA KALPA YOGA 4 Hours
Spiritual development: Need – Development through Kaya Kalpa - Responsibility of men and women – Need of morality.
KayaKalpa yoga: Aim - kayakalpa philosophy - Importance of kayakalpa training.
**Training:** Kaya Kalpa Yoga.

**EXERCISE & MEDITATION**

Simplified Physical Exercise & Meditation Practice.

**10 Hours**

L: 16 Hr, P: 14, Total: 30 Hours

**REFERENCES BOOKS:**


**COURSE OUTCOMES:**

- Behaves as a responsible family member.
- Develop skills for personality improvement.
- Acquire practical knowledge on self-control technique for teenagers.
- Identify the significance of Genetic Centre for the Soul functional base operation.
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**TOTAL – 33 HOURS**

**TOTAL CREDITS – 24**
OBJECTIVES
- To develop reading accuracy and English fluency
- To Employ appropriate formats in writing and effective
- To compare and relate words/sounds and listen for specific information.
- To maximize the elements of spoken ability

INTERPRETATIONAL DEXTERITY 15 Hours
Homophones and homonyms - Encoding and decoding advertisements - Transcoding Graphical Representations – Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree diagram - Reading brochures, leaflets, instruction manual - Cloze test - Reading Comprehension- Note Making – Linear and non-linear - Book review, Article review

STYLES OF SCRIPTING 15 Hours
Types of sentences - Concord - Framing Questions – “Wh” questions, Yes/No questions and Question Tags- Modifiers – Dangling, Misplaced, Squinting- Phrasal Expressions- Editing a passage – Punctuation, Spelling, and Common errors - Paragraph Writing – Narrative, Descriptive, Argumentative, Comparative / Contrastive. - Letter Writing – requesting information, explaining a situation, letter of acceptance, declining letter, letter of application and resume - Essay Writing

AUDITORY PROFICIENCY 15 Hours
Listening to monologues, Listening for general content - Listening to dialogues - Listening to a telephonic conversation - Listening for specific information, numbers, time, duration - Listening to conversations between three or more people- Listening to a group discussion and providing factual information, Intensive listening

ORATORICAL EFFICIENCY 15 Hours
Discussing studies/interests/friends/families-Describe an object or event - Describing a working mechanism - Justify an opinion / Negotiating views - Argumentative speech about a public issue - Responding to situations and providing solutions - Picture Perception

L: 30 Hr, P: 30 Hr, TOTAL: 60 HOURS

REFERENCES
COURSE OUTCOMES

- Distinguish the application of technical diction for the data interpretation while reading
- Construct technical sentences and compose corporate letters
- Improve listening for inferring technical information
- Develop spoken communication needed for presentations and discussions
OBJECTIVES

On completion of the course, the students are expected

- To understand double and triple integrations and enable them to find area and volume using multiple integrals.
- To know the basics of vector calculus comprising gradient, divergence and curl and line, surface and volume integrals.
- To understand analytic functions of complex variables and conformal mappings.
- To know the basics of residues, complex integration and contour integration.
- To understand Laplace transform and use it to represent system dynamic models and evaluate their time responses.

MULTIPLE INTEGRALS

9 Hours
Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between cartesian and polar coordinates - Triple integration in cartesian coordinates – Application : Area as double integral – Volume as triple integral.

VECTOR CALCULUS

9 Hours
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields - Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

ANALYTIC FUNCTION

9 Hours
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy-Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping : $w = z + c , cz , 1/z$ and bilinear transformation.

COMPLEX INTEGRATION

9 Hours
Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Residues – Cauchy’s residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals - Unit circle and semi-circular contours (excluding poles on real axis).
LAPLACE TRANSFORM


REFERENCES


Course Outcomes

After pursuing the above mentioned course, the students will be able to:

- Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure.
- Know the gradient, divergence and curl, related theorems useful for engineering applications.
- Test the analyticity and to construct the analytic function and transform complex functions from one plane to another plane graphically.
- Evaluate real and complex integrals over suitable closed paths or contours.
- Know the Applications of Laplace transform and its properties & to solve certain linear differential equations using Laplace transform technique.
OBJECTIVES
At end of the course students would be exposed to
- Conducting, super conducting, magnetic and dielectric materials in electrical devices.
- Semi conducting, optical and new engineering materials in switching and display devices, data storage.

CONDUCTING AND SUPERCONDUCTING MATERIALS 9 Hours

Superconducters: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I & Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

SEMICONDUCTING MATERIALS 9 Hours
Origin of band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semiconductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semiconductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC & DIELECTRIC MATERIALS 9 Hours


NEW ENGINEERING MATERIALS AND NANOTECHNOLOGY 9 Hours
New Engineering Materials: Metallic glasses – preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications - advantages and disadvantages of SMA.

OPTICAL MATERIALS


TOTAL: 45 HOURS

REFERENCES

COURSE OUTCOMES
- Apply core concepts in Materials Science to solve engineering problems
- Determine the position of the acceptor or donor levels and the band gap of an extrinsic semiconductor,
- Classify & differentiate the structure and physical properties of conducting materials
- Apply the techniques to manufacturing of modern materials for engineering practice.
- Recognize the various nanomaterials for engineering and technological applications
OBJECTIVES
To impart a sound knowledge on basics of
- Theoretical and modern technological aspects of modern polymeric materials technology for micro electrical, electronics, instrumentation and communication fields.

INTRODUCTION TO CONDUCTING POLYMERIC MATERIALS 9 Hours

APPLIED CONDUCTING POLYMERS 9 Hours
Synthesis, structure, morphology, conductivity, doping theory and uses of Poly(sulfur nitride), polyacetylene, polyphenylene, poly(phenylene vinylenes), poly(phenylene sulfide), Polypyrrole and Polythiophene, Polyaniline - Polymers with transition metals in the side-group structure and their uses (includes Stacked Phthalocyanine polymers).

MANUFACTURING METHODS OF ORGANO ELECTRONICS MATERIALS 9 Hours

ORGANIC ELECTRONIC MATERIALS 9 Hours
Organic thin-film transistor (OTFT) – architecture, operating mode - fabrication techniques - structure-property relationship - Methods of improving performance – structural perfection - device architecture - Electrical and environmental stability – chemical effects on stability - Gate dielectrics on electrical functionality.

ADVANCED MATERIALS FOR ORGANIC ELECTRONICS 9 Hours

TOTAL: 45 HOURS
REFERENCES

COURSE OUTCOMES
- Analyse and determine the required conducting polymers in fabrication of organic electronic devices
- Describe the mechanism of formation of conducting polymeric materials
- Design an Organic Thin film transistor
- Outline the performance of Pentacene transistors
OBJECTIVES

- Recognize and apply basic electrical units and terminology
- Identify the circuit elements and their corresponding schematic symbols - voltage and current sources (ac and dc), resistors, transformers, capacitors, inductors
- State and apply the laws, rules and theorems to analyze electrical circuit
- Analyze steady state and transient response of source free / driven RL and RC circuits.
- Design and analyze series and parallel Resonance circuits.

DC CIRCUITS ANALYSIS 9 Hours

NETWORK THEOREMS 9 Hours
Superposition Theorem, Thevenin’s Theorem and Norton’s Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Verification of Theorems, Introduction to PSPICE.

SINUSOIDAL STEADY STATE ANALYSIS 9 Hours

FIRST ORDER AND SECOND ORDER CIRCUITS 9 Hours
Basic RL and RC Circuits: The Source-Free RL Circuit, the Source-Free RC Circuit, The Unit-Step Function, Driven RL Circuits, Driven RC Circuits- Source free series and parallel RLC circuits.

RESONANCE AND COUPLED CIRCUITS 9 Hours
Frequency Response of Parallel and Series Resonance circuits-determination of Resonant Frequency, Q – Factor and Bandwidth. Magnetically Coupled Circuits - Self Inductance, Mutual Inductance, Coefficient of Coupling, Energy in a coupled circuit, Linear Transformer, Ideal Transformer, Duality.

L:45 Hr, T:15 Hr TOTAL: 60 HOURS
REFERENCES

COURSE OUTCOMES
- Able to model passive elements & sources
- Apply circuit theory concepts to compute voltage, current & resistance in DC&AC circuits.
- Use SPICE as a simulation tool to analyze electric circuits.
- Estimate the transient response of simple RL, RC & RLC circuits.
- Predict the frequency response of resonance circuits.
OBJECTIVES
- Describe the basic concepts of Electron Ballistics
- Illustrate the formation of a p-n junction diode (built-in potential, electric field, charge transport).
- Explain the construction, operation and characteristics of BJT, JFET and MOSFET
- Appraise the functioning of special semiconductor devices: Tunnel diode, SCR, DIAC, TRIAC, UJT, optoelectronic devices.
- Discuss the manufacturing methods for the production of Integrated Circuits.

ELECTRON BALLISTICS 9 Hours
Force on charge particles in electric field – Motion of charge in uniform and time varying electric fields – Force in a magnetic field – Current Density – Motion in a Magnetic Field – Electrostatic deflection in a cathode ray tube – Magnetic deflection in a cathode ray tube – Deflection sensitivity- Magnetic Focusing –Parallel Electric and Magnetic Fields - Perpendicular Electric and Magnetic Fields – Cyclotron

SEMICONDUCTOR DIODES 9 Hours

BIPOLAR JUNCTION TRANSISTORS AND FIELD EFFECT TRANSISTORS 9 Hours

SPECIAL SEMICONDUCTOR DEVICES 9 Hours
Tunnel diode, Operation and Characteristics - SCR ,TRIAC, DIAC - Applications. UJT - Operation - Characteristics – Equivalent Circuit and Applications – Opto electronic devices- LED - Photo diode –Photo transistor

FABRICATION OF SEMICONDUCTOR DEVICES 9 Hours
REFERENCES

COURSE OUTCOMES
- Recognize the concepts of Electron ballistics
- Understand the principles of Semiconductor Physics
- Illustrate the characteristics of diodes, BJT, FET, MOSFET and their applications.
- Develop skills to implement simple projects using the basic devices
OBJECTIVES
- The experiments are designed to illustrate phenomena in different areas of Physics and to expose you to measuring instruments.
- The laboratory provides a unique opportunity to validate physical theories in a quantitative manner.
- Laboratory experience demonstrates the limitations in the application of physical theories to real physical situations.
- In general, the purpose of these laboratory exercises is both to demonstrate some physical principle and to teach techniques of careful measurement.

LIST OF EXPERIMENTS

Any Ten Experiments
1. Lee’s disc - determination of thermal conductivity of a bad conductor
2. Air wedge - determination of thickness of a given specimen.
3. Spectrometer - determination of wavelength of mercury source using grating
4. Compound pendulum - determination of acceleration due to gravity.
5. Carey foster bridge - determination of specific resistance of given coil of wire.
7. Non-uniform bending – determination of Young’s modulus
8. Ultrasonic interferometer – determination of velocity of sound and compressibility of liquid.
9. Band gap determination of a semiconductor using post office box
10. Semiconductor laser:
    a. Determination of wavelength of laser using grating
    b. Particle size determination
    c. Acceptance angle of optical fibre
11. Torsional pendulum - determination of Rigidity modulus of the wire
12. Field along the axis of a coil – Determination of magnetic moment.

Demonstration experiments:
5. Determination of solar cell parameters
6. Hall effect
7. Four probe apparatus
8. Animations – (Laser, Fiber optics and hysteresis curve)

TOTAL: 45 HOURS

COURSE OUTCOMES
- Determine different physical properties of a material like the thermal conductivity, thickness of the material, etc.
- Perform experiments involving the physical phenomena like interference and diffraction.
- Apply physical theories in real life situations by also taking into account its limitations.
OBJECTIVES
- Assemble simple electric circuits with passive elements and sources.
- Verify laws and theorems in electric circuits
- Design and analyze series and parallel resonant circuits
- Use simulation tools to analyze electric circuits.

LIST OF EXPERIMENTS
1. Measurement of current and voltage in series and parallel circuits.
2. Verification of Kirchhoff’s Laws.
3. Verification of Thevenin’s Theorem
4. Verification of Reciprocity Theorem
5. Verification of Super position Theorem
6. Verification of Maximum Power Transfer Theorem
7. Frequency Response of Series and Parallel resonance circuits

PSPICE SIMULATION
8. Verification of Theorems
9. Analysis of Transient Response of RL & RC circuits
10. Analysis of Series and parallel resonance circuits

TOTAL: 45 HOURS

COURSE OUTCOMES
- Practice proper use of measuring instruments.
- Relate physical observations and measurements involving electrical circuits to theoretical principles.
- Experiment series and parallel resonance circuits.
- Able to use simulation tools to analyze electric circuits.
OBJECTIVES

- Sketch the characteristics of the semiconductor devices: Diode, Zener diode, Transistor, FET, MOSFET, UJT, SCR, Photo diode & Photo transistor.
- Demonstrate the application circuits: rectifier, voltage regulator and BJT amplifier.

LIST OF EXPERIMENTS

1. PN Diode VI – Characteristics
2. Half Wave and Full wave rectifier
3. Zener Diode characteristics and Voltage regulator
4. Transistor (CE) characteristics and h parameter determination
5. JFET characteristics
6. MOSFET characteristics
7. UJT characteristics
8. SCR characteristics
9. TRIAC and DIAC characteristics
10. Photo Diode and Photo Transistor characteristics
11. BJT as an amplifier and switch

TOTAL: 45 HOURS

COURSE OUTCOMES

- Analyze the characteristics and behavior of devices like diode, zener diode, BJT, FET, MOSFET, UJT, SCR and optoelectronic devices
- Verify the working of diodes, transistors and their applications
- Build a common emitter/base/collector amplifier and measure h-parameters.
OBJECTIVES

- To inculcate the basic need for family life and need to maintain peace in it.
- To lead spiritual development through good family life.
- To know the 5C’s & 5E’s.
- To know the examples for Self Control.
- To practice meditation & Pranayamam.

PEACE IN FAMILY

4 Hours


Greatness of womanhood: Good culture – Cultured behavioral patterns – Love and Compassion.

BLESSING – EFFECTS IN FAMILY

2 Hours

Introduction - Benefits – Mental Frequency level - Effect of vibrations – Make blessings a daily habit.
Training: Method of blessings.

FOOD IS MEDICINE

2 Hours

Food is medicine - Healthy food habits- Method of Medicinal food preparations – Food based on character.

PERSONALITY DEVELOPMENT CONCEPTS - 5C’S & 5E’S

4 Hours

Personality Concepts: Definition - Types of Personality- Personality development activities- Factors affecting personality development - Tools to improve personality- Steps to a dynamic personality-5 C’s and 5 E’s.

Time Management: Importance –Training.

LEADERSHIP TRAITS & SELF DEVELOPMENT

4 Hours

Leadership Traits – Carrying oneself - Factors of leadership – Principles of leadership.


Training: Method of Self-Control.

SPIRITUAL DEVELOPMENT THROUGH KAYA KALPA YOGA

4 Hours

Spiritual development: Need – Development through Kaya Kalpa - Responsibility of men and women – Need of morality.
**Kaya Kalpa Yoga**: Aim - kayakalpa philosophy - Importance of kayakalpa training.

**Training**: Kaya Kalpa Yoga.

**EXERCISE & MEDITATION**

Simplified Physical Exercise & Meditation Practice.

- **10 Hours**

L: 16 Hr, P: 14, Total: 30 Hours

**REFERENCES BOOKS:**

1. Dr. A. Chandra Mohan, *Leadership and Management*, Himalaya Publication House,

**COURSE OUTCOMES:**

- Behaves as a responsible family member.
- Develop skills for personality improvement.
- Acquire practical knowledge on self-control technique for teenagers.
- Identify the significant of Genetic Centre for the Soul functional base operation.
### B.E - ELECTRICAL AND ELECTRONICS ENGINEERING

#### SEMESTER – II

<table>
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**TOTAL – 33 HOURS**

**TOTAL CREDIT – 25**
OBJECTIVES

- To develop reading accuracy and English fluency
- To Employ appropriate formats in writing and effective
- To compare and relate words/sounds and listen for specific information.
- To maximize the elements of spoken ability

INTERPRETATIONAL DEXTERITY  
15 Hours

Homophones and homonyms - Encoding and decoding advertisements - Transcoding
Graphical Representations – Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree
Diagram - Reading brochures, leaflets, instruction manual - Cloze test - Reading
Comprehension- Note Making – Linear and non-linear - Book review, Article review

STYLES OF SCRIPTING  
15 Hours

Types of sentences - Concord - Framing Questions – “Wh” questions, Yes/No questions and
Question Tags- Modifiers – Dangling, Misplaced, Squinting- Phrasal Expressions- Editing a
passage – Punctuation, Spelling, and Common errors - Paragraph Writing – Narrative,
Descriptive, Argumentative, Comparative / Contrastive. - Letter Writing – requesting
information, explaining a situation, letter of acceptance, declining letter, letter of application
and resume - Essay Writing

AUDITORY PROFICIENCY  
15 Hours

Listening to monologues, Listening for general content - Listening to dialogues - Listening to
a telephonic conversation - Listening for specific information, numbers, time, duration -
Listening to conversations between three or more people- Listening to a group discussion and
providing factual information, Intensive listening

ORATORICAL EFFICIENCY  
15 Hours

Discussing studies/interests/friends/families-Describe an object or event - Describing a
working mechanism - Justify an opinion / Negotiating views - Argumentative speech about a
public issue - Responding to situations and providing solutions - Picture Perception

L: 30 Hr, P: 30 Hr, TOTAL: 60 HOURS

REFERENCES

1. Mark Ibbotson, Cambridge English for Engineering Published by Cambridge University
3. Jeremy Comfort, Pamela Rogerson, Trish Stott and Derek Utley, Speaking Effectively,
   Cambridge University Press, 1994
5. Dorothy Adams, Everyday English: A Course on Communicative English, Cengage
   learning, 2009
COURSE OUTCOMES
➢ Distinguish the application of technical diction for the data interpretation while reading
➢ Construct technical sentences and compose corporate letters
➢ Improve listening for inferring technical information
➢ Develop spoken communication needed for presentations and discussions
OBJECTIVES
On completion of the course, the students are expected
- To understand double and triple integrations and enable them to find area and volume using multiple integrals.
- To know the basics of vector calculus comprising gradient, divergence and curl and line, surface and volume integrals.
- To understand analytic functions of complex variables and conformal mappings.
- To know the basics of residues, complex integration and contour integration.
- To understand Laplace transform and use it to represent system dynamic models and evaluate their time responses.

MULTIPLE INTEGRALS
9 Hours
Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between cartesian and polar coordinates - Triple integration in cartesian coordinates – Application : Area as double integral – Volume as triple integral.

VECTOR CALCULUS
9 Hours
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields - Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

ANALYTIC FUNCTION
9 Hours
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy-Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping : \( w = z + c \), \( cz \), \( 1/z \) and bilinear transformation.

COMPLEX INTEGRATION
9 Hours
Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Residues – Cauchy’s residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals - Unit circle and semi-circular contours (excluding poles on real axis).
LAPLACE TRANSFORM  9 Hours

L: 45 + T: 15 = 60

REFERENCES


Course Outcomes

- Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure.
- Know the gradient, divergence and curl, related theorems useful for engineering applications.
- Test the analyticity and to construct the analytic function and transform complex functions from one plane to another plane graphically.
- Evaluate real and complex integrals over suitable closed paths or contours.
- Know the Applications of Laplace transform and its properties & to solve certain linear differential equations using Laplace transform technique.
OBJECTIVES
At the end of the course the students would be exposed to fundamental knowledge in

- Design of acoustically good buildings
- Properties and applications of conducting materials, Superconducting materials, magnetic and dielectric materials.
- Preparation, properties and applications of Metallic glasses, Shape memory alloys and Nano materials.
- Plasma, types and its applications

ACOUSTICS

CONDUCTING AND SUPERCONDUCTING MATERIALS

Superconducting Materials: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I & Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

SEMICONDUCTING & OPTICAL MATERIALS
Origin of band gap in solids (Qualitative treatment only) - carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semi conductors (derivation) – Variation of Fermi level with temperature and impurity concentration –

MAGNETIC & DIELECTRIC MATERIALS


**Dielectric Materials**: Electronic, ionic, orientation and space charge polarization - Frequency and temperature dependence of polarization – Dielectric loss – Dielectric breakdown – different types of break down mechanism - Ferro electric materials - properties and applications.

PLASMA AND NANOTECHNOLOGY

**Plasma Technology**: properties of plasma- types of plasma- thermal and non thermal plasma- Production of glow discharge plasma-Cold plasma- applications in textile and biomedical field.


TOTAL: 45 HOURS

REFERENCES

COURSE OUTCOMES
- Apply core concepts in Materials Science to solve engineering problems
- Describe the impact of acoustic engineering solutions in a constructional environmental, and societal context.
- Determine the position of the acceptor or donor levels and the band gap of an extrinsic semiconductor,
- Classify & differentiate the structure and physical properties of conducting materials
- Apply the concepts of nanomaterials and modern materials for explaining surface properties like adhesion etc. in engineering practice.
OBJECTIVES
To impart a sound knowledge on basics of
- Theoretical and modern technological aspects of modern polymeric materials
technology for micro electrical, electronics, instrumentation and communication
fields.

INTRODUCTION TO CONDUCTING POLYMERIC MATERIALS 9 Hours
Formation of polymers – Types of polymers - chain growth and step growth polymerization –
Mechanisms - copolymerization - Thermoplastics and thermosets - Micro structures in
polymers – polymer length - molecular weight - amorphous and crystalline - thermal
transitions in plastics.

APPLIED CONDUCTING POLYMERS 9 Hours
Synthesis, structure, morphology, conductivity, doping theory and uses of Poly(sulfur
nitride), polyacetylene, polyphenylene, poly(phenylene vinylenes), poly(phenylene sulfide),
Polypyrrole and Polythiophene, Polyaniline - Polymers with transition metals in the side-
group structure and their uses (includes Stacked Phthalocyanine polymers).

MANUFACTURING METHODS OF ORGANO ELECTRONICS MATERIALS 9 Hours
Organo-electronic materials – classification – Production of substrates for organic electronics
- Reel-to-reel Vacuum metallization - Organic vapor phase deposition – production of TFTs,
OLED, organic photovoltaics - Micro and nanofabrication techniques – Solution based
printing.

ORGANIC ELECTRONIC MATERIALS 9 Hours
Organic thin-film transistor (OTFT) – architecture, operating mode - fabrication techniques -
structure-property relationship - Methods of improving performance – structural perfection -
device architecture - Electrical and environmental stability – chemical effects on stability -
Gate dielectrics on electrical functionality.

ADVANCED MATERIALS FOR ORGANIC ELECTRONICS 9 Hours
Pentacene transistors – performance - Engineered pentacenes – Reversible functionalization
- end - substituted derivatives - perifunctionalized pentacenes – Heteropentacenes -
Semiconductors based on polythiophene and Indolo[3,2-b]carbazole –
polydialkyltheriophenones – polydialkylquaterthiophenones - polythiophene nanoparticles -
indocarbazole designs.

TOTAL: 45 HOURS
REFERENCES

COURSE OUTCOMES
- Analyse and determine the required conducting polymers in fabrication of organic electronic devices
- Describe the mechanism of formation of conducting polymeric materials
- Design an Organic Thin film transistor
- Outline the performance of Pentacene transistors
OBJECTIVES

- To understand the concept of electrical circuits, characteristics of circuit elements and power sources.
- To analyse A.C. circuits, the concept of active, reactive and apparent powers, power factor and resonance in series and parallel circuits.
- To solve electrical network problems using mesh and nodal analysis and by applying network theorems.
- To know the basic concepts of magnetic coupled circuits
- To know the fundamental relationships involved with three phase circuits and power measurement.

BASIC CIRCUIT CONCEPTS


AC CIRCUIT CONCEPTS


CIRCUIT ANALYSIS & NETWORK THEOREMS

Nodal analysis and Mesh analysis for D.C and A.C circuits, Superposition theorem, Thevenin’s theorem, Norton’s theorem, Reciprocity theorem, maximum power transfer theorem, Duality in networks-problems.

MAGNETIC COUPLED CIRCUITS


THREE PHASE CIRCUITS

Phase sequence-line and phase quantities-Three phase star and delta connections -analysis of three phase circuits with star and delta connected balanced and unbalanced loads-power measurement in three phase circuits using two wattmeter method-power factor of an unbalanced system.
REFERENCES

COURSE OUTCOMES
- Determine the current and voltage magnitudes by applying laws. Students can also reduce the complex circuits to simple forms using reduction techniques and source transformations. Students will be able to draw the phasor diagrams and can find the design parameters (Q factor and bandwidth) for series and parallel resonance circuits.
- Reduce the complex circuits to simple circuits and apply mesh and nodal analysis to compute the current and voltage magnitudes in different branches of the given circuit.
- Understand the concepts of magnetic circuits and can compute the effective inductance with respect to different parameters like number of turns, flux, area, direction of winding current and flux density. Students understand the 3 phase concepts and its types applicable for both balanced and unbalanced load.
OBJECTIVES

- To introduce principles of power generation utilizing various sources
- To introduce the basic concepts in various thermal applications like IC engines, gas, steam turbines and compressors.
- To gain knowledge regarding the fundamentals of fluid flow and their Applications.

POWER PLANT ENGINEERING

Introduction, Classification of Power Plants – Working principles of thermal (coal, gas and diesel), Hydro-electric and Nuclear Power plants – Merits and Demerits – Non-conventional power generation methods- Solar and wind power – Boilers - construction and working principles of Cochran, Babcock and Wilcox boilers

PRIME MOVERS

Steam turbines-Impulse (Delaval) and reaction turbines – Hydraulic prime movers- Pelton and Kaplan turbines- Internal combustion engines as automobile power plant – Working principles of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines.

REFRIGERATION AND AIR CONDITIONING

Positive displacement compressors – Reciprocating compressors- Rotary positive displacement compressors - Construction and working principles of centrifugal and axial flow compressors. Refrigeration –Vapour compression and vapour absorption refrigeration – Air conditioning- Terminology- Classification as to season of the year - window room air conditioning- thermoelectric cooling-applications.

FLUID PROPERTIES AND FLOW CHARACTERISTICS


FLUID FLOW APPLICATIONS


L: 45 Hr, T: 15 Hr, TOTAL: 60 HOURS
REFERENCES

COURSE OUTCOMES
- Demonstrate understanding of basic concepts of thermodynamics, power plants and prime movers.
- Understand the working of air conditioning systems.
- Solve problems in fluid properties and flow dynamics.
OBJECTIVES

- The experiments are designed to illustrate phenomena in different areas of Physics and to expose you to measuring instruments.
- The laboratory provides a unique opportunity to validate physical theories in a quantitative manner.
- Laboratory experience demonstrates the limitations in the application of physical theories to real physical situations.
- In general, the purpose of these laboratory exercises is both to demonstrate some physical principle and to teach techniques of careful measurement.

LIST OF EXPERIMENTS

Any Ten Experiments
1. Lee’s disc - determination of thermal conductivity of a bad conductor
2. Air wedge - determination of thickness of a given specimen.
3. Spectrometer - determination of wavelength of mercury source using grating
4. Compound pendulum - determination of acceleration due to gravity.
5. Carey foster bridge – determination of specific resistance of a given coil of wire.
7. Non-uniform bending – determination of Young’s modulus
8. Ultrasonic interferometer – determination of velocity of sound and compressibility of liquid.
9. Band gap determination of a semiconductor using post office box
10. Semiconductor laser:
    a. Determination of wavelength of laser using grating
    b. Particle size determination
    c. Acceptance angle of optical fibre
11. Torsional pendulum - determination of Rigidity modulus of the wire
12. Field along the axis of a coil – Determination of magnetic moment.

Demonstration experiments:
1. Determination of solar cell parameters
2. Hall effect
3. Four probe apparatus
4. Animations – (Laser, Fiber optics and hysteresis curve)

TOTAL: 45 HOURS

COURSE OUTCOMES

- Determine different physical properties of a material like the thermal conductivity thickness of the material, etc.
- Perform experiments involving the physical phenomena like interference and diffraction. Apply physical theories in real life situations by also taking into account its limitations.
OBJECTIVES

- Expected to gain knowledge regarding the working of IC engines and air compressors.
- Expected to gain knowledge regarding the fundamentals of fluid flow and their applications to flow through pipes and hydraulic machines.

LIST OF EXPERIMENTS

THERMODYNAMICS LAB
1. Study of a Petrol Engine
2. Study of a Diesel Engine
3. Study of a IC Engine
4. Performance evaluation of four stroke diesel engine using rope brake dynamometer
5. Test on reciprocating air compressor

FLUID MECHANICS LABORATORY
1. Flow measurements using venturi meter
2. Test to estimate frictional losses in pipe flow.
3. Test on positive displacement pump for obtaining its characteristics curves and design flow parameters.
4. Test on centrifugal pump for obtaining its characteristics curves and design flow parameters.
5. Test on jet pump for obtaining its characteristics curves and design flow parameters.
6. Test on reaction turbine for obtaining the characteristics curve and to design values of specific speed, discharge, output and efficiency.
7. Test on impulse turbine to obtain its characteristics curves and hydraulic design values.

TOTAL: 45 HOURS

COURSE OUTCOMES

- Conduct tests on engine performance.
- Study petrol and diesel engine working principles.
- Examine the pump characteristics and conduct test on turbines.
OBJECTIVES
- To impart hands on experience in verification of circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics and simulation of time response.

LIST OF EXPERIMENTS

2. Verifications of Superposition theorem.
3. Verifications of Thevenin’s theorem.
4. Verifications of Norton’s theorem.
5. Verifications of Reciprocity theorem.
6. Verifications of Maximum power transfer theorem.
7. Verifications of Mesh analysis.
8. Verifications of Nodal analysis.
10. Frequency response RL & RC Circuits

TOTAL: 45 HOURS

COURSE OUTCOMES
- Reduce the given complex circuit to simple circuit by applying theorems and can verify the theoretical and practical outputs
- Find the impedance value of the given circuit at which the maximum power is transferred and also confirms with the practical results
- Find the magnitudes of voltages and currents in the given circuit and verifies experimentally using mesh and nodal analysis
- Demonstrate frequency response, Phasor relationships for the given RL, RC circuits and verify experimentally.
- Design a circuit to accept or reject a particular frequency using resonance principle.
OBJECTIVES

- To inculcate the basic need for family life and need to maintain peace in it.
- To lead spiritual development through good family life.
- To know the 5C’s & 5E’s.
- To know the examples for Self Control.
- To practice meditation & Pranayamam.

PEACE IN FAMILY 4 Hours


Greatness of womanhood: Good culture – Cultured behavioral patterns – Love and Compassion.

BLESSING – EFFECTS IN FAMILY 2 Hours

Introduction - Benefits – Mental Frequency level - Effect of vibrations – Make blessings a daily habit.

Training: Method of blessings.

FOOD IS MEDICINE 2 Hours

Food is medicine - Healthy food habits- Method of Medicinal food preparations – Food based on character.

PERSONALITY DEVELOPMENT CONCEPTS - 5C’S & 5E’S 4 Hours

Personality Concepts: Definition - Types of Personality- Personality development activities- Factors affecting personality development - Tools to improve personality- Steps to a dynamic personality-5 C’s and 5 E’s.

Time Management: Importance –Training.

LEADERSHIP TRAITS & SELF DEVELOPMENT 4 Hours

Leadership Traits – Carrying oneself - Factors of leadership – Principles of leadership.


Training: Method of Self-Control.

SPIRITUAL DEVELOPMENT THROUGH KAYA KALPA YOGA 4 Hours

Spiritual development: Need – Development through Kaya Kalpa - Responsibility of men and women – Need of morality.

Kaya Kalpa yoga: Aim - kayakalpa philosophy - Importance of kayakalpa training.

Training: Kaya Kalpa Yoga.
REFERENCES BOOKS:

1. Dr. A. Chandra Mohan, “Leadership and Management”, Himalaya Publication House,

COURSE OUTCOMES:

- Behaves as a responsible family member.
- Develop skills for personality improvement.
- Acquire practical knowledge on self-control technique for teenagers.
- Identify the significant of Genetic Centre for the Soul functional base operation.
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**TOTAL – 32 HOURS**

**TOTAL CREDITS – 24**
OBJECTIVES
- To develop reading accuracy and English fluency
- To Employ appropriate formats in writing and effective
- To compare and relate words/sounds and listen for specific information.
- To maximize the elements of spoken ability

INTERPRETATIONAL DEXTERITY 15 Hours
Homophones and homonyms - Encoding and decoding advertisements - Transcoding
Graphical Representations – Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree
diagram - Reading brochures, leaflets, instruction manual - Cloze test - Reading
Comprehension- Note Making – Linear and non-linear - Book review, Article review

STYLES OF SCRIPTING 15 Hours
Types of sentences - Concord - Framing Questions – “Wh” questions, Yes/No questions and
Question Tags- Modifiers – Dangling, Misplaced, Squinting- Phrasal Expressions- Editing a
passage – Punctuation, Spelling, and Common errors - Paragraph Writing – Narrative,
Descriptive, Argumentative, Comparative / Contrastive. - Letter Writing – requesting
information, explaining a situation, letter of acceptance, declining letter, letter of application
and resume - Essay Writing

AUDITORY PROFICIENCY 15 Hours
Listening to monologues, Listening for general content - Listening to dialogues - Listening to
a telephonic conversation - Listening for specific information, numbers, time, duration -
Listening to conversations between three or more people- Listening to a group discussion and
providing factual information, Intensive listening

ORATORICAL EFFICIENCY 15 Hours
Discussing studies/interests/friends/families-Describe an object or event - Describing a
working mechanism - Justify an opinion / Negotiating views - Argumentative speech about a
public issue - Responding to situations and providing solutions - Picture Perception

L: 30 Hr, P: 30 Hr, TOTAL: 60 HOURS

REFERENCES
1. Mark Ibbotson, Cambridge English for Engineering Published by Cambridge University
3. Jeremy Comfort, Pamela Rogerson, Trish Stott and Derek Utley, Speaking Effectively,
   Cambridge University Press, 1994
5. Dorothy Adams, Everyday English: A Course on Communicative English, Cengage
   learning, 2009
COURSE OUTCOMES

- Distinguish the application of technical diction for the data interpretation while reading
- Construct technical sentences and compose corporate letters
- Improve listening for inferring technical information
- Develop spoken communication needed for presentations and discussions
OBJECTIVES
On completion of the course, the students are expected

- To understand double and triple integrations and enable them to find area and volume using multiple integrals.
- To know the basics of vector calculus comprising gradient, divergence and curl and line, surface and volume integrals.
- To understand analytic functions of complex variables and conformal mappings.
- To know the basics of residues, complex integration and contour integration.
- To understand Laplace transform and use it to represent system dynamic models and evaluate their time responses.

MULTIPLE INTEGRALS  9 Hours
Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between cartesian and polar coordinates - Triple integration in cartesian coordinates – Application : Area as double integral – Volume as triple integral .

VECTOR CALCULUS  9 Hours
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields - Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

ANALYTIC FUNCTION  9 Hours
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy-Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping : \( w = z + c , cz , 1/z \) and bilinear transformation.

COMPLEX INTEGRATION  9 Hours
Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Residues – Cauchy’s residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals - Unit circle and semi-circular contours (excluding poles on real axis).
LAPLACE TRANSFORM  
9 Hours


L: 45 + T: 15 = 60

REFERENCES


Course Outcomes

After pursuing the above mentioned course, the students will be able to:

- Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure.
- Know the gradient, divergence and curl, related theorems useful for engineering applications.
- Test the analyticity and to construct the analytic function and transform complex functions from one plane to another plane graphically.
- Evaluate real and complex integrals over suitable closed paths or contours.
- Know the Applications of Laplace transform and its properties & to solve certain linear differential equations using Laplace transform technique.
OBJECTIVES
At end of the course students would be exposed to

- Conducting, super conducting, magnetic and dielectric materials in electrical devices.
- Semi conducting, optical and new engineering materials in switching and display devices, data storage.

CONDUCTING AND SUPERCONDUCTING MATERIALS 9 Hours

Superconducters: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I &Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

SEMICONDUCTING MATERIALS 9 Hours
Origin of band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semi conductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC & DIELECTRIC MATERIALS 9 Hours


NEW ENGINEERING MATERIALS AND NANOTECHNOLOGY 9 Hours
New Engineering Materials: Metallic glasses – preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications - advantages and disadvantages of SMA.

Nano Materials: synthesis - plasma arcing – Chemical vapour deposition – sol-gel - Electro deposition – ball milling – properties of nanoparticles and applications. – Carbon nano tubes –
fabrication - arc method – pulsed laser deposition - Chemical vapour deposition - structure, properties & applications.

**OPTICAL MATERIALS**

9 Hours

**TOTAL: 45 HOURS**

**REFERENCES**


**COURSE OUTCOMES**

- Apply core concepts in Materials Science to solve engineering problems
- Determine the position of the acceptor or donor levels and the band gap of an extrinsic semiconductor,
- Classify & differentiate the structure and physical properties of conducting materials
- Apply the techniques to manufacturing of modern materials for engineering practice.
- Recognize the various nanomaterials for engineering and technological applications
OBJECTIVES
To impart a sound knowledge on basics of
- Theoretical and modern technological aspects of modern polymeric materials technology for micro electrical, electronics, instrumentation and communication fields.

INTRODUCTION TO CONDUCTING POLYMERIC MATERIALS 9 Hours

APPLIED CONDUCTING POLYMERS 9 Hours
Synthesis, structure, morphology, conductivity, doping theory and uses of Poly(sulfur nitride), polyacetylene, polyphenylene, poly(phenylene vinylenes), poly(phenylene sulfide), Polypyrrole and Polythiophene, Polyaniline - Polymers with transition metals in the side-group structure and their uses (includes Stacked Pthalocyanine polymers).

MANUFACTURING METHODS OF ORGANO ELECTRONICS MATERIALS 9 Hours

ORGANIC ELECTRONIC MATERIALS 9 Hours
Organic thin-film transistor (OTFT) – architecture, operating mode - fabrication techniques - structure-property relationship - Methods of improving performance – structural perfection - device architecture - Electrical and environmental stability – chemical effects on stability - Gate dielectrics on electrical functionality.

ADVANCED MATERIALS FOR ORGANIC ELECTRONICS 9 Hours

TOTAL: 45 HOURS
REFERENCES

COURSE OUTCOMES
- Analyse and determine the required conducting polymers in fabrication of organic electronic devices
- Describe the mechanism of formation of conducting polymeric materials
- Design an Organic Thin film transistor
- Outline the performance of Pentacene transistors
OBJECTIVES

- Recognize and apply basic electrical units and terminology
- Identify the circuit elements and their corresponding schematic symbols - voltage and current sources (ac and dc), resistors, transformers, capacitors, inductors
- State and apply the laws, rules and theorems to analyze electrical circuit
- Analyze steady state and transient response of source free / driven RL and RC circuits.
- Design and analyze series and parallel Resonance circuits.

DC CIRCUITS ANALYSIS  
9 Hours

NETWORK THEOREMS  
9 Hours
Superposition Theorem, Thevenin’s Theorem and Norton’s Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Verification of Theorems, Introduction to PSPICE.

SINUSOIDAL STEADY STATE ANALYSIS 
9 Hours

FIRST ORDER AND SECOND ORDER CIRCUITS  
9 Hours
Basic RL and RC Circuits: The Source-Free RL Circuit, the Source-Free RC Circuit, The Unit-Step Function, Driven RL Circuits, Driven RC Circuits- Source free series and parallel RLC circuits

RESONANCE AND COUPLED CIRCUITS 
9 Hours
Frequency Response of Parallel and Series Resonance circuits-determination of Resonant Frequency, Q – Factor and Bandwidth.
Magnetically Coupled Circuits - Self Inductance, Mutual Inductance, Coefficient of Coupling, Energy in a coupled circuit, Linear Transformer, Ideal Transformer, Duality.

L:45 Hr, T:15 Hr  TOTAL: 60 HOURS
REFERENCES

COURSE OUTCOMES
➤ Able to model passive elements & sources
➤ Apply circuit theory concepts to compute voltage, current & resistance in DC&AC circuits.
➤ Use SPICE as a simulation tool to analyze electric circuits.
➤ Estimate the transient response of simple RL, RC & RLC circuits.
➤ Predict the frequency response of resonance circuits.
OBJECTIVES
- To describe how current flows through PN junction & relating this phenomena to the characteristics & operation of the diodes, bipolar, FET transistors.
- To expose students to the functions and application of diodes, BJT &FET in electronic circuits.

SEMICONDUCTOR DIODE
9 Hours

BI-POLAR TRANSISTOR
9 Hours

FIELD EFFECT TRANSISTORS
9 Hours

OPTO ELECTRONIC DEVICES
9 Hours
Photo emissivity and photo electric theory – Theory, construction and characteristics: light emitting diodes, liquid crystal cell, seven segment display, photo conductive cell, photodiode, solar cell, photo transistor, opto couplers and laser diode.

OTHER DEVICES
9 Hours
Theory, characteristics and application: SCR, TRIAC, PUT, tunnel diode, thermistors, piezo electric devices, zener diode, charge coupled devices, varactor diode and LDR.

REFERENCES

TOTAL: 45 HOURS
COURSE OUTCOMES

➢ Describe the working principle and characteristics of various electronic devices like FET, BJT, PN Junction Diode and other Electronics devices.
OBJECTIVES

- The experiments are designed to illustrate phenomena in different areas of Physics and to expose you to measuring instruments.
- The laboratory provides a unique opportunity to validate physical theories in a quantitative manner.
- Laboratory experience demonstrates the limitations in the application of physical theories to real physical situations.
- In general, the purpose of these laboratory exercises is both to demonstrate some physical principle and to teach techniques of careful measurement.

LIST OF EXPERIMENTS

Any Ten Experiments

1. Lee’s disc - determination of thermal conductivity of a bad conductor
2. Air wedge - determination of thickness of a given specimen.
3. Spectrometer - determination of wavelength of mercury source using grating
4. Compound pendulum - determination of acceleration due to gravity.
5. Carey Foster bridge – determination of specific resistance of a given coil of wire.
7. Non-uniform bending – determination of Young’s modulus
8. Ultrasonic interferometer – determination of velocity of sound and compressibility of liquid.
9. Band gap determination of a semiconductor using post office box
10. Semiconductor laser:
    a. Determination of wavelength of laser using grating
    b. Particle size determination
    c. Acceptance angle of optical fibre
11. Torsional pendulum - determination of Rigidity modulus of the wire
12. Field along the axis of a coil – Determination of magnetic moment.

Demonstration experiments:

1. Determination of solar cell parameters
2. Hall effect
3. Four probe apparatus
4. Animations – (Laser, Fiber optics and hysteresis curve)

TOTAL: 45 HOURS

COURSE OUTCOMES

- Determine different physical properties of a material like the thermal conductivity, thickness of the material, etc.
- Perform experiments involving the physical phenomena like interference and diffraction. Apply physical theories in real life situations by also taking into account its limitations.
OBJECTIVES

- To analyze webpage and identify its elements and attributes
- Learn the basic language of the web: HTML.
- Be able to embed social media content into web pages.
- Implement and understand how to get used with MATLAB

List of Experiments

1. Study of HTML tags
2. Design a web page using basic html tags
3. Design a webpage using table tags
4. Design a webpage using forms and frames
5. Design a webpage using list tags
6. Develop a website of your interest(include a minimum of 3 web pages)
7. Study of MATLAB functions
8. Working with matrix operations
9. Working with image arithmetic
   a. Addition of two images
   b. Subtraction of two images
10. Write a Matlab program for the following
    a. Read an image and crop
    b. Read an image and resize
11. Working with Integration and Differentiation
12. Working with graphs

COURSE OUTCOMES

On successful completion of this course the student should be able to

1. Develop static web pages using HTML. [S]
2. Perform basic MATLAB operations. [S]
3. Make use of MATLAB to work with images and graphs. [S]
4. Perform integration and differentiation using MATLAB. [S]
5. Develop team spirit and professional attitude towards the development of simple web applications [A]
OBJECTIVES

- To experimentally verify the characteristics of P-N diode, BJT, FET, UJT, TRIAC SCR.
- To verify the various theorems like super position, Thevenin, Norton and Maximum power transfer theorem.

LIST OF EXPERIMENTS

2. Characteristics of transistor under CE configuration and Determination of h parameters
3. Characteristics of transistor under CB configuration and Determination of h parameters
4. Characteristics of JFET.
5. Characteristics of UJT.
6. Verification of ohms law, Kirchhoff’s voltage and current laws.
7. Verification of Thevenin’s and Norton’s Theorems.
8. Verification of Superposition and maximum power transfer theorem.
9. Characteristics of SCR.
10. Characteristics of Triac.
11. Characteristics of MOSFET

TOTAL: 45 HOURS

COURSE OUTCOMES

- Demonstrate the working of various electronic devices.
- Compute and experimentally verify thevenin’s, Norton, Superposition, Maximum power transfer theorems.
OBJECTIVES
- To inculcate the basic need for family life and need to maintain peace in it.
- To lead spiritual development through good family life.
- To know the 5C’s & 5E’s.
- To know the examples for Self Control.
- To practice meditation & Pranayamam.

PEACE IN FAMILY 4 Hours

Greatness of womanhood: Good culture – Cultured behavioral patterns – Love and Compassion.

BLESSING – EFFECTS IN FAMILY 2 Hours
Introduction - Benefits – Mental Frequency level - Effect of vibrations – Make blessings a daily habit.
Training: Method of blessings.

FOOD IS MEDICINE 2 Hours
Food is medicine - Healthy food habits- Method of Medicinal food preparations – Food based on character.

PERSONALITY DEVELOPMENT CONCEPTS - 5C’S & 5E’S 4 Hours
Personality Concepts: Definition - Types of Personality- Personality development activities- Factors affecting personality development - Tools to improve personality- Steps to a dynamic personality-5 C’s and 5 E’s.
Time Management: Importance –Training.

LEADERSHIP TRAITS & SELF DEVELOPMENT 4 Hours
Leadership Traits – Carrying oneself - Factors of leadership – Principles of leadership.

Training: Method of Self-Control.

SPIRITUAL DEVELOPMENT THROUGH KAYA KALPA YOGA 4 Hours
Spiritual development: Need – Development through Kaya Kalpa - Responsibility of men and women – Need of morality.
Kaya Kalpa yoga: Aim - kayakalpa philosophy - Importance of kayakalpa training.
**Training:** Kaya Kalpa Yoga.

**EXERCISE & MEDITATION**
Simplified Physical Exercise & Meditation Practice.

L: 16 Hr, P: 14, Total: 30 Hours

**REFERENCES BOOKS:**
1. Dr. A. Chandra Mohan, “Leadership and Management”, Himalaya Publication House,

**COURSE OUTCOMES:**
- Behaves as a responsible family member.
- Develop skills for personality improvement.
- Acquire practical knowledge on self-control technique for teenagers.
- Identify the significant of Genetic Centre for the Soul functional base operation.
### B.Tech - Textile Technology (Fashion Technology)

#### Semester – II

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**PRACTICAL**

**TOTAL – 31 HOURS**

**TOTAL CREDIT – 23**
OBJECTIVES

- To develop reading accuracy and English fluency
- To Employ appropriate formats in writing and effective
- To compare and relate words/sounds and listen for specific information.
- To maximize the elements of spoken ability

INTERPRETATIONAL DEXTERITY 15 Hours
Homophones and homonyms - Encoding and decoding advertisements - Transcoding Graphical Representations – Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree diagram - Reading brochures, leaflets, instruction manual - Cloze test - Reading Comprehension- Note Making – Linear and non-linear - Book review, Article review

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Types of sentences - Concord - Framing Questions – “Wh” questions, Yes/No questions and Question Tags- Modifiers – Dangling, Misplaced, Squinting- Phrasal Expressions- Editing a passage – Punctuation, Spelling, and Common errors - Paragraph Writing – Narrative, Descriptive, Argumentative, Comparative / Contrastive. - Letter Writing – requesting information, explaining a situation, letter of acceptance, declining letter, letter of application and resume - Essay Writing

AUDITORY PROFICIENCY 15 Hours
Listening to monologues, Listening for general content - Listening to dialogues - Listening to a telephonic conversation - Listening for specific information, numbers, time, duration - Listening to conversations between three or more people- Listening to a group discussion and providing factual information, Intensive listening

ORATORICAL EFFICIENCY 15 Hours
Discussing studies/interests/friends/families-Describe an object or event - Describing a working mechanism - Justify an opinion / Negotiating views - Argumentative speech about a public issue - Responding to situations and providing solutions - Picture Perception

L: 30 Hr, P: 30 Hr, TOTAL: 60 HOURS
REFERENCES

COURSE OUTCOMES
- Distinguish the application of technical diction for the data interpretation while reading
- Construct technical sentences and compose corporate letters
- Improve listening for inferring technical information
- Develop spoken communication needed for presentations and discussions
OBJECTIVES
On completion of the course, the students are expected
- To understand double and triple integrations and enable them to find area and volume using multiple integrals.
- To know the basics of vector calculus comprising gradient, divergence and curl and line, surface and volume integrals.
- To understand analytic functions of complex variables and conformal mappings.
- To know the basics of residues, complex integration and contour integration.
- To understand Laplace transform and use it to represent system dynamic models and evaluate their time responses.

MULTIPLE INTEGRALS
9 Hours
Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between cartesian and polar coordinates - Triple integration in cartesian coordinates – Application: Area as double integral – Volume as triple integral.

VECTOR CALCULUS
9 Hours
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

ANALYTIC FUNCTION
9 Hours
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy- Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping: \( w = z + c \), \( cz \), \( 1/z \) and bilinear transformation.

COMPLEX INTEGRATION
9 Hours
Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Residues – Cauchy’s residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals - Unit circle and semi-circular contours (excluding poles on real axis).
**LAPLACE TRANSFORM**

9 Hours


\[ L: 45 + T: 15 = 60 \]

**REFERENCES**


**Course Outcomes**

*After pursuing the above mentioned course, the students will be able to:*

- Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure.
- Know the gradient, divergence and curl, related theorems useful for engineering applications.
- Test the analyticity and to construct the analytic function and transform complex functions from one plane to another plane graphically.
- Evaluate real and complex integrals over suitable closed paths or contours.
- Know the Applications of Laplace transform and its properties & to solve certain linear differential equations using Laplace transform technique.
OBJECTIVES
At the end of the course the students would be exposed to

- Properties of conducting, superconducting, magnetic and dielectric materials.
- Properties of semi-conducting, optical and new engineering materials.
- Application of ultrasonic and nuclear physics in medicine.

CONDUCTING AND SUPERCONDUCTING MATERIALS 9 Hours

Superconducting Materials: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I & Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

SEMICONDUCTING MATERIALS 9 Hours
Origin of band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semi conductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC & DIELECTRIC MATERIALS 9 Hours

NEW ENGINEERING MATERIALS
9 Hours
Metallic glasses – preparation, properties and applications – shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications advantages and disadvantages of SMA. Ceramics-Classification of ceramics- Fabrication, Properties and application. Biomaterials-Biomechanisms - Classification of Biomaterials-Processing, Properties and applications.

NANO SCIENCE AND PLASMA TECHNOLOGY
9 Hours

Plasma Technology: properties of plasma- types of plasma- thermal and non thermal plasma- Production of glow discharge plasma-Cold plasma- applications in textile and biomedical field.

TOTAL: 45 HOURS

REFERENCES
3. Avadhanalu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S. Chand & Company Ltd., New Delhi, 2005

COURSE OUTCOMES
- Apply core concepts in Materials Science to solve engineering problems
- Illustrate the electrical / thermal conductivity of semiconductors and determine the position of the acceptor or donor levels and the band gap of an extrinsic semiconductor,
- Classify & differentiate the structure and physical properties of conducting materials
- Apply the concepts of nanomaterials and modern materials for explaining surface properties like adhesion etc. in engineering practice.
- Identify methods for etching of fabrics
OBJECTIVES

- To correlate theoretical principles with application oriented studies
- To embark on the usage of theoretical and modern technological aspects in polymers and dyes to exhibit engineering and technical concepts as required for Textile and Fashion Technology students.

WATER TECHNOLOGY  9 Hours

POLYMERS  9 Hours
Introduction – Degree of polymerization – functionality – tacticity - classification based on source, application, thermal properties (thermosetting and thermoplastics) - effect of polymer structure on properties – types of polymerization (addition, condensation, co-polymerization, Ring polymerisation) - mechanism of polymerization (free radical mechanism)

Preparation (mechanism not required) and applications of polythene, polypropylene, polystyrene, polyamides (nylon 6,6), polyesters (PET)

CHEMICAL BONDING  9 Hours
Ionic, covalent and co-ordinate covalent bonds (overview only) -- hydrogen bonding and its consequences - van der Waal’s forces (dipole – dipole, dipole – induced dipole, induced dipole – induced dipole interactions) - Interaction of enzymes with fibres (basic concepts only). Interaction between fibres and dyes (basic concepts only) - Dyes substrate affinity (dyes for cellulose fibres, silk)

DYES  9 Hours
Introduction - Classification system of dyes - Chromophore and auxochromes – Important chemical chromophores of dyes classes (azo, anthraquinone, phthalocyanin, Indigoid, polymethine, phthalocyanine, metal complex, Fluorescent) - synthesis of azo dye (Congo red), triaryl methane dye (Malachite green), Anthraquinone dye (Alizarin - 1,2 dihydroxy anthraquinone), Indigoid dye (Indigo), phthalein dyes (Eosin)
ANTHOLOGY OF SPECIALITY CHEMICALS IN TEXTILES         9 Hours
An introduction on chemistry of the following in textiles: Dispersing agents, levelling agents, Retarding agents, Dye fixing agents.
Thermal analysis (DSC): Principle, Instrumentation and application in Textiles

TOTAL: 45 HOURS

REFERENCES
7. Amarika Singh, Vairam S. and Suba Ramesh., Chemistry for engineers., Wiley India Ltd., New Delhi

COURSE OUTCOMES
➢ Design a water purifier
➢ Discuss the mechanism of polymer formation
➢ Classify dyes and describe its interaction with fibers using bonding.
➢ Analyse the usage of specialty chemicals in dyes
OBJECTIVES
- To acquire knowledge on properties of textile fibres and their manufacturing methods
- To impart knowledge on the conventional and modern yarn manufacturing process

TEXTILE FIBRES 9 Hours
Introduction: Definition of staple fibre, filament, bicomponent fibres. Classification of natural and man-made fibres, essential and desirable properties of fibres.
**Production and cultivation of Natural Fibers:** Cultivation of cotton, production of silk (sericulture), wool and jute – physical and chemical structure of these fibres.
**Production sequence of modified cellulosic fibres:** Viscose Rayon, Acetate Rayon, high wet modulus and high tenacity fibres. Physical and chemical properties of the above fibres.

PRODUCTION SEQUENCE AND PHYSICAL AND CHEMICAL PROPERTIES OF SYNTHETIC FIBERS 9 Hours
Polyester, Nylon and Acrylic. Introduction to spin finishes and texturisation.
**Speciality fibres:** High temperature and flame retardant fibres, elastomeric fibres, Polylactic Acid (PLA) fibre, nano-fibres, metallic fibres-Gold and Silver coated, super-absorbent fibres for medical and hygiene applications.

SHORT STAPLE SPINNING SYSTEM (COTTON) 9 Hours
Sequence of process in cotton spinning - Ginning-objectives, types, suitability and principle of working; objectives and principles of working of Blow room, Carding, Drawing, Combing, Simplex and spinning machines - Ring spinning and Ringless-Rotor spinning, Air jet spinning and DREF spinning machines.

LONG STAPLE SPINNING SYSTEM 9 Hours
Sequence of process in woolen and worsted spinning; objectives and principles of Scouring, Drying, Oiling, Dyeing, Blending, Carding, Gilling and Combing, Roving and Spinning – Siro, Solo and Compact spinning systems.

POST SPINNING 9 Hours
Objectives and principles of working of Reeling, Assembly winder, Ring doubler and Two for one twister (TFO); Single yarn and ply yarn characteristics and their applications. Sewing threads. Package faults (Cones, Cheese and Hanks) and identification.
REFERENCES

COURSE OUTCOMES
➢ Acquire knowledge on the basic forms of textiles namely fibres, their classification and properties, and on the cultivation/production of natural fibres as well as modified fibres from natural raw materials.
➢ Outline the production of synthetic fibres, and acquire knowledge on their physical and chemical properties as well as their applications.
➢ Outline sequentially the processes involved in spinning cotton and worsted yarns, and describe the working of various machines used, from fibre preparation to yarn spinning
OBJECTIVES
- Acquire knowledge in weaving preparatory process
- Develop skills in basic principles of working of shuttle and shuttleless loom mechanisms
- Understand the process of weaving and controlling quality

YARN PREPARATION FOR WEAVING 9 Hours
Process Flow – objectives of winding; principles of cheese and cone winding Machines; concepts in yarn clearing – mechanical, optical and electronic clearers; knotters and splicers; Yarn quality requirements for weaving.

BEAM PREPARATION FOR WEAVING 9 Hours
Objectives of warping, material flow in beam warping and creels used in warping machines; sectional warping machines.
Objectives of sizing; sizing materials and recipes used for different types of fibers; sizing machines; control systems used in sizing machine; sizing filament yarns; concept of single end sizing

SHUTTLE WEAVING 9 Hours
Objectives and working principles – primary, secondary and auxiliary motions; Types of looms – Handloom, Non-automatic, Semi-automatic and Automatic looms; Drop box looms; Terry loom, mechanisms of Tappet, Dobby and Jacquard weaving.

SHUTTLELESS WEAVING 9 Hours
Basic principles of various shuttleless weaving machines – Projectile, Rapier, Air-jet, Water-jet, Multi-phase; productivity and techno-economics of these machines.

PROCESS CONTROL IN WEAVING 9 Hours
Process and quality control measures in pirn winding, cone winding, beam warping, sectional warping, sizing, and weaving. Computerised fabric inspection, Loom data system.

TOTAL: 45 HOURS
REFERENCES

COURSE OUTCOMES
➢ Outline the objectives and working principles of various weaving preparatory processes.
➢ Describe the working principle of automatic and non automatic looms used for fabric manufacture.
➢ Acquire knowledge on the process and quality control in the preparatory processes as well as in weaving.
OBJECTIVES

- The experiments are designed to illustrate phenomena in different areas of Physics and to expose you to measuring instruments.
- The laboratory provides a unique opportunity to validate physical theories in a quantitative manner.
- Laboratory experience demonstrates the limitations in the application of physical theories to real physical situations.
- In general, the purpose of these laboratory exercises is both to demonstrate some physical principle and to teach techniques of careful measurement.

LIST OF EXPERIMENTS

Any Ten Experiments
1. Lee’s disc - determination of thermal conductivity of a bad conductor
2. Air wedge - determination of thickness of a given specimen.
4. Compound pendulum - determination of acceleration due to gravity.
5. Carey foster bridge – determination of specific resistance of given coil of wire.
8. Ultrasonic interferometer – determination of velocity of sound and compressibility of liquid.
10. Semiconductor laser:
    b. Particle size determination.
    c. Acceptance angle of optical fibre.
11. Torsional pendulum - determination of Rigidity modulus of the wire.
12. Field along the axis of a coil – Determination of magnetic moment.

Demonstration experiments:
1. Determination of solar cell parameters.
2. Hall effect.
3. Four probe apparatus.

TOTAL: 45 HOURS

COURSE OUTCOMES

- Determine different physical properties of a material like the thermal conductivity thickness of the material, etc.
- Perform experiments involving the physical phenomena like interference and diffraction.
- Apply physical theories in real life situations by also taking into account its limitations.
LIST OF EXPERIMENTS

1. Study of longitudinal and cross sectional view of natural and synthetic fibres
2. Identification of fibres through flammability test.
3. Identification of fibres through solubility test.
4. Determination of moisture regain of fibres
5. Determination of blend proportions of blends
6. Study of blow room
7. Study of carding
8. Study of Draw frame
9. Study of comber and simplex
10. Study of ring frame and Open end spinning.
11. Study of non automatic and automatic looms
12. Study of knitting machines

TOTAL: 45 HOURS

COURSE OUTCOMES

- Ability to identify the given fibre by choosing proper scientific method
- Knowledge of production process methods of yarn and woven and knit fabric
- Acquire Skill to determine the blend proportion
OBJECTIVES

- To analyze webpage and identify its elements and attributes
- Learn the basic language of the web: HTML.
- Be able to embed social media content into web pages.
- Implement and understand how to get used with MATLAB

List of Experiments

1. Study of HTML tags
2. Design a web page using basic html tags
3. Design a webpage using table tags
4. Design a webpage using forms and frames
5. Design a webpage using list tags
6. Develop a website of your interest (include a minimum of 3 web pages)
7. Study of MATLAB functions
8. Working with matrix operations
9. Working with image arithmetic
   a. Addition of two images
   b. Subtraction of two images
10. Write a Matlab program for the following
    a. Read an image and crop
    b. Read an image and resize
11. Working with Integration and Differentiation
12. Working with graphs

COURSE OUTCOMES

On successful completion of this course the student should be able to

1. Develop static web pages using HTML. [S]
2. Perform basic MATLAB operations. [S]
3. Make use of MATLAB to work with images and graphs. [S]
4. Perform integration and differentiation using MATLAB. [S]
5. Develop team spirit and professional attitude towards the development of simple web applications [A]
OBJECTIVES

- To inculcate the basic need for family life and need to maintain peace in it.
- To lead spiritual development through good family life.
- To know the 5C’s & 5E’s.
- To know the examples for Self Control.
- To practice meditation & Pranayamam.

PEACE IN FAMILY


**Greatness of womanhood:** Good culture – Cultured behavioral patterns – Love and Compassion.

BLESSING – EFFECTS IN FAMILY

Introduction - Benefits – Mental Frequency level - Effect of vibrations – Make blessings a daily habit.

**Training:** Method of blessings.

FOOD IS MEDICINE

Food is medicine - Healthy food habits- Method of Medicinal food preparations – Food based on character.

PERSONALITY DEVELOPMENT CONCEPTS - 5C’S & 5E’S

**Personality Concepts:** Definition - Types of Personality- Personality development activities- Factors affecting personality development - Tools to improve personality- Steps to a dynamic personality-5 C’s and 5 E’s.

**Time Management:** Importance – Training.

LEADERSHIP TRAITS & SELF DEVELOPMENT

**Leadership Traits** – Carrying oneself - Factors of leadership – Principles of leadership.

**Self Development:** Importance – Techniques to development oneself– How to develop oneself?–Ten Commandments of self-development– Self-control technique for teenagers.

**Training:** Method of Self-Control.
SPIRITUAL DEVELOPMENT THROUGH KAYA KALPA YOGA 4 Hours

Spiritual development: Need – Development through Kaya Kalpa - Responsibility of men and women – Need of morality.
KayaKalpa yoga: Aim - kayakalpa philosophy - Importance of kayakalpa training.

Training: Kaya Kalpa Yoga.

EXERCISE & MEDITATION 10 Hours
Simplified Physical Exercise & Meditation Practice.

L: 16 Hr, P: 14, Total: 30 Hours

REFERENCES BOOKS:
1. Dr. A. Chandra Mohan, “Leadership and Management”, Himalaya Publication House,

COURSE OUTCOMES:
- Behaves as a responsible family member.
- Develop skills for personality improvement.
- Acquire practical knowledge on self-control technique for teenagers.
- Identify the significant of Genetic Centre for the Soul functional base operation.
# B.Tech - INFORMATION TECHNOLOGY

## SEMESTER – II

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**TOTAL – 32 HOURS**

**TOTAL CREDIT – 24**
OBJECTIVES
- To develop reading accuracy and English fluency
- To Employ appropriate formats in writing and effective
- To compare and relate words/sounds and listen for specific information.
- To maximize the elements of spoken ability

INTERPRETATIONAL DEXTERITY 15 Hours
Homophones and homonyms - Encoding and decoding advertisements - Transcoding Graphical Representations – Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree diagram - Reading brochures, leaflets, instruction manual - Cloze test - Reading Comprehension- Note Making – Linear and non-linear - Book review, Article review

STYLES OF SCRIPTING 15 Hours
Types of sentences - Concord - Framing Questions – “Wh” questions, Yes/No questions and Question Tags- Modifiers – Dangling, Misplaced, Squinting- Phrasal Expressions- Editing a passage – Punctuation, Spelling, and Common errors - Paragraph Writing – Narrative, Descriptive, Argumentative, Comparative / Contrastive. - Letter Writing – requesting information, explaining a situation, letter of acceptance, declining letter, letter of application and resume - Essay Writing

AUDITORY PROFICIENCY 15 Hours
Listening to monologues, Listening for general content - Listening to dialogues - Listening to a telephonic conversation - Listening for specific information, numbers, time, duration - Listening to conversations between three or more people- Listening to a group discussion and providing factual information, Intensive listening

ORATORICAL EFFICIENCY 15 Hours
Discussing studies/interests/friends/families-Describe an object or event - Describing a working mechanism - Justify an opinion / Negotiating views - Argumentative speech about a public issue - Responding to situations and providing solutions - Picture Perception

L: 30 Hr, P: 30 Hr, TOTAL: 60 HOURS
REFERENCES

COURSE OUTCOMES
- Distinguish the application of technical diction for the data interpretation while reading
- Construct technical sentences and compose corporate letters
- Improve listening for inferring technical information
- Develop spoken communication needed for presentations and discussions
OBJECTIVES
On completion of the course, the students are expected

• To understand double and triple integrations and enable them to find area and volume using multiple integrals.
• To know the basics of vector calculus comprising gradient, divergence and curl and line, surface and volume integrals.
• To understand analytic functions of complex variables and conformal mappings.
• To know the basics of residues, complex integration and contour integration.
• To understand Laplace transform and use it to represent system dynamic models and evaluate their time responses.

MULTIPLE INTEGRALS 9 Hours
Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between cartesian and polar coordinates - Triple integration in cartesian coordinates – Application : Area as double integral – Volume as triple integral.

VECTOR CALCULUS 9 Hours
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

ANALYTIC FUNCTION 9 Hours
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy- Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping : \( w = z + c, cz, 1/z \) and bilinear transformation.

COMPLEX INTEGRATION 9 Hours
Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Residues – Cauchy’s residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals - Unit circle and semi-circular contours (excluding poles on real axis).
LAPLACE TRANSFORM  
9 Hours

L: 45 + T: 15 = 60

REFERENCES


Course Outcomes

After pursuing the above mentioned course, the students will be able to:

- Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure.
- Know the gradient, divergence and curl, related theorems useful for engineering applications.
- Test the analyticity and to construct the analytic function and transform complex functions from one plane to another plane graphically.
- Evaluate real and complex integrals over suitable closed paths or contours.
- Know the Applications of Laplace transform and its properties & to solve certain linear differential equations using Laplace transform technique.
OBJECTIVES
At end of the course students would be exposed to
- Conducting, super conducting, magnetic and dielectric materials in electrical devices.
- Semi conducting, optical and new engineering materials in switching and display devices, data storage.

CONDUCTING AND SUPERCONDUCTING MATERIALS 9 Hours

Superconducters: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I &Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

SEMICONDUCTING MATERIALS 9 Hours
Origin of band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semi conductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC & DIELECTRIC MATERIALS 9 Hours

NEW ENGINEERING MATERIALS AND NANOTECHNOLOGY 9 Hours

New Engineering Materials: Metallic glasses – preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications - advantages and disadvantages of SMA.


OPTICAL MATERIALS 9 Hours


TOTAL: 45 HOURS

REFERENCES

COURSE OUTCOMES
- Apply core concepts in Materials Science to solve engineering problems
- Determine the position of the acceptor or donor levels and the brand gap of an extrinsic semiconductor,
- Classify & differentiate the structure and physical properties of conducting materials
- Apply the techniques to manufacturing of modern materials for engineering practice.
- Recognize the various nanomaterials for engineering and technological applications
OBJECTIVES
- To study the characteristics of circuit elements
- To understand relationships among current, voltage and power in DC and AC circuits
- To study the construction, characteristics and applications of amplifiers and oscillators circuitry

DC CIRCUITS 9 Hours

AC CIRCUITS 9 Hours

SEMICONDUCTOR DIODE AND APPLICATIONS 9 Hours

TRANSISTORS AND APPLICATIONS 9 Hours

OSCILLATORS AND OPERATIONAL AMPLIFIERS 9 Hours
REFERENCES

COURSE OUTCOMES
- Define & identify the basic electrical quantities and also able to calculate approximately the voltage, current parameters in DC circuits using basic laws.
- Understand the phasor representation of various AC circuit parameters and acquire knowledge on fundamentals of three phase ac circuits.
- Differentiate the various semiconductor diodes and rectifiers
- Summarize the characteristics of different types of transistors.
- Apply the achieved basic knowledge about oscillators & op-amp to different dc applications.
OBJECTIVES
To impart a sound knowledge on basics of
- Theoretical and modern technological aspects of modern polymeric materials technology for micro electrical, electronics, instrumentation and communication fields.

INTRODUCTION TO CONDUCTING POLYMERIC MATERIALS 9 Hours

APPLIED CONDUCTING POLYMERS 9 Hours
Synthesis, structure, morphology, conductivity, doping theory and uses of Poly(sulfur nitride), polyacetylene, polyphenylene, poly(phenylene vinylenes), poly(phenylene sulfide), Polypyrrole and Polyythiophene, Polyaniline - Polymers with transition metals in the side-group structure and their uses (includes Stacked Phthalocyanine polymers).

MANUFACTURING METHODS OF ORGANO ELECTRONICS MATERIALS 9 Hours

ORGANIC ELECTRONIC MATERIALS 9 Hours
Organic thin-film transistor (OTFT) – architecture, operating mode - fabrication techniques - structure-property relationship - Methods of improving performance – structural perfection - device architecture - Electrical and environmental stability – chemical effects on stability - Gate dielectrics on electrical functionality.

ADVANCED MATERIALS FOR ORGANIC ELECTRONICS 9 Hours

TOTAL: 45 HOURS
REFERENCES

COURSE OUTCOMES
- Analyse and determine the required conducting polymers in fabrication of organic electronic devices
- Describe the mechanism of formation of conducting polymeric materials
- Design an Organic Thin film transistor
- Outline the performance of Pentacene transistors
U14IT7201/ FOUNDATIONS OF INFORMATION TECHNOLOGY

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(Common to CSE & IT)

**OBJECTIVES**

- Acquire an overview of data storage and manipulation in computers
- Understand the basic concepts of operating systems, networks and database
- Know the applications of Internet and Information Technology

**Computer Basics and Architecture**

11 Hours

**Computer Organization and Architecture**: Introduction-CPU-Communication among various units - Instruction Format-Instruction Cycle-Instruction Set-Data Representation in Computers.

**Computer Memory and Storage**: Memory Hierarchy-Types of Memory-CPU interaction with memory-Secondary Storage devices and its types

**Operating Systems**

10 Hours

**Operating systems**: Evolution-Types of Operating System –Functions of Operating System-Coordinating machine activities-Handling competition among processes

**Database Fundamentals**: Logical and Physical Data Concepts- Database Management System-Architecture-Database Models-Types of databases.

**Basics of Networks and Data Communication**

08 Hours

**Networks**: Network Topologies-Communication Protocol-Network devices

**Data Communication**: Introduction-Data Communication-Transmission Media-Modulation-Multiplexing-Switching

**Basics of Data abstraction and Software Engineering**

11 Hours

**Data abstraction**: Basic data structures - Implementation - Classes and objects - Object Oriented Programming

**Software Engineering**: Lifecycle-Methodologies-Modularity-Quality Assurance-Documentation-Software Ownership and Liability

**Current and Future trends in IT**

05 Hours


**TOTAL: 45 HOURS**

**REFERENCES**

1. Introduction to Information Technology, Pearson Education, ITL Education solutions Ltd., 2012
COURSE OUTCOMES

- Outline various functional components of computer system.
- Summarize the functions of operating systems
- Define different types of network topologies and protocols.
- Explain the various internet tools and terminology.
- Explain the basic concept of data abstraction, database, software engineering.
OBJECTIVES

- To apply the theoretical principles and perform experiments
- Experience the importance of theory by using analytical equipments and quantitative and qualitative procedures.

LIST OF EXPERIMENTS

PREPARATION OF SOLUTIONS (STANDARD)
1. Preparation of normal solutions of the following substances - oxalic acid, sodium carbonate, hydrochloric acid.
2. Preparation of phosphate buffer using Henderson equation.

WATER TESTING
3. Determination of total, temporary and permanent hardness by EDTA method.
4. Estimation of DO by Winkler’s method.
5. Estimation of alkalinity by Indicator method.

ELECTRO CHEMICAL ANALYSIS
7. Estimation of hydrochloric acid by pH metry.
8. Conductometric titration of mixture of acids and strong base
9. Conductometric precipitation titration using $\text{BaCl}_2$ and $\text{Na}_2\text{SO}_4$.
10. Estimation of Iron by Potentiometry

PHOTOMETRY
11. Estimation of the Ferrous ions (Thiocyanate method) by Spectrophotometry.
12. Estimation of sodium and potassium by Flame photometry.

TOTAL: 45 HOURS

REFERENCES
COURSE OUTCOMES

- Prepare normal solutions
- Analyse the properties of water by applying the chemical concepts
- Estimate the concentration of solutions by electrochemical methods and apply it in real life situations like blood testing etc
OBJECTIVES

- Acquire in-depth practical knowledge of the computer hardware and computer networks.
- Understand the assembly of PC and connection of networks
- Develop skill related to the trouble shooting and configuration of PC.

LIST OF EXPERIMENTS

1. Study of different types of cables and network topologies
2. Study of different types of network devices
3. Study and identification of Major parts of PC
4. Assembly and Disassembly of PC
5. Connecting a small LAN
6. IP configuration and Subnet masking.
7. Study and troubleshoot the boot process
8. Installation and configuration of Windows 2000
9. Implementation of Wireless Network
10. Study, Identification, Assembly and Disassembly of Printer and Monitor

TOTAL: 45 HOURS

COURSE OUTCOMES

- Explain the various computer hardware components and their functionality. [S]
- Illustrate the assembling process of a computer system. [S]
- Explain the local area network and file sharing methods. [S]
- Perform the installation of Windows and Linux operating system. [S]
- Explain the configuration of wireless adapter. [S]
OBJECTIVES

- To study the characteristics of resonant circuits
- To obtain the characteristics of electronic devices
- To obtain the characteristics of amplifier circuits

LIST OF EXPERIMENTS

1. Verification of Kirchhoff’s Laws
2. Series & Parallel Resonance
4. Half wave and full wave rectifier
5. Zener diode Regulator
6. Common Emitter Transistor characteristics
7. JFET characteristics
8. Wein Bridge oscillator
9. Comparator, summing Amplifier using Op-Amp
10. Integrator and Differentiator using Op-Amp

TOTAL: 45 HOURS

COURSE OUTCOMES

- Understand and verify the breadboard connections.
- Check the working condition of a cathode ray oscilloscope.
- Understand the basic laws of electric circuits.
- Understand the working of various electronic devices.
- Understand the performance of an amplifier to carryout different operations.
OBJECTIVES

- Acquire in-depth practical knowledge of the computer hardware and computer networks.
- Understand the assembly of PC and connection of networks
- Develop skill related to the trouble shooting and configuration of PC.

LIST OF EXPERIMENTS

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TOTAL: 45 HOURS

COURSE OUTCOMES

- Explain the various computer hardware components and their functionality. [S]
- Illustrate the assembling process of a computer system. [S]
- Explain the local area network and file sharing methods. [S]
- Perform the installation of Windows and Linux operating system. [S]
- Explain the configuration of wireless adapter. [S]
OBJECTIVES

- To inculcate the basic need for family life and need to maintain peace in it.
- To lead spiritual development through good family life.
- To know the 5C’s & 5E’s.
- To know the examples for Self Control.
- To practice meditation & Pranayamam.

PEACE IN FAMILY


Greatness of womanhood: Good culture – Cultured behavioral patterns – Love and Compassion.

BLESSING – EFFECTS IN FAMILY

Introduction - Benefits – Mental Frequency level - Effect of vibrations – Make blessings a daily habit.

Training: Method of blessings.

FOOD IS MEDICINE

Food is medicine - Healthy food habits- Method of Medicinal food preparations – Food based on character.

PERSONALITY DEVELOPMENT CONCEPTS - 5C’S & 5E’S

Personality Concepts: Definition - Types of Personality- Personality development activities- Factors affecting personality development - Tools to improve personality- Steps to a dynamic personality- 5 C’s and 5 E’s.

Time Management: Importance – Training.

LEADERSHIP TRAITS & SELF DEVELOPMENT

Leadership Traits – Carrying oneself - Factors of leadership – Principles of leadership.


Training: Method of Self-Control.
SPIRITUAL DEVELOPMENT THROUGH KAYA KALPA YOGA

Spiritual development: Need – Development through Kaya Kalpa - Responsibility of men and women – Need of morality.

KayaKalpa yoga: Aim - kayakalpa philosophy - Importance of kayakalpa training.

Training: Kaya Kalpa Yoga.

EXERCISE & MEDITATION

Simplified Physical Exercise & Meditation Practice.

L: 16 Hr, P: 14, Total: 30 Hours

REFERENCES BOOKS:
1. Dr. A. Chandra Mohan, “Leadership and Management”, Himalaya Publication House,

COURSE OUTCOMES:
- Behaves as a responsible family member.
- Develop skills for personality improvement.
- Acquire practical knowledge on self-control technique for teenagers.
- Identify the significant of Genetic Centre for the Soul functional base operation.
# B.E - MECHANICAL ENGINEERING

## SEMESTER – II

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**TOTAL – 32 HOURS**  
**TOTAL CREDITS – 24**
OBJECTIVES

- To develop reading accuracy and English fluency
- To Employ appropriate formats in writing and effective
- To compare and relate words/sounds and listen for specific information.
- To maximize the elements of spoken ability

INTERPRETATIONAL DEXTERITY

Homophones and homonyms - Encoding and decoding advertisements - Transcoding Graphical Representations – Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree diagram - Reading brochures, leaflets, instruction manual - Cloze test - Reading Comprehension- Note Making – Linear and non-linear - Book review, Article review

STYLES OF SCRIPTING

Types of sentences - Concord - Framing Questions – “Wh” questions, Yes/No questions and Question Tags- Modifiers – Dangling, Misplaced, Squinting- Phrasal Expressions- Editing a passage – Punctuation, Spelling, and Common errors - Paragraph Writing – Narrative, Descriptive, Argumentative, Comparative / Contrastive. - Letter Writing – requesting information, explaining a situation, letter of acceptance, declining letter, letter of application and resume - Essay Writing

AUDITORY PROFICIENCY

Listening to monologues, Listening for general content - Listening to dialogues - Listening to a telephonic conversation - Listening for specific information, numbers, time, duration - Listening to conversations between three or more people- Listening to a group discussion and providing factual information, Intensive listening

ORATORICAL EFFICIENCY

Discussing studies/interests/friends/families-Describe an object or event - Describing a working mechanism - Justify an opinion / Negotiating views - Argumentative speech about a public issue - Responding to situations and providing solutions - Picture Perception

L: 30 Hr, P: 30 Hr, TOTAL: 60 HOURS
REFERENCES

COURSE OUTCOMES
- Distinguish the application of technical diction for the data interpretation while reading
- Construct technical sentences and compose corporate letters
- Improve listening for inferring technical information
- Develop spoken communication needed for presentations and discussions
OBJECTIVES
On completion of the course, the students are expected
- To understand double and triple integrations and enable them to find area and volume using multiple integrals.
- To know the basics of vector calculus comprising gradient, divergence and curl and line, surface and volume integrals.
- To understand analytic functions of complex variables and conformal mappings.
- To know the basics of residues, complex integration and contour integration.
- To understand Laplace transform and use it to represent system dynamic models and evaluate their time responses.

MULTIPLE INTEGRALS
9 Hours
Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between cartesian and polar coordinates - Triple integration in cartesian coordinates – Application: Area as double integral – Volume as triple integral.

VECTOR CALCULUS
9 Hours
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields - Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

ANALYTIC FUNCTION
9 Hours
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy- Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping: \( w = z + c, cz, 1/z \) and bilinear transformation.

COMPLEX INTEGRATION
9 Hours
Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Residues – Cauchy’s residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals - Unit circle and semi-circular contours (excluding poles on real axis).
LAPLACE TRANSFORM

9 Hours


L: 45 + T: 15 = 60

REFERENCES


Course Outcomes

After pursuing the above mentioned course, the students will be able to:

- Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure.
- Know the gradient, divergence and curl, related theorems useful for engineering applications.
- Test the analyticity and to construct the analytic function and transform complex functions from one plane to another plane graphically.
- Evaluate real and complex integrals over suitable closed paths or contours.
- Know the Applications of Laplace transform and its properties & to solve certain linear differential equations using Laplace transform technique.
OBJECTIVES
At the end of the course students would be exposed to

- Types of defects in engineering materials and mechanisms of strengthening
- Properties of conducting, super conducting, magnetic and dielectric materials.
- Properties of Semi conducting, optical and new engineering materials.

CONDUCTING AND SUPERCONDUCTING MATERIALS 9 Hours

Superconducting Materials: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I &Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

SEMICONDUCTING MATERIALS 9 Hours
Origin of band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semi conductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC & DIELECTRIC MATERIALS 9 Hours

NANOTECHNOLOGY AND NEW ENGINEERING MATERIALS  
9 Hours

New Engineering Materials: Metallic glasses – preparation, properties and applications – shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications advantages and disadvantages of SMA.


STRENGTHENING OF MATERIALS  
9 Hours

Strengthening mechanisms for the improvement of mechanical properties - cold working precipitation hardening, solute hardening and diffusion hardening - Fracture-Mechanism of brittle fracture (Griffith’s theory ) and Ductile fracture - difference between brittle and ductile fracture - fatigue failure and its prevention - creep different stages in creep curve-Factors affecting mechanical properties Grain size and heat treatment - Mechanical test Tensile, compression, hardness, impact creep, fatigue and stress.

TOTAL: 45 HOURS

REFERENCE BOOKS
2. Avadhanalu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S. Chand & Company Ltd, New Delhi, 2005
5. Arumugam M., Physics-II, Materials science for mechanical engineering, Anuradha agencies publishers, Kumbakonam, 2005

COURSE OUTCOMES
- Apply core concepts in Materials Science to solve engineering problems
- Determine the position of the acceptor or donor levels and the band gap of an extrinsic semiconductor
- Classify & differentiate the structure and physical properties of conducting materials
- Apply the techniques to manufacturing of modern materials and nano materials for engineering applications
- Recognize the basic concepts of strengthening of materials in technological applications
OBJECTIVES
- To inculcate essential knowledge on theoretical and modern technological aspects of fuels and combustion, specialty materials, water technology, corrosion studies and powder metallurgy.

FUELS AND COMBUSTION  
Classification of fuels - coal varieties - analysis of coal (proximate and ultimate analysis) - coke manufacture (Otto-Hoffman byproduct coke oven method) - characteristics of metallurgical coke - cracking (thermal and catalytic cracking definition only) – manufacturing of synthetic petrol (Fischer Tropsch method, Bergius process) – knocking (octane number, cetane number) - gaseous fuels (production, composition and uses of producer gas, water gas and natural gas).

Combustion: gross and net calorific value - determination of calorific value by bomb calorimeter - explosive range - spontaneous ignition temperature - flue gas analysis (Orsat apparatus).

MECHANICAL ENGINEERING MATERIALS  
Abrasives: Moh’s scale of hardness - natural abrasives (diamond, corundum, emery, garnets and quartz) - artificial abrasives (silicon carbide, boron carbide).

Refractories: Characteristics - classification (acid, basic and natural refractories) - properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) - General manufacturing methods of refractories - preparation, properties and uses of high alumina bricks, magnesite and zirconia bricks.

Lubricants: Classification - Functions - properties (viscosity index, flash and fire point, oiliness, carbon residue, aniline point, cloud and pour point) - greases (calcium based, sodium based, lithium based) - solid lubricants (graphite, molybdenum disulphide).

CORROSION SCIENCE  
Corrosion - Principles of electrochemical corrosion - difference between chemical and electrochemical corrosion - factors influencing corrosion.

Types of corrosion: galvanic corrosion - differential aeration corrosion (soil (microbial) corrosion, pitting corrosion, water line corrosion) - stress corrosion.

Corrosion control: cathodic protection (sacrificial anode) - Protective Coatings (Paint, Electroplating of Copper).
WATER TECHNOLOGY 9 Hours
Boiler feed water: requirements - disadvantages of hard water (formation of deposits in steam boilers, priming, foaming, caustic embrittlement & boiler corrosion).
Prevention of scale formation: external treatment (ion exchange method) - internal treatment (phosphate, calgon, carbonate, colloidal) - desalination by reverse osmosis - Treatment of Domestic water

PHASE RULE AND POWDER METALLURGY 9 Hours
Phase rule - condensed phase rule - construction of phase diagram (thermal analysis) – Applications of phase rule: Simple eutectic system (Ag - Pb, Fe - C system).

POWDER METALLURGY: Preparation of metal powders (mechanical pulverization, atomization, chemical reduction, electrolytic process, decomposition) - mixing and blending - compacting - sintering - advantages and limitations of powder metallurgy.

TOTAL: 45 HOURS

REFERENCES

COURSE OUTCOMES
- Classify the different types of fuels and their properties
- Categorize the engineering materials and their uses
- Defend the Corrosion problems
- Design a water purifier
- Identify the techniques of preparing metal powder
OBJECTIVES

- To understand the concept of equilibrium of particles and rigid bodies.
- To understand the concept of first and second moment of area.
- To understand the concept of various types of frictions.
- To understand the principle of work energy method, Newton’s law and impact of elastic bodies.

BASICS & STATICS OF PARTICLES

9 Hours

EQUILIBRIUM OF RIGID BODIES

9 Hours
Moment of a force about point – Varignon s theorem- Moment of a couple-Resolution of force in to force couple system-Resultant of coplanar non concurrent system - Types of supports and their reactions- Requirements of stable equilibrium - Equilibrium of Rigid bodies in two dimensions.

PROPERTIES OF SURFACES AND SOLIDS

9 Hours
First moment of area and the Centroid of sections Rectangle, circle, triangle, T section, I section Angle section and Hollow section. Second and product moments of plane area Rectangle, triangle, circle. T Section, I section, Angle section and Hollow section, Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia.

FRICITION

9 Hours
Frictional force-Law of coloumb friction , simple contact friction, Rolling resistance and Belt friction, Ladder friction, Wedge friction.

DYNAMICS OF PARTICLES

9 Hours
Kinematics: Rectilinear & Curvilinear motion of particles, Displacements Velocity and acceleration.

L: 45 Hr, T: 15 Hr, TOTAL: 60 HOURS
REFERENCES

COURSE OUTCOMES
- Explain the concept of equilibrium of particles and rigid bodies.
- Apply the concepts of equilibrium and moment of inertia for various shapes sections.
- Make use of various concepts of friction.
- Solve problems using the concepts in kinematics and kinetics.
OBJECTIVES
- To study the characteristics of circuit elements
- To understand relationships among current, voltage and power in DC and AC circuits
- To study the construction, characteristics and applications of amplifiers and oscillators circuitry

ELECTRIC CIRCUITS FUNDAMENTALS  9 Hours

ELECTROMAGNETISM  9 Hours

AC-CIRCUITS  9 Hours

ELECTRICAL MACHINES (Qualitative Treatment Only)  9 Hours

ELECTRONIC CIRCUITS  9 Hours
Semiconductor diode – Half wave and Full wave rectifier – Bipolar Junction transistors – circuit configurations – static characteristics – load line and biasing – simple introduction to amplifiers – Introduction to Binary logic gates – AND, OR, NOT, NAND, NOR, EX-OR & EX-NOR.

TOTAL: 45 HOURS
REFERENCES

COURSE OUTCOMES
- Acquire the knowledge of fundamental laws of electrical and electronics engineering.
- State the definition of magnetic circuits.
- Choose suitable motor for desired application.
- The students have the ability to apply the fundamental laws of magnetic circuits to electrical machines.
- The learners can verify the truth table of digital logic gates.
OBJECTIVES

- To apply the theoretical principles and perform experiments
- Experience the importance of theory by using analytical equipments and quantitative and qualitative procedures.

LIST OF EXPERIMENTS

PREPARATION OF SOLUTIONS (STANDARD)
1. Preparation of normal solutions of the following substances - oxalic acid, sodium carbonate, hydrochloric acid.
2. Preparation of phosphate buffer using Henderson equation.

WATER TESTING
3. Determination of total, temporary and permanent hardness by EDTA method.
4. Estimation of DO by Winkler’s method.
5. Estimation of alkalinity by Indicator method.

ELECTRO CHEMICAL ANALYSIS
7. Estimation of hydrochloric acid by pH metry.
8. Conductometric titration of mixture of acids and strong base
9. Conductometric precipitation titration using BaCl₂ and Na₂SO₄.
10. Estimation of Iron by Potentiometry

PHOTOMETRY
11. Estimation of the Ferrous ions (Thiocyanate method) by Spectrophotometry.
12. Estimation of sodium and potassium by Flame photometry.

TOTAL: 45 HOURS

REFERENCES

COURSE OUTCOMES

- Prepare normal solutions
- Analyse the properties of water by applying the chemical concepts
- Estimate the concentration of solutions by electrochemical methods and apply it in real life situations like blood testing etc
OBJECTIVES

- To analyze webpage and identify its elements and attributes
- Learn the basic language of the web: HTML.
- Be able to embed social media content into web pages.
- Implement and understand how to get used with MATLAB

List of Experiments

1. Study of HTML tags
2. Design a web page using basic html tags
3. Design a webpage using table tags
4. Design a webpage using forms and frames
5. Design a webpage using list tags
6. Develop a website of your interest (include a minimum of 3 web pages)
7. Study of MATLAB functions
8. Working with matrix operations
9. Working with image arithmetic
   a. Addition of two images
   b. Subtraction of two images
10. Write a Matlab program for the following
    a. Read an image and crop
    b. Read an image and resize
11. Working with Integration and Differentiation
12. Working with graphs

COURSE OUTCOMES

On successful completion of this course the student should be able to

1. Develop static web pages using HTML. [S]
2. Perform basic MATLAB operations. [S]
3. Make use of MATLAB to work with images and graphs. [S]
4. Perform integration and differentiation using MATLAB. [S]
5. Develop team spirit and professional attitude towards the development of simple web applications [A]
AIM
To provide experimental skill in the operation of DC, AC machines and Hands on experience in the development of electronic circuits.

OBJECTIVES
- To experimentally verify the principle of operation, performance characteristics of DC Motors and AC Motors.
- To obtain the characteristics of electronic devices and its applications

LIST OF EXPERIMENTS
1. Load Test on DC Shunt Motor
2. Load Test on DC Series Motor
3. Speed Control of DC Shunt Motor
4. Load Test on three phase Induction Motor
5. Load Test on single phase Induction Motor
6. Load test on single phase transformer
7. Half wave and full wave rectifier
8. Characteristics of CE transistor configuration
9. Characteristics of PN diode
10. Verification of truth table of logic gates

COURSE OUTCOMES
- The Students will gain the basic knowledge and understanding the concept of AC and DC machines.
- Students will know the working principle, performance characteristics, (Torque, Speed, Efficiency) control and applications of Electrical Machines.
- Students will be able to design and conduct performance experiments in machines and Rectifiers.
- To familiarize the starting methods of all rotating machines.
- Students will be exposed to the practical applications of identify and solve machines related problems.

TOTAL: 45 HOURS
OBJECTIVES

- To inculcate the basic need for family life and need to maintain peace in it.
- To lead spiritual development through good family life.
- To know the 5C’s & 5E’s.
- To know the examples for Self Control.
- To practice meditation & Pranayamam.

PEACE IN FAMILY

4 Hours


Greatness of womanhood: Good culture – Cultured behavioral patterns – Love and Compassion.

BLESSING – EFFECTS IN FAMILY

2 Hours

Introduction - Benefits – Mental Frequency level - Effect of vibrations – Make blessings a daily habit.

Training: Method of blessings.

FOOD IS MEDICINE

2 Hours

Food is medicine - Healthy food habits - Method of Medicinal food preparations – Food based on character.

PERSONALITY DEVELOPMENT CONCEPTS - 5C’S & 5E’S

4 Hours

Personality Concepts: Definition - Types of Personality - Personality development activities - Factors affecting personality development - Tools to improve personality - Steps to a dynamic personality-5 C’s and 5 E’s.

Time Management: Importance – Training.

LEADERSHIP TRAITS & SELF DEVELOPMENT

4 Hours

Leadership Traits – Carrying oneself - Factors of leadership – Principles of leadership.


Training: Method of Self-Control.
SPIRITUAL DEVELOPMENT THROUGH KAYA KALPA YOGA 4 Hours

Spiritual development: Need – Development through Kaya Kalpa - Responsibility of men and women – Need of morality.

KayaKalpa yoga: Aim - kayakalpa philosophy - Importance of kayakalpa training.

Training: Kaya Kalpa Yoga.

EXERCISE & MEDITATION 10 Hours

Simplified Physical Exercise & Meditation Practice.

L: 16 Hr, P: 14, Total: 30 Hours

REFERENCES BOOKS:
1. Dr. A. Chandra Mohan, “Leadership and Management”, Himalaya Publication House,

COURSE OUTCOMES:
- Behaves as a responsible family member.
- Develop skills for personality improvement.
- Acquire practical knowledge on self-control technique for teenagers.
- Identify the significant of Genetic Centre for the Soul functional base operation.
# B.E - MECHATRONICS ENGINEERING

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**TOTAL – 32 HOURS**

**TOTAL CREDIT – 24**
U14EN7201/ FUNCTIONAL ENGLISH - II
(Common to all branches of Engineering and Technology)

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OBJECTIVES
- To develop reading accuracy and English fluency
- To Employ appropriate formats in writing and effective
- To compare and relate words/sounds and listen for specific information.
- To maximize the elements of spoken ability

INTERPRETATIONAL DEXTERITY 15 Hours
Homophones and homonyms - Encoding and decoding advertisements - Transcoding Graphical Representations – Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree diagram - Reading brochures, leaflets, instruction manual - Cloze test - Reading Comprehension- Note Making – Linear and non-linear - Book review, Article review

STYLES OF SCRIPTING 15 Hours
Types of sentences - Concord - Framing Questions – “Wh” questions, Yes/No questions and Question Tags- Modifiers – Dangling, Misplaced, Squinting- Phrasal Expressions- Editing a passage – Punctuation, Spelling, and Common errors - Paragraph Writing – Narrative, Descriptive, Argumentative, Comparative / Contrastive. - Letter Writing – requesting information, explaining a situation, letter of acceptance, declining letter, letter of application and resume - Essay Writing

AUDITORY PROFICIENCY 15 Hours
Listening to monologues, Listening for general content - Listening to dialogues - Listening to a telephonic conversation - Listening for specific information, numbers, time, duration - Listening to conversations between three or more people- Listening to a group discussion and providing factual information, Intensive listening

ORATORICAL EFFICIENCY 15 Hours
Discussing studies/interests/friends/families-Describe an object or event - Describing a working mechanism - Justify an opinion / Negotiating views - Argumentative speech about a public issue - Responding to situations and providing solutions - Picture Perception

L: 30 Hr, P: 30 Hr, TOTAL: 60 HOURS
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COURSE OUTCOMES
- Distinguish the application of technical diction for the data interpretation while reading
- Construct technical sentences and compose corporate letters
- Improve listening for inferring technical information
- Develop spoken communication needed for presentations and discussions
OBJECTIVES
On completion of the course, the students are expected

- To understand double and triple integrations and enable them to find area and volume using multiple integrals.
- To know the basics of vector calculus comprising gradient, divergence and curl and line, surface and volume integrals.
- To understand analytic functions of complex variables and conformal mappings.
- To know the basics of residues, complex integration and contour integration.
- To understand Laplace transform and use it to represent system dynamic models and evaluate their time responses.

MULTIPLE INTEGRALS
9 Hours
Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between cartesian and polar coordinates - Triple integration in cartesian coordinates – Application: Area as double integral – Volume as triple integral.

VECTOR CALCULUS
9 Hours
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields - Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

ANALYTIC FUNCTION
9 Hours
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy- Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping: w = z + c, cz, 1/z and bilinear transformation.

COMPLEX INTEGRATION
9 Hours
Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Residues – Cauchy’s residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals - Unit circle and semi-circular contours (excluding poles on real axis).
LAPLACE TRANSFORM


REFERENCES


Course Outcomes

After pursuing the above mentioned course, the students will be able to:

- Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure.
- Know the gradient, divergence and curl, related theorems useful for engineering applications.
- Test the analyticity and to construct the analytic function and transform complex functions from one plane to another plane graphically.
- Evaluate real and complex integrals over suitable closed paths or contours.
- Know the Applications of Laplace transform and its properties & to solve certain linear differential equations using Laplace transform technique.
OBJECTIVES
At the end of the course students would be exposed to
- Types of defects in engineering materials and mechanisms of strengthening
- Properties of conducting, super conducting, magnetic and dielectric materials.
- Properties of Semi conducting, optical and new engineering materials.

CONDUCTING AND SUPERCONDUCTING MATERIALS 9 Hours

Superconducting Materials: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I & Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

SEMICONDUCTING MATERIALS 9 Hours
Origin of band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semiconductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semi conductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC & DIELECTRIC MATERIALS 9 Hours

NANOTECHNOLOGY AND NEW ENGINEERING MATERIALS 9 Hours

New Engineering Materials: Metallic glasses – preparation, properties and applications – shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications advantages and disadvantages of SMA.


STRENGTHENING OF MATERIALS 9 Hours

Strengthening mechanisms for the improvement of mechanical properties - cold working precipitation hardening, solute hardening and diffusion hardening - Fracture-Mechanism of brittle fracture (Griffith’s theory ) and Ductile fracture - difference between brittle and ductile fracture - fatigue failure and its prevention - creep different stages in creep curve-Factors affecting mechanical properties Grain size and heat treatment - Mechanical test Tensile, compression, hardness, impact creep, fatigue and stress.

TOTAL: 45 HOURS

REFERENCE BOOKS
2. Avadhanalu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S. Chand & Company Ltd, New Delhi, 2005

COURSE OUTCOMES
- Apply core concepts in Materials Science to solve engineering problems
- Determine the position of the acceptor or donor levels and the brand gap of an extrinsic semiconductor
- Classify & differentiate the structure and physical properties of conducting materials
- Apply the techniques to manufacturing of modern materials and nano materials for engineering applications
- Recognize the basic concepts of strengthening of materials in technological applications
OBJECTIVES

- To inculcate essential knowledge on theoretical and modern technological aspects of fuels and combustion, specialty materials, water technology, corrosion studies and powder metallurgy.

FUELS AND COMBUSTION 9 Hours
Classification of fuels - coal varieties - analysis of coal (proximate and ultimate analysis) - coke manufacture (Otto-Hoffman byproduct coke oven method) - characteristics of metallurgical coke - cracking (thermal and catalytic cracking definition only) – manufacturing of synthetic petrol (Fischer Tropsch method, Bergius process) – knocking (octane number, cetane number) - gaseous fuels (production, composition and uses of producer gas, water gas and natural gas).

Combustion: gross and net calorific value - determination of calorific value by bomb calorimeter - explosive range - spontaneous ignition temperature - flue gas analysis (Orsat apparatus).

MECHANICAL ENGINEERING MATERIALS 9 Hours
Abrasives: Moh’s scale of hardness - natural abrasives (diamond, corundum, emery, garnets and quartz) - artificial abrasives (silicon carbide, boron carbide).

Refractories: Characteristics - classification (acid, basic and natural refractories) - properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) - General manufacturing methods of refractories - preparation, properties and uses of high alumina bricks, magnesite and zirconia bricks.

Lubricants: Classification - Functions - properties (viscosity index, flash and fire point, oiliness, carbon residue, aniline point, cloud and pour point) - greases (calcium based, sodium based, lithium based) - solid lubricants (graphite, molybdenum disulphide).

CORROSION SCIENCE 9 Hours
Corrosion - Principles of electrochemical corrosion - difference between chemical and electrochemical corrosion - factors influencing corrosion.

Types of corrosion: galvanic corrosion - differential aeration corrosion (soil (microbial) corrosion, pitting corrosion, water line corrosion) - stress corrosion.

Corrosion control: cathodic protection (sacrificial anode) - Protective Coatings (Paint, Electroplating of Copper).
WATER TECHNOLOGY  
9 Hours

**Boiler feed water:** requirements - disadvantages of hard water (formation of deposits in steam boilers, priming, foaming, caustic embrittlement & boiler corrosion).

**Prevention of scale formation:** external treatment (ion exchange method) - internal treatment (phosphate, calgon, carbonate, colloidal) - desalination by reverse osmosis - Treatment of Domestic water

**PHASE RULE AND POWDER METALLURGY**  
9 Hours

Phase rule - condensed phase rule - construction of phase diagram (thermal analysis) – Applications of phase rule: Simple eutectic system (Ag - Pb, Fe - C system).

**POWDER METALLURGY:** Preparation of metal powders (mechanical pulverization, atomization, chemical reduction, electrolytic process, decomposition) - mixing and blending - compacting - sintering - advantages and limitations of powder metallurgy.

**TOTAL:** 45 HOURS

**REFERENCES**


**COURSE OUTCOMES**

- Classify the different types of fuels and their properties
- Categorize the engineering materials and their uses
- Defend the Corrosion problems
- Design a water purifier
- Identify the techniques of preparing metal powder
OBJECTIVES

- To understand the concept of equilibrium of particles and rigid bodies.
- To understand the concept of first and second moment of area.
- To understand the concept of various types of frictions.
- To understand the principle of work energy method, Newton’s law and impact of elastic bodies.

BASICS & STATICS OF PARTICLES 9 Hours

EQUILIBRIUM OF RIGID BODIES 9 Hours
Moment of a force about point – Varignon s theorem- Moment of a couple-Resolution of force in to force couple system-Resultant of coplanar non concurrent system - Types of supports and their reactions- Requirements of stable equilibrium - Equilibrium of Rigid bodies in two dimensions.

PROPERTIES OF SURFACES AND SOLIDS 9 Hours
First moment of area and the Centroid of sections Rectangle, circle, triangle, T section, I section Angle section and Hollow section. Second and product moments of plane area Rectangle, triangle, circle. T Section, I section, Angle section and Hollow section, Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia.

FRICTION 9 Hours
Frictional force-Law of coloumb friction , simple contact friction, Rolling resistance and Belt friction, Ladder friction, Wedge friction.

DYNAMICS OF PARTICLES 9 Hours
Kinematics: Rectilinear & Curvilinear motion of particles, Displacements Velocity and acceleration.

L: 45 Hr, T: 15 Hr, TOTAL: 60 HOURS
REFERENCES

COURSE OUTCOMES
- Explain the concept of equilibrium of particles and rigid bodies.
- Apply the concepts of equilibrium and moment of inertia for various shapes sections.
- Make use of various concepts of friction.
- Solve problems using the concepts in kinematics and kinetics.
CIRCUIT THEORY  
9 Hours

THEORY OF SEMICONDUCTOR DEVICES  
9 Hours
PN junction – diode equation (Derivation not required) – forward and reverse bias – Diode dc and ac resistances – Zener diode – Bipolar Junction Transistor – CE, CB and CC configurations – Biasing of a transistor; fixed bias, collector feedback bias, self bias – FET – Common source and drain characteristics of JFET and MOSFET.

APPLICATIONS OF DIODES  
9 Hours
HW and FW rectifiers – Filters with Capacitior and Inductors -Clippers and Clampers – Voltage Multipliers – Voltage regulators – Zener, series and shunt types.

AMPLIFIERS AND OSCILLATORS  
9 Hours

OPERATIONAL AMPLIFIERS  
9 Hours

TOTAL: 45 HOURS

REFERENCES
COURSE OUTCOMES

➢ Use passive elements and basic theorems to solve the electric circuits.
➢ Relate the basic semiconductor physics to the characteristics and biasing of low powered electronic devices.
➢ Design regulators and rectifiers using diodes.
➢ Design amplifiers for oscillators using transistors.
➢ Use operational amplifiers to solve simple mathematical operations and build conventional vibrators.
OBJECTIVES

- To apply the theoretical principles and perform experiments
- Experience the importance of theory by using analytical equipments and quantitative and qualitative procedures.

LIST OF EXPERIMENTS

PREPARATION OF SOLUTIONS (STANDARD)
1. Preparation of normal solutions of the following substances - oxalic acid, sodium carbonate, hydrochloric acid.
2. Preparation of phosphate buffer using Henderson equation.

WATER TESTING
3. Determination of total, temporary and permanent hardness by EDTA method.
4. Estimation of DO by Winkler’s method.
5. Estimation of alkalinity by Indicator method.

ELECTRO CHEMICAL ANALYSIS
7. Estimation of hydrochloric acid by pH metry.
8. Conductometric titration of mixture of acids and strong base
10. Estimation of Iron by Potentiometry

PHOTOMETRY
11. Estimation of the Ferrous ions (Thiocyanate method) by Spectrophotometry.
12. Estimation of sodium and potassium by Flame photometry.

TOTAL: 45 HOURS

REFERENCES
COURSE OUTCOMES

- Prepare normal solutions
- Analyse the properties of water by applying the chemical concepts
- Estimate the concentration of solutions by electrochemical methods and apply it in real life situations like blood testing etc
OBJECTIVES

- To analyze webpage and identify its elements and attributes
- Learn the basic language of the web: HTML.
- Be able to embed social media content into web pages.
- Implement and understand how to get used with MATLAB

List of Experiments

1. Study of HTML tags
2. Design a web page using basic html tags
3. Design a webpage using table tags
4. Design a webpage using forms and frames
5. Design a webpage using list tags
6. Develop a website of your interest(include a minimum of 3 web pages)
7. Study of MATLAB functions
8. Working with matrix operations
9. Working with image arithmetic
   a. Addition of two images
   b. Subtraction of two images
10. Write a Matlab program for the following
    a. Read an image and crop
    b. Read an image and resize
11. Working with Integration and Differentiation
12. Working with graphs

COURSE OUTCOMES

On successful completion of this course the student should be able to

1. Develop static web pages using HTML. [S]
2. Perform basic MATLAB operations. [S]
3. Make use of MATLAB to work with images and graphs. [S]
4. Perform integration and differentiation using MATLAB. [S]
5. Develop team spirit and professional attitude towards the development of simple web applications [A]
OBJECTIVES

- To obtain the characteristics of electronic devices
- To obtain the characteristics of amplifier circuits
- To simulate electronic circuits using standard software packages

LIST OF EXPERIMENTS

1. Characteristics of Semiconductor diode and Zener diode
2. Input and Output characteristics of BJT
3. Characteristics of JFET
4. Frequency response of CE amplifier
5. Clipper and Clamper
6. Phase shift and Wein Bridge oscillators using OP-AMP
7. Astable multivibrator using OP-AMP
8. Monostable and Bistable multivibrator using OP-AMP
9. Voltage Regulator (Zener diode, Transistor series and shunt)
10. Half-wave and Full-wave Rectifier with and without filter.
11. Circuit design using software (Multisim, Pspice)
12. Printed Circuit Board (PCB) design and fabrication using (software) for simple circuits.

TOTAL: 45 HOURS

COURSE OUTCOMES

- Construct input output characteristics of electronic devices.
- Measure current voltage resistance capacitance of a given circuit.
- Design and construct regulators, rectifiers, amplifiers and oscillators using electronic devices and operational amplifiers.
- Simulate electronic circuits using software.
OBJECTIVES
- To inculcate the basic need for family life and need to maintain peace in it.
- To lead spiritual development through good family life.
- To know the 5C’s & 5E’s.
- To know the examples for Self Control.
- To practice meditation & Pranayamam.

PEACE IN FAMILY 4 Hours

Greatness of womanhood: Good culture – Cultured behavioral patterns – Love and Compassion.

BLESSING – EFFECTS IN FAMILY 2 Hours
Introduction - Benefits – Mental Frequency level - Effect of vibrations – Make blessings a daily habit.
Training: Method of blessings.

FOOD IS MEDICINE 2 Hours
Food is medicine - Healthy food habits- Method of Medicinal food preparations – Food based on character.

PERSONALITY DEVELOPMENT CONCEPTS - 5C’S & 5E’S 4 Hours
Personality Concepts: Definition - Types of Personality- Personality development activities- Factors affecting personality development - Tools to improve personality- Steps to a dynamic personality-5 C’s and 5 E’s.
Time Management: Importance –Training.

LEADERSHIP TRAITS & SELF DEVELOPMENT 4 Hours
Leadership Traits – Carrying oneself - Factors of leadership – Principles of leadership.


Training: Method of Self-Control.
SPIRITUAL DEVELOPMENT THROUGH KAYA KALPA YOGA 4 Hours

Spiritual development: Need – Development through Kaya Kalpa - Responsibility of men and women – Need of morality.

Kaya Kalpa yoga: Aim - kayakalpa philosophy - Importance of kayakalpa training.

Training: Kaya Kalpa Yoga.

EXERCISE & MEDITATION 10 Hours

Simplified Physical Exercise & Meditation Practice.

L: 16 Hr, P: 14, Total: 30 Hours

REFERENCES BOOKS:

COURSE OUTCOMES:
- Behaves as a responsible family member.
- Develop skills for personality improvement.
- Acquire practical knowledge on self-control technique for teenagers.
- Identify the significant of Genetic Centre for the Soul functional base operation.

253
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**TOTAL – 32 HOURS**

**TOTAL CREDITS – 24**
OBJECTIVES
- To develop reading accuracy and English fluency
- To Employ appropriate formats in writing and effective
- To compare and relate words/sounds and listen for specific information.
- To maximize the elements of spoken ability

INTERPRETATIONAL DEXTERITY 15 Hours
Homophones and homonyms - Encoding and decoding advertisements - Transcoding Graphical Representations – Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree diagram - Reading brochures, leaflets, instruction manual - Cloze test - Reading Comprehension- Note Making – Linear and non-linear - Book review, Article review

STYLES OF SCRIPTING 15 Hours
Types of sentences - Concord - Framing Questions – “Wh” questions, Yes/No questions and Question Tags- Modifiers – Dangling, Misplaced, Squinting- Phrasal Expressions- Editing a passage – Punctuation, Spelling, and Common errors - Paragraph Writing – Narrative, Descriptive, Argumentative, Comparative / Contrastive. - Letter Writing – requesting information, explaining a situation, letter of acceptance, declining letter, letter of application and resume - Essay Writing

AUDITORY PROFICIENCY 15 Hours
Listening to monologues, Listening for general content - Listening to dialogues - Listening to a telephonic conversation - Listening for specific information, numbers, time, duration - Listening to conversations between three or more people- Listening to a group discussion and providing factual information, Intensive listening

ORATORICAL EFFICIENCY 15 Hours
Discussing studies/interests/friends/families-Describe an object or event - Describing a working mechanism - Justify an opinion / Negotiating views - Argumentative speech about a public issue - Responding to situations and providing solutions - Picture Perception

L: 30 Hr, P: 30 Hr, TOTAL: 60 HOURS

REFERENCES

COURSE OUTCOMES

- Distinguish the application of technical diction for the data interpretation while reading
- Construct technical sentences and compose corporate letters
- Improve listening for inferring technical information
- Develop spoken communication needed for presentations and discussions
OBJECTIVES

On completion of the course, the students are expected

- To understand double and triple integrations and enable them to find area and volume using multiple integrals.
- To know the basics of vector calculus comprising gradient, divergence and curl and line, surface and volume integrals.
- To understand analytic functions of complex variables and conformal mappings.
- To know the basics of residues, complex integration and contour integration.
- To understand Laplace transform and use it to represent system dynamic models and evaluate their time responses.

MULTIPLE INTEGRALS

9 Hours

Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between cartesian and polar coordinates - Triple integration in cartesian coordinates – Application: Area as double integral – Volume as triple integral.

VECTOR CALCULUS

9 Hours

Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields - Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

ANALYTIC FUNCTION

9 Hours

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy- Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping: \( w = z + c, \ cz, \ 1/z \) and bilinear transformation.

COMPLEX INTEGRATION

9 Hours

Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Residues – Cauchy’s residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals - Unit circle and semi-circular contours (excluding poles on real axis).
LAPLACE TRANSFORM  


L: 45 + T: 15 = 60

REFERENCES


Course Outcomes

After pursuing the above mentioned course, the students will be able to:

- Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure.
- Know the gradient, divergence and curl, related theorems useful for engineering applications.
- Test the analyticity and to construct the analytic function and transform complex functions from one plane to another plane graphically.
- Evaluate real and complex integrals over suitable closed paths or contours.
- Know the Applications of Laplace transform and its properties & to solve certain linear differential equations using Laplace transform technique.
OBJECTIVES
At the end of the course the students would be exposed to

- Properties of conducting, superconducting, magnetic and dielectric materials.
- Properties of semi-conducting, optical and new engineering materials.
- Application of ultrasonic and nuclear physics in medicine.

CONDUCTING AND SUPERCONDUCTING MATERIALS  9 Hours

Superconducting Materials: Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I & Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

SEMICONDUCTING MATERIALS  9 Hours
Origin of band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semiconductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semi conductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

MAGNETIC & DIELECTRIC MATERIALS  9 Hours

NEW ENGINEERING MATERIALS

Metallic glasses – preparation, properties and applications – shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications advantages and disadvantages of SMA. Ceramics-Classification of ceramics- Fabrication, Properties and application. Biomaterials-Biomechanisim - Classification of Biomaterials-Processing, Properties and applications.

NANO SCIENCE AND PLASMA TECHNOLOGY


Plasma Technology: properties of plasma- types of plasma- thermal and non thermal plasma- Production of glow discharge plasma-Cold plasma- applications in textile and biomedical field.

REFERENCES
3. Avadhanalu M.N. and Kshirsagar P.G., A textbook of Engineering Physics, S. Chand & Company Ltd., New Delhi, 2005

COURSE OUTCOMES
- Apply core concepts in Materials Science to solve engineering problems
- Illustrate the electrical / thermal conductivity of semiconductors and determine the position of the acceptor or donor levels and the band gap of an extrinsic semiconductor,
- Classify & differentiate the structure and physical properties of conducting materials
- Apply the concepts of nanomaterials and modern materials for explaining surface properties like adhesion etc. in engineering practice.
- Identify methods for etching of fabrics
OBJECTIVES

- To correlate theoretical principles with application oriented studies
- To embark on the usage of theoretical and modern technological aspects in polymers and dyes to exhibit engineering and technical concepts as required for Textile and Fashion Technology students.

WATER TECHNOLOGY

9 Hours

POLYMERS

9 Hours
Introduction – Degree of polymerization – functionality – tacticity - classification based on source, application, thermal properties (thermosetting and thermoplastics) - effect of polymer structure on properties – types of polymerization (addition, condensation, co-polymerization, Ring polymerisation) - mechanism of polymerization (free radical mechanism)

Preparation (mechanism not required) and applications of polythene, polypropylene, polystyrene, polyamides (nylon 6,6), polyesters (PET)

CHEMICAL BONDING

9 Hours
Ionic, covalent and co-ordinate covalent bonds (overview only) -- hydrogen bonding and its consequences - van der Waal’s forces (dipole – dipole, dipole – induced dipole, induced dipole – induced dipole interactions) - Interaction of enzymes with fibres (basic concepts only). Interaction between fibers and dyes (basic concepts only) - Dyes substrate affinity (dyes for cellulose fibres, silk)

DYES

9 Hours
Introduction - Classification system of dyes - Chromophore and auxochromes – Important chemical chromophores of dyes classes (azo, anthraquinone, phthalocyanin, Indigoid, polymethine, phthalocyanine, metal complex, Fluorescent) - synthesis of azo dye (Congo red), triaryl methane dye (Malachite green), Anthraquinone dye (Alizarin - 1,2 dihydroxy anthraquinone), Indigoid dye (Indigo), phthalein dyes (Eosin)
ANTHOLOGY OF SPECIALITY CHEMICALS IN TEXTILES  

An introduction on chemistry of the following in textiles: Dispersing agents, levelling agents, Retarding agents, Dye fixing agents.
Thermal analysis (DSC): Principle, Instrumentation and application in Textiles

TOTAL: 45 HOURS

REFERENCES

COURSE OUTCOMES
- Design a water purifier
- Discuss the mechanism of polymer formation
- Classify dyes and describe its interaction with fibers using bonding.
- Analyse the usage of specialty chemicals in dyes
OBJECTIVES

- To understand the concept of equilibrium of particles and rigid bodies.
- To understand the concept of first and second moment of area.
- To understand the concept of various types of frictions.
- To understand the principle of work energy method, Newton’s law and impact of elastic bodies.

BASICS & STATICS OF PARTICLES 9 Hours

EQUILIBRIUM OF RIGID BODIES 9 Hours
Moment of a force about point – Varignon’s theorem- Moment of a couple-Resolution of force in to force couple system-Resultant of coplanar non concurrent system - Types of supports and their reactions- Requirements of stable equilibrium - Equilibrium of Rigid bodies in two dimensions.

PROPERTIES OF SURFACES AND SOLIDS 9 Hours
First moment of area and the Centroid of sections Rectangle, circle, triangle, T section, I section Angle section and Hollow section. Second and product moments of plane area Rectangle, triangle, circle. T Section, I section, Angle section and Hollow section, Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia.

FRICTION 9 Hours
Frictional force-Law of Coulomb friction , simple contact friction, Rolling resistance and Belt friction, Ladder friction, Wedge friction.

DYNAMICS OF PARTICLES 9 Hours
Kinematics: Rectilinear & Curvilinear motion of particles, Displacements Velocity and acceleration.

L: 45 Hr, T: 15 Hr, TOTAL: 60 HOURS
REFERENCES

COURSE OUTCOMES
- Explain the concept of equilibrium of particles and rigid bodies.
- Apply the concepts of equilibrium and moment of inertia for various shapes sections.
- Make use of various concepts of friction.
- Solve problems using the concepts in kinematics and kinetics.
OBJECTIVES
At the end of the course the students would be exposed to

- Basic concepts about Textile Fibres
- Basic concepts about Specialty Fibres

INTRODUCTION

NATURAL FIBRES
Vegetable fibres:
Cotton: Development of fibre in seed, morphological & chemical structure, physical & chemical properties and applications.
Chemical constituents, physical, chemical properties and applications of jute and linen fibres.
Animal fibres:
Wool: Types of wool, grading of wool, morphological & chemical structure, physical & chemical properties and applications.
Silk: Types, morphological & chemical structure, physical & chemical properties and applications. Production of silk.

REGENERATED FIBRES
Basic production system of man-made fibres. Merits and demerits of man-made fibres; Viscose rayon: Raw material, physical & chemical properties and applications; Concept of high wet and low wet modulus fibres; Introduction to acetate & triacetate fibres, modal, lyocell and Tencel fibre.
Protein Base: General properties and applications of Caesin, soyabean and zein fibres.

SYNTHETIC FIBRES
Polyamide: Raw material, physical & chemical properties and applications of Nylon 6 & Nylon 6, 6; Polyester: Raw material, physical & chemical properties and applications. Flame retardant PET, Hygroscopic PET fibre and their applications. Polycrylonitrile fibre: Raw material, physical & chemical properties and applications of acrylic and modacrylic fibre; Polypropylene and polyethylene: Raw material, physical & chemical properties and applications.
SPECIALTY FIBRES AND FIBRE IDENTIFICATION

9 Hours
Raw material, General properties and applications of Aramid fibre, Carbon, Glass, PVA, Polyurethane, PVC fibre; Identification of textile fibres by microscopic, solubility, flammability and density methods.

TOTAL: 45 HOURS

CASE STUDY:
1. Demographic cultivation and production of cotton fibre in India.
2. Production trend of synthetic fibres for last five years.

REFERENCES

COURSE OUTCOMES
- Classify the textile fibres
- Describe about the properties of major textile fibres
- Compare the fundamental properties of major fibres
- List the end uses of major textile fibres
- Describe about the structure of textile fibres
OBJECTIVES

- The experiments are designed to illustrate phenomena in different areas of Physics and to expose you to measuring instruments.
- The laboratory provides a unique opportunity to validate physical theories in a quantitative manner.
- Laboratory experience demonstrates the limitations in the application of physical theories to real physical situations.
- In general, the purpose of these laboratory exercises is both to demonstrate some physical principle and to teach techniques of careful measurement.

LIST OF EXPERIMENTS

Any Ten Experiments
1. Lee’s disc - determination of thermal conductivity of a bad conductor
2. Air wedge - determination of thickness of a given specimen.
3. Spectrometer - determination of wavelength of mercury source using grating
4. Compound pendulum - determination of acceleration due to gravity.
5. Carey foster bridge – determination of specific resistance of a given coil of wire.
7. Non-uniform bending – determination of Young’s modulus
8. Ultrasonic interferometer – determination of velocity of sound and compressibility of liquid.
9. Band gap determination of a semiconductor using post office box
10. Semiconductor laser:
    a. Determination of wavelength of laser using grating
    b. Particle size determination
    c. Acceptance angle of optical fibre
11. Torsional pendulum - determination of Rigidity modulus of the wire
12. Field along the axis of a coil – Determination of magnetic moment.

Demonstration experiments:
1. Determination of solar cell parameters
2. Hall effect
3. Four probe apparatus
4. Animations – (Laser, Fiber optics and hysteresis curve)

TOTAL: 45 HOURS

COURSE OUTCOMES

- Determine different physical properties of a material like the thermal conductivity thickness of the material, etc.
- Perform experiments involving the physical phenomena like interference and diffraction.
- Apply physical theories in real life situations by also taking into account its limitations.
OBJECTIVES

- To analyze webpage and identify its elements and attributes
- Learn the basic language of the web: HTML.
- Be able to embed social media content into web pages.
- Implement and understand how to get used with MATLAB

List of Experiments

1. Study of HTML tags
2. Design a web page using basic html tags
3. Design a webpage using table tags
4. Design a webpage using forms and frames
5. Design a webpage using list tags
6. Develop a website of your interest (include a minimum of 3 web pages)
7. Study of MATLAB functions
8. Working with matrix operations
9. Working with image arithmetic
   a. Addition of two images
   b. Subtraction of two images
10. Write a Matlab program for the following
    a. Read an image and crop
    b. Read an image and resize
11. Working with Integration and Differentiation
12. Working with graphs

COURSE OUTCOMES

On successful completion of this course the student should be able to

1. Develop static web pages using HTML. [S]
2. Perform basic MATLAB operations. [S]
3. Make use of MATLAB to work with images and graphs. [S]
4. Perform integration and differentiation using MATLAB. [S]
5. Develop team spirit and professional attitude towards the development of simple web applications [A]
LIST OF EXPERIMENTS

1. Identification of textile fibres by microscopy method.
2. Studying swelling behavior of cotton/Viscose fibres.
3. Fibre maturity measurement by caustic soda method.
4. Identification of textile fibres by flammability methods.
5. Determination of moisture absorption properties of textile fibres.
6. Identification of textile fibres through solubility test.
7. Determination of blend proportion of given samples.
8. Effect of acids on fibres under various factors (Temperature/Time /Concentration).
9. Effect of alkalis on fibres under various factors (Temperature/ Time / Concentration).
10. Effect of oxidizing agents on fibres under various factors (Temperature/ time/Concentration).
12. Study of spin finish in manufactured fibres through soxhlet extraction

Creative Evaluation (Any two)

1. Properties of various domestic cotton variety
2. Properties of various imported cotton variety
3. Collection and characteristics analysis of various micro denier fibres
4. Collection and study of modified polyester fibres samples

TOTAL: 45 HOURS

COURSE OUTCOMES

➢ Identify & distinguish the major textile fibres
➢ Estimate the moisture regain and blend proportion of textile fibres
➢ Experiment on effect of temperature, time and concentration on fibre degradation
➢ Sketch the cross sectional and longitudinal view of major textile fibres
➢ Evaluate the spin finish percentage of manmade fibre & molecular weight of a polymer
OBJECTIVES
• To inculcate the basic need for family life and need to maintain peace in it.
• To lead spiritual development through good family life.
• To know the 5C’s & 5E’s.
• To know the examples for Self Control.
• To practice meditation & Pranayamam.

PEACE IN FAMILY 4 Hours

Greatness of womanhood: Good culture – Cultured behavioral patterns – Love and Compassion.

BLESSING – EFFECTS IN FAMILY 2 Hours
Introduction - Benefits – Mental Frequency level - Effect of vibrations – Make blessings a daily habit.
Training: Method of blessings.

FOOD IS MEDICINE 2 Hours
Food is medicine - Healthy food habits- Method of Medicinal food preparations – Food based on character.

PERSONALITY DEVELOPMENT CONCEPTS - 5C’S & 5E’S 4 Hours
Personality Concepts: Definition - Types of Personality- Personality development activities- Factors affecting personality development - Tools to improve personality- Steps to a dynamic personality-5 C’s and 5 E’s.
Time Management: Importance –Training.

LEADERSHIP TRAITS & SELF DEVELOPMENT 4 Hours
Leadership Traits – Carrying oneself - Factors of leadership – Principles of leadership.


Training: Method of Self-Control.
SPIRITUAL DEVELOPMENT THROUGH KAYA KALPA YOGA  4 Hours

Spiritual development: Need – Development through Kaya Kalpa - Responsibility of men and women – Need of morality.

Kaya Kalpa yoga: Aim - kayakalpa philosophy - Importance of kayakalpa training.

Training: Kaya Kalpa Yoga.

EXERCISE & MEDITATION  10 Hours
Simplified Physical Exercise & Meditation Practice.

L: 16 Hr, P: 14, Total: 30 Hours

REFERENCES BOOKS:
1. Dr. A. Chandra Mohan, “Leadership and Management”, Himalaya Publication House,

COURSE OUTCOMES:
- Behaves as a responsible family member.
- Develop skills for personality improvement.
- Acquire practical knowledge on self-control technique for teenagers.
- Identify the significant of Genetic Centre for the Soul functional base operation.