

HU110 ENGLISH

HU110	ENGLISH	3-0-2
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COURSE OBJECTIVE:

The objective of this foundational course is to develop the second language learners' ability to use the four fundamental language skills – listening, speaking, writing and reading. The objective of this laboratory is to practice English phonetics through audio & visual aids and computer software. It intends to enable student to speak English correctly with confidence.

COURSE CONTENT:

Grammar – Applied Grammar and usage, Parts of Speech, Articles, Tenses, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure, Punctuations.

Vocabulary Development – Using Dictionaries and Thesaurus, Synonyms, Antonyms, Homophones, One Word Substitution, Affixation: Prefixes & Suffixes, Derivation from root words, Jargon, Scientific Jargon.

Developing Reading Skills – Reading Comprehension, Process, Active & Passive Reading, Reading Speed Strategies, Benefits of effective reading, note-making, note-taking, Reading comprehension of technical material and SQ3R reading technique

Developing Writing Skills – Planning, Drafting & Editing, Writing with style, right-words selection, writing effective sentences, developing logical paragraphs, art of condensation, précis, essay, technical definition and technical description

Business Correspondence – Business Letters, Parts & Layouts of Business Letters, Writing Resume/ Application Calling/ Sending Quotations/ Orders/ Complaints and E-mails

Topics for the Laboratory:

1. Basic Grammar & Vocabulary Practice (Synonyms, Antonyms, Analogies, Sentence Completion, Correctly Spelt Words, Idioms, Proverbs, Common Errors).
2. Phonetic Symbols, Pronunciations
3. Listening Skills – Including Listening Comprehension
4. Extempore and JAM (Just a Minute Session)
5. Role Play – I
6. Role play – II
7. Body Language
8. Debate
9. Oral Presentation – Preparation & Delivery using Audio – Visual Aids with stress on body language and voice modulations. (Topics to be selected by the Instructor)

COURSE OUTCOMES

Student after successful completion of course must possess sound language skills. They must also feel confident in communicating their ideas and feelings. After laboratory exercises, students must possess sound language skills. They must also feel confident in communicating their ideas to others.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment. Laboratory assessment will be based on assignments, presentations, and interview of each candidate.

REFERENCES

A.J. Thomson and A.V. Martinet, A Practical English Grammar, Oxford IBH Pub
Sanjay Kumarm Pushp Lata, English for Effective Communication, Oxford

COURSE OBJECTIVE:

The objective of this course is to help students to acquire reading and writing skills in a self-learning mode.

COURSE CONTENT:**Exercises to be performed by students:**

- Reading text selection from the list given below
- To write a book-review

COURSE OUTCOMES

Student after successful completion of course must possess sound comprehension skills. They must also feel confident in writing reviews and comments on the read material.

EVALUATION

Evaluation will be continuous an integral part of the class. Assessment will be based on assignments, presentations, and interview of each candidate.

REFERENCES

1. My Experiments with Truth by Mahatma Gandhi
2. Wings of Fire by Dr. APJ Abdul Kalam
3. History of Everything by Stephen Hawking
4. A Passage to India by E.M. Forster
5. The Argumentative Indian by Amartya Sen
6. The Old Man and the Sea by Ernest Hemingway
7. Life of Pi by William Dalrymple
8. The Alchemist by Paulo Coelho
9. The Eighth Habit by Stephen Covey
10. The Road Less Travelled by M.Scott Peck

MA110 MATHEMATICS- I

MA110	MATHEMATICS- I	3-1-0
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COURSE OBJECTIVE:

The objective of this foundational course is to review mathematical concepts already learnt in higher secondary. This course will also introduce fundamentals of mathematical functions, derivatives and aspects of calculus to students.

COURSE CONTENT:

Recapitulation of Mathematics: Basics of Differentiation, Rolle's and Lagranges Theorem, Tangents and Normals, Indefinite Integral (Substitution, Integration using Trigonometric Identity & Integration by Parts & Definite Integral).

Ordinary Derivatives & Applications: Expansion of functions by Maclaurin's & Taylor's Theorem (One Variable), Maxima and Minima of functions of two variables, Curvature (Radius, Center & Circle of Curvature for Cartesian Coordinates), Curve Tracing.

Partial Derivatives & Applications: Definition, Euler's Theorem for Homogeneous Functions, Differentiation of Implicit Functions, Total Differential Coefficient, Transformations of Independent Variables, Jacobians, Approximation of Errors.

Integral Calculus: Definite Integrals as a Limit of Sum, Application in Summation of series, Beta and Gamma functions (Definitions, Relation between Beta and Gamma functions, Duplication formula, Applications of Beta & Gama Functions).

Applications of Integral Calculus: Multiple Integral (Double & Triple Integrals), Change of Variables, Change the Order of Integration, Applications of Multiple Integral in Area, Volume, Surfaces & Volume of Solid of Revolution about X-Axis & Y-Axis.

COURSE OUTCOMES

The curriculum of the Department is designed to satisfy the diverse needs of students. Coursework is designed to provide students the opportunity to learn key concepts of mathematical functions, partial derivatives as well as fundamentals and applications of integral calculus.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

Michael Greenberg, Advanced Engineering Mathematics, Second Edition, Pearson Education, 2002 (Indian Edition).

B.V. Rammana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company, 2007.

Potter, Goldberg & Edward, Advanced Engineering Mathematics, Oxford University Press.

S. S. Shastry, Engineering Mathematics, PHI Learning

C.B. Gupta, Engineering Mathematics I & II, McGraw Hill India, 2015

COURSE OBJECTIVE:

The objective of this foundational course is to review mathematical concepts already learnt in higher secondary. This course deep understanding of matrix, differential equations as well as a strong sense of how useful the subject can be in other disciplines of learning.

COURSE CONTENT:

Matrices & Linear Systems: Rank of a Matrix (By reducing it to Elementary Transformation, Echelon & Normal Forms), Solution of Simultaneous equations by Elementary Transformation Methods, Consistency & Inconsistency of Equations, Eigen Values & Eigen Vectors, Cayley- Hamilton Theorem..

Ordinary Differential Equations-I: First-order differential equations (Separable, Exact, Homogeneous, Linear), Linear differential Equations with constant coefficients.

Ordinary Differential Equations-II: Homogeneous linear differential equations, Simultaneous linear differential equations. Second-Order Linear Differential Equations with Variable Coefficients: Solution by Method of Undetermined Coefficients, ByS Known Integral, Removal of First Derivative, Change of Independent Variable and Variation of Parameters.

Partial Differential Equations-I: Definition, Formulation, Solution of PDE (By Direct Integration Method & Lagranges Method), Non-Linear Partial Differential Equation of First order {Standard I, II, III & IV), Charpit's General Method of Solution Partial Differential equations.

Partial Differential Equations-II: Partial Differential Equations with Constant Coefficients (Second and Higher Orders Homogeneous and Non- Homogeneous equations), Partial differential Equations Reducible to equations with constant coefficients, The Method of Separation of Variables.

COURSE OUTCOMES

The curriculum of the Department is designed to satisfy the diverse needs of students. Coursework is designed to provide students the opportunity to learn key concepts of matrix, differential equations and their applications.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

- Dean G. Duffy, Advanced Engineering Mathematics with MATLAB, CRC Press, 2013.*
E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons Inc.
Michael Greenberg, Advanced Engineering Mathematics, Second Edition, Pearson Education, 2002 (Indian Edition).
B.V. Rammana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company, 2007.
Shanti Narayan, A Course of Mathematical Analysis. S. Chand & Co. Delhi.
Marwaha, Introduction to Linear Algebra, PHI Learning.

COURSE OBJECTIVE:

This course introduces students to environment concerns. Students are expected to learn about environment, factors affecting it, environmental ethics and its protection through lectures, presentations, documentaries and field visits.

COURSE CONTENT:

Introduction: Domestic and Global Environmental concerns, principles of sustainable development, Sustainable agriculture, organic farming, bio-fuels, Threats for sustainability

Environmental Ethics & Legislations: Enforcement of Environment laws in India – The water act, The Air (Prevention and Control of Pollution) Act, 1981, The Environment (Protection) Act, 1986, Environmental Auditing

Environmental Pollution: Air Pollution – sources, types of air pollutants, National Ambient Air Quality Standards, Controlling Air Pollution. Water pollution – sources, types of water pollutants, water quality indicators, water quality standards. Soil Pollution - types of soil pollutants: industrial wastes, pesticides, fertilizers and manures, salination of soil, Controlling Soil Pollution.

Environmental Challenges: Local Challenges - Solid Waste – Impact of solid waste on natural resources, Deforestation; Global Challenges - climate change and global warming, Kyoto Protocol, Greenhouse Gases, Ways to reduce Greenhouse gases emissions, Carbon Footprint, ways to reduce carbon footprint, Carbon Trading.

Sustainable habitat, industrialisation and urbanization: Concept of Green Building, Volatile Organic Compounds (VOC), GRIHA Rating, LEED Rating, HVAC, Hybrid Car Technology, Industrial ecology, India's renewable energy capacity. *Green Technology & Green Business:* Green Business, Green Computing, E-waste management.

COURSE OUTCOMES

Student after successful completion of course must possess an understanding of environment, eco-system and its consequences of unbalancing the environment. After successful completion of this course, student will earn 2 credits.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

- R. Rajagopalan, Environmental Studies, Oxford IBH Pub, 2011.*
Kogent Learning Solutions Inc., Energy, Environment, Ecology and Society, Dreamtech, 2012.
Rag, R. L, Ramesh, Lekshmi Dinachandran, Introduction to sustainable engineering

COURSE OBJECTIVE:

This course introduces students about the basic fundamentals of Information Technology (IT). Students are expected to learn about applications of IT in communication, multimedia, internet and cloud computing.

COURSE CONTENT:

Data and Information: Introduction, Type of data, Simple model of computer.

Data processing using a computer: Introduction to Operating System, Data storage Media, High capacity network storage media.

Introduction to Database Management System; Database modelling; Relational model; Distributed DBMS; Data warehouse, Data mining; Classification of Language and Applications

IT Application in Communication: Network services-telephone services, Cellular telephone services, Radio and TV broadcasting, Audio-Visual conferencing, Video-on-demand.

Internet Technology: Introduction, Working of internet, Introduction to network protocol and topologies, Types of network: LAN, WAN, Web browser.

Internet Services: E-mail, Telnet, FTP, WWW, HTML, URL.

IT Application in Multimedia: Introduction, Components of multimedia and challenges, Video compression, Video coding technology: JPEG, MPEG, And JBIG.

Introduction to cloud computing: Types, Services, Models, Characteristics, Benefits and Challenges, Application, Limitations.

IT Application in E-Commerce and E-Governance: Introduction, Different Types of E- Commerce with examples, Advantages and disadvantages, E-Commerce in India, E-Services, E-Commerce security, Internet security and ethics, Technology issues, Social issues, Introduction to E-Governance, Challenges, Application, advantages, Case study of MP-online and IRCTC

Social impact of information technology: Introduction, Social Uses of World Wide Web, Social networking Services, Privacy, security and integrity of Information ,Disaster recovery Intellectual property rights, IT Enabled Services and careers, Career in information technology, Case study of NPTEL.

References:

V.Rajaraman, Introduction to Information Technology, PHI
E Balagurusamy, Fundamentals of Computers, TMH
Santiram Kal Basic Electronics, PHI
M.N. Rao Cloud Computing, PHI

COURSE OBJECTIVE:

This course introduces students to civil engineering and its sub-domains. Students are expected to learn about scope, current and future trends in infrastructure industry, jobs, innovations & research opportunities in the field of civil engineering. Course content will be covered through lectures, assignments, case-studies, presentations, documentaries and field visits.

COURSE CONTENT:

Overview of Civil Engineering, types of Infrastructures, Effect of infrastructure facilities on economy and environment, Role of Civil Engineers in the infrastructural Development Introduction to sub-domains of Civil Engineering, Size of Infrastructure Industry, emerging trends in infra spending through public and public-private partnership (PPP), talent shortage, and global trends in workforce mobility and skill-demands.

Stages in the life of construction – Design, Construction, Maintenance, Repair, Demolition/Recycling; an overview of Indian Standards, units and conversion factors for Lengths, Areas, Volumes and Weights; Opportunities and challenge of India's Infrastructure, Interdisciplinary nature of Civil Engineering Projects.

Roads: Types of Roads, Nagpur Road Plan, Components of Road and their function; Bridges: Important parts of bridges, classification of bridges; Types of Dams.

Properties and classification of common building materials – Stones, Bricks, Sand, Limes, Cement, Mortar, Concrete, Steel.

Overview of Indian Road Congress, National Highway Authority of India (NHAI) and American Society of Civil Engineers (ASCE), Emerging areas and new technologies in the field of civil engineering.

COURSE OUTCOMES

After successful completion of course, Students are expected to possess an in-depth understanding and knowledge about the scope, current and future trends in infrastructure industry, elementary terminologies, learning resources and career-opportunities in the field of civil engineering and its allied domains.

EVALUATION

Evaluation will be continuous an integral part of the class followed by final examination.

REFERENCES

Elements of Civil Engineering by MD Saikia, B Mohan Das, MM Das, PHI Learning Private Limited, 2015

Prakash M.N. Shesha, Ganesh B., A Textbook on Elements of Civil Engineering, PHI Learning Pvt. Ltd.

Study material provided by the instructor

COURSE OBJECTIVE:

The primary objective of the course is to introduce concepts in engineering design to students from all the engineering disciplines. This course broadly covers the prerequisites for an innovative design followed by concepts of products design cycle right from planning, designing, manufacturing, distributing and its usage.

COURSE CONTENT:

Introduction to engineering Design process: Its importance, types of designs, various ways to think about design like visualization, photography etc, simplified iteration model, design versus scientific method, a problem solving methodology.

Considerations of a good design Achievement of performance requirements, Total life cycle, Regulatory and social issues in Indian context

Description of Design Process Conceptual Design, Embodiment Design, Detail Design, Planning for Manufacture, Planning for distribution, Planning for Use, Planning for the retirement of the product.

Product Design Cycle, Identification of customer needs and market research essentials, concept generation, technology and market assessment

An exposure to various aspects of design including visual, creative and user-centric design (Visual merchandising, trends, materials, technology and techniques). Evolution in Transportation and Communication Technology, Bullock Cart to Lear Jets, Personal messengers to Cell Phones, Fighter planes

Introduction to any one as a case study:

1. Communication Design
2. Industrial Design
3. IT Integrated Design
4. Textile Design
5. Inter disciplinary Design

COURSE OUTCOMES

Student after successful completion of course must possess an understanding of various concepts of design, product design cycle, and significant principles inevitable for design of any engineering product or services.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

George E. Dieter and Linda C. Schmidt, Engineering Design, McGraw Hill Education (India) Pvt. Ltd.
Arvid Eide, Introduction to Engineering Design, McGraw Hill.
Otto. K and Wood, K, Product Design, Pearson Education

COURSE OBJECTIVE:

This course introduces students to mechanical engineering and its sub-domains. Students are expected to learn about scope, current and future trends, jobs, innovations & research opportunities in the field of mechanical engineering. Course content will be covered through lectures, assignments, case-studies, presentations, documentaries and field visits.

COURSE CONTENT:

What is Engineering, Who are Mechanical Engineers, Overview of Mechanical Engineering, its domains, scope and its utility in different areas; Specializations available with in mechanical Engineering (thermal, production and design) and job opportunities in mechanical Engineering.

Basic definitions of terms related to Thermodynamics, First and Second law of Thermodynamics, Properties of Steam, Introduction to Boilers, Terminology of IC Engines, Two and Four Stroke Petrol and Diesel Cycle.

Introduction to mechanical properties, basic manufacturing processes, pattern, type and its use in metal casting, Introduction of welding, brazing and soldering processes

Case study on any topic from Manufacturing Engineering Magazine Published by Society of Manufacturing Engineers (USA), Machinist Magazine, Technorama published by Institution of Engineers (India) and Manufacturing Today and any other magazine related to mechanical engineering..

Overview of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Society of Automotive Engineers, American Society of Mechanical Engineers (ASME); Indian Society of Mechanical Engineers (ISME) etc ; Emerging areas and new technologies in the field of mechanical engineering (3D Printing)

COURSE OUTCOMES

After successful completion of course, Students are expected to possess basic understanding and knowledge about the scope, current and future trends in mechanical engineering. The versatility of the mechanical engineering branch and career-opportunities in this field will enable the students to explore the new avenues in their future endeavours.

EVALUATION

Evaluation will be continuous an integral part of the class followed by final examination.

REFERENCES

Jonathan Wickert, Kemper Lewis, An Introduction to Mechanical Engineering, CENGAGE Learning.
Michael Clifford, Kathy Simmons, Philip Shipway, An Introduction to Mechanical Engineering: Part 1 and Part 2, Taylor and Francis

COURSE CONTENT:

SIGNALS: Introduction, Representation of Discrete-time Signals: Graphical Representation, Functional Representation, Tabular Representation, Sequence Representation. Elementary Signals: Unit Step Function, Unit Ramp Function, Unit Parabolic Function, Unit Impulse Function, Sinusoidal Signal, Real Exponential Signal, Complex Exponential Signal, Rectangular Pulse Function, Triangular Pulse Function, Signum Function, Sinc Function, Gaussian Function. Basic Operations on Signals: Time Shifting, Time Reversal, Amplitude Scaling, Time Scaling, Signal Addition, Signal Multiplication. Classification of Signals: Deterministic and Random Signals, Periodic and Non-periodic Signals, Energy and Power Signals, Causal and Non-causal Signals, Even and Odd Signals.

DIODE AND ITS CIRCUITS: Introduction to Semiconductor theory: Classification of materials- Insulators, conductors and semiconductors and their Energy Bands, Types of semiconductors- Intrinsic, Extrinsic. PN Junction Diode: Biasing and operation of PN Diode, V-I characteristics, Limiting Values of PN Diode, Breakdown in PN Diode, Applications of PN Diode.

Zener Diode: V-I Characteristics, Applications of Zener Diode.

Rectifier Circuits: PN Diode as a Rectifier, Half Wave Rectifier, Full Wave Rectifier, Full Wave Bridge Rectifier, Clipping Circuits, Clamper Circuits.

NUMBER SYSTEMS: Introduction, Binary Number System, Octal Number System, Decimal Number System, Hexadecimal System, Conversions: Binary to Decimal conversion and vice-versa, Octal to Decimal Conversion and vice versa, Hexadecimal to Decimal Conversion and vice-versa, Binary to Hexadecimal Conversion and vice-versa, Octal to Decimal and vice-versa, Octal to Hexadecimal and vice-versa.

Complements: One's Complement, Two's Complement, Nine's Complement, Ten's Complement.

Binary Arithmetic (addition, subtraction, multiplication, division), Octal Arithmetic, Hexadecimal Arithmetic, Signed Numbers, Floating Numbers, Codes.

BOOLEAN ALGEBRA AND LOGIC GATES: Introduction, Definitions, Principle of Duality, Basic Theorems, Applications of Boolean Algebra, Boolean Functions, Complement of Boolean Function.

Logic Gates (Symbol, Truth Table, Logic Diagram): And, OR, NOT, NAND, NOR, XOR, XNOR. Universal Gates: NAND Gate and NOR Gate implementation, Realization of other Logic Operations using NAND/NOR. Buffer, Negative and Positive Logic, Mixed Logic.

COMMUNICATIONS SYSTEMS: Introduction to Communication Systems, Elements of Communication Systems: Transmitter, Channel, Receiver, Noise. IEEE Frequency Spectrum Used in Communication Systems: Frequency Bands, Units of Measurement and Abbreviations, Bandwidth and other Parameters, Spectrum Assignment and Regulation. Need of Modulation, Amplitude Modulation, Frequency Modulation, Communication Media and its Classification: Guided and Unguided Propagation.

EVALUATION

Evaluation will be continuous an integral part of the class followed by final examination.

REFERENCES

Hwei P. Hsu, Schaum's Outline of Signals and Systems, McGraw-Hill.

A.V. Oppenheim, A.S. Willsky, S Hamid Nawab, Signals and Systems, PHI.

A Anand Kumar, Signals and Systems, PHI.

Basics of Electronics Engineering, Wiley India Pvt. Ltd.

COURSE CONTENT:

SIGNALS: Introduction, Representation of Discrete-time Signals: Graphical Representation, Functional Representation, Tabular Representation, Sequence Representation. Elementary Signals: Unit Step Function, Unit Ramp Function, Unit Parabolic Function, Unit Impulse Function, Sinusoidal Signal, Real Exponential Signal, Complex Exponential Signal, Rectangular Pulse Function, Triangular Pulse Function, Signum Function, Sinc Function, Gaussian Function. Basic Operations on Signals: Time Shifting, Time Reversal, Amplitude Scaling, Time Scaling, Signal Addition, Signal Multiplication. Classification of Signals: Deterministic and Random Signals, Periodic and Non-periodic Signals, Energy and Power Signals, Causal and Non-causal Signals, Even and Odd Signals.

FOURIER SERIES REPRESENTATION OF PERIODIC SIGNALS: Introduction, Representation of Fourier Series, Existence of Fourier Series, Trigonometric Form of Fourier Series: Evaluation of Fourier Coefficients of the Trigonometric Fourier Series, Cosine Representation (Alternate Form of the Trigonometric Representation), Wave Symmetry: Even or Mirror Symmetry, Odd or Rotation Symmetry, Half Wave Symmetry, Quarter Wave Symmetry. Exponential Fourier Series: Determination of the Coefficients of Exponential Fourier Series, Trigonometric Fourier Series from Exponential Fourier Series, Exponential Fourier Series from Trigonometric Fourier Series, Cosine Fourier Series from Exponential Fourier Series. Properties of Continuous-Time Fourier Series: Linearity Property, Time Shifting Property, Time Reversal Property, Time Scaling Property, Time Differentiation Property and Time Integration Property.

Unit-III DIODE AND ITS CIRCUITS: Introduction to Semiconductor theory: Classification of materials- Insulators, conductors and semiconductors and their Energy Bands, Types of semiconductors- Intrinsic, Extrinsic. PN Junction Diode: Biasing and operation of PN Diode, V-I characteristics, Limiting Values of PN Diode, Breakdown in PN Diode, Applications of PN Diode. Zener Diode: V-I Characteristics, Applications of Zener Diode. Rectifier Circuits: PN Diode as a Rectifier, Half Wave Rectifier, Full Wave Rectifier, Full Wave Bridge Rectifier, Clipping Circuits, Clamper Circuits.

NUMBER SYSTEMS: Introduction, Binary Number System, Octal Number System, Decimal Number System, Hexadecimal System, Conversions: Binary to Decimal conversion and vice-versa, Octal to Decimal Conversion and vice versa, Hexadecimal to Decimal Conversion and vice-versa, Binary to Hexadecimal Conversion and vice-versa, Octal to Decimal and vice-versa, Octal to Hexadecimal and vice-versa. Complements: One's Complement, Two's Complement, Nine's Complement, Ten's Complement. Binary Arithmetic (addition, subtraction, multiplication, division), Octal Arithmetic, Hexadecimal Arithmetic, Signed Numbers, Floating Numbers, Codes.

BOOLEAN ALGEBRA AND LOGIC GATES: Introduction, Definitions, Principle of Duality, Basic Theorems, Applications of Boolean Algebra, Boolean Functions, Complement of Boolean Function. Logic Gates (Symbol, Truth Table, Logic Diagram): And, OR, NOT, NAND, NOR, XOR, XNOR. Universal Gates: NAND Gate and NOR Gate implementation, Realization of other Logic Operations using NAND/NOR. Buffer, Negative and Positive Logic, Mixed Logic.

EVALUATION

Evaluation will be continuous an integral part of the class followed by final examination.

REFERENCES

Hwei P. Hsu, Schaum's Outline of Signals and Systems, McGraw-Hill.
A.V. Oppenheim, A.S. Willsky, S Hamid Nawab, Signals and Systems, PHI.
A Anand Kumar, Signals and Systems, PHI.
Basics of Electronics Engineering, Wiley India Pvt. Ltd.

COURSE OBJECTIVE:

1. To familiarize with the basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy
2. To familiarize with the production of simple models in the above trades.

COURSE CONTENT:

FITTING: Tools & Equipments – Practice in filing. Making Vee Joints, Square, Dovetail joints and Key making - plumbing.

Suggested Mini project – Assembly of simple I.C. engines

CARPENTRY: Tools and Equipments- Planning practice. Making Half Lap, Dovetail, Mortise & Tenon joints.

Suggested Mini project - model of a single door window frame.

SHEET METAL: Tools and equipments– practice. Making rectangular tray, hopper, scoop, etc.

Suggested Mini project - Fabrication of a small cabinet, dust bin, etc.

Tools and equipments - Arc welding of butt joint, Lap joint, Tee fillet. Demonstration of gas welding, TIG & MIG welding.

SMITHY: Tools and Equipments – Making simple parts like hexagonal headed bolt, chisel.

FOUNDRY: Tools and Equipments, Mould making, conducting casting operation of a job

COURSE OUTCOMES

1. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
2. An ability to design and conduct experiments
3. An ability to design a system, component, or process to meet desired needs .ethical, health and safety, manufacturability, and sustainability
4. An ability to use the techniques, skills, and modern engineering tools necessary for Engineering practices

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

S K Hazara Choudhary, Gopal.T.V, Kumar.T, and Murali.G, “A first course on workshop practice – Theory, Practice and Work Book”, Suma Publications, Chennai, 2005.

Kannaiah.P and Narayanan.K.C, “Manual on Workshop Practice”, Scitech Publications

Venkatachalapathy.V.S, “First year Engineering Workshop Practice”, Ramalinga Publications

COURSE OBJECTIVE:

1. To familiarize with the construction of geometrical figures
2. To familiarize with the projection of 1D, 2D and 3D elements
3. To familiarize with the sectioning of solids and development of surfaces
4. To familiarize with the Preparation and interpretation of building drawing

COURSE CONTENT:

Projections of Points, Straight Lines and Planes: Types and use of Lines, Lettering & Dimensioning, Various types of projection System, Projection of Points in different quadrants, projections of lines and planes for parallel, perpendicular & inclined to horizontal and vertical reference planes.

Projections Solids and Development of Surfaces: Cylinder, Cone, Pyramid, & Sphere with axes parallel, perpendicular & inclined to both reference planes. Development of surfaces of various solids. Sections of Solids Section planes, Sectional views, True shape of Sections for Prism, Cylinder, Pyramid, and Cone & Sphere. Orthographic Projections of Simple objects and Machine Components like Bolts and Screw.

Isometric projections: Isometric scales, isometric views of Simple objects.

Introduction to computer-aided drafting (CAD): Cartesian and Polar Co-ordinate system, Absolute and Relative Co-ordinates systems; Basic drawing commands: Line, Point, Rectangle, Polygon, Circle, Arc, Ellipse, Polyline; Basic editing Commands: Basic Object Selection Methods, Window and Crossing Window, Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror. Display Commands: Zoom, Pan, Redraw, and Regenerate; Simple dimensioning and text, Simple exercises.

Solid modelling: Basics of 2-D solid modelling

LABORATORY

Drawing for topics covered in the theory as suggested by the course coordinator.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

N.D. Bhatt and V.M.Panchal, Engineering Drawing Plane and Solid Geometry, Charotar Publishing House.

James leach, AutoCAD 2015 Instructor, SDC Publications

COURSE OBJECTIVE:

1. To familiarize with the basic concept of Mechanical Engineering
2. To familiarize with the scope of Mechanical Engineering
- 3 To familiarize with the job prospects of Mechanical Engineer

COURSE CONTENT:

MANUFACTURING PROCESSES: Sheet Metal Work processes (applications, advantages/disadvantages). Welding: Types – Equipments– Tools and accessories – Techniques employed - applications, advantages / disadvantages – Gas cutting – Brazing and soldering. Lathe Practice: Types - Description of main components – Cutting tools – Work holding devices – Basic operations. Simple Problems. Drilling Practice: Introduction – Types – Description – Tools. Simple Problems.

POWER GENERATION: External and internal combustion engines Auto diesel & dual cycles, comparative study – Hydro, thermal and nuclear power plants (layouts, element/component description, advantages, disadvantages, applications). Simple Problems. Introduction to Steam water and gas turbines, basics of Rankine & Joule cycle, centrifugal pumps.

MACHINE ELEMENTS: Springs: Helical and leaf springs – Springs in series and parallel. Cams: Types of cams and followers – Cam profile Power Transmission: Gears (terminology, spur, helical and bevel gears, gear trains). Belt drives (types). Chain drives. Simple problems. Introduction to mechanisms, four bar chain , inversions .

THERMAL ENGINEERING: Basic concepts of thermodynamics , Concept of system ,Introduction to Zeroth , first & second law of thermodynamics , salient features of steam boilers , accessories & mountings ,High pressure boilers Basic modes of heat transfer Fourier's law , Stefan Boltzmann's law ,Newton's law . Concept of refrigeration & air conditioning, ton of refrigeration, COP. working of domestic refrigerator & air conditioner

MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS: Mechanisms of plastic deformation, slip and twinning – Types of fracture –mechanical Properties of materials , Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test Izod and charpy, fatigue and creep failure mechanisms. Ferrous & non ferrous materials, non metallic materials, Alloys & phase diagram.

LABORATORY

Experiments as suggested by the course coordinator.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

COURSE OBJECTIVE:

1. To familiarize with different branches of mechanics
2. To familiarize with Static equilibrium of particles
3. To familiarize with Properties of surfaces and volumes.
4. To familiarize with fundamental concepts of dynamics

COURSE CONTENT:

Coplanar Concurrent Forces: Introduction to Engineering Mechanics: What is Engineering Mechanics? Classification of Engineering Mechanics, Statics, Dynamics, Kinematics, Kinetics etc. Fundamental Laws of Mechanics.

Resolution and Composition of Forces: Force, Pressure and Stress, Free Body Diagram, Bow's Notation, Characteristics and Effects of a Force, System of Forces, Resolution of a Force, Composition of Forces, Resultant / Equilibrant Force, Law of Parallelogram of Forces, Law of Triangle of Forces, Polygon Law of Forces, Lami's Theorem, Equilibrium of a Body Under Two / Three/More Than Three Forces. Law of Superposition of Forces.

Coplanar Non Concurrent Forces: Moment of a Force, Principle of Moments/ Varignon's Theorem, Parallel Forces : Resultant of Parallel Forces, Couple: Moment of a Couple, Resolution of Force into a Couple. Coplanar Non Concurrent Forces: Resultant of Coplanar, Non Con-Current Forces.

Beams: Types of Beams: Simply Supported Beam, Overhanging Beam, Cantilever Beam. Types of Supports of a Beam or Frame: Roller, Hinged and Fixed Supports. Load on the Beam or Frame: Different Types of Loading. Support Reaction of a Beam or Frame: Analytical Method. Truss Analysis: Method of Joints & Sections.

Centroid and Centre of Gravity: Centroid, Centre of Gravity, Determination of Centroid of Simple Figures, Centroid of Composite Sections. Centre of Gravity of Solid Bodies. Area Moment of Inertia: Basic Concept of Inertia, Definition of Moment of Inertia, Theorems of Moment of Inertia, Radius of Gyration, Polar Moment of Inertia of Standard Sections, Moment of Inertia of Composite Section, Principal Moment of Inertia, Mass Moment of Inertia.

Introduction to Dynamics: Overview of Dynamics, Basic Concepts and Terms Used in Dynamics, Motion, Types of Motion, Newton's Laws of Motion, Newton's Law of Gravitation.

COURSE OUTCOMES

1. An ability to apply knowledge of mathematics, science, and engineering
2. An ability to identify, formulate, and solve engineering problems

LABORATORY

Experiments as suggested by the course coordinator.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

Ferdinand.P. Beer. E, Russell Johnston Jr., David Mazurek, Philip J Cornwell, "Vector Mechanics for Engineers: Statics and Dynamics" , McGraw - Hill
Timoshenko, and Young, "Engineering Mechanics", Tata Mc-Graw Hill
P.N. Chanchandramouli, Engineering Mechanics, PHI Learning Private Limited.

COURSE OBJECTIVE:

The objective of this foundational course is to develop general familiarity and understanding with the following areas in chemistry: inorganic, organic, physical chemistry, electrochemistry, photochemistry and Thermochemistry. The course also intended to make students work effectively and safely in the laboratory working environment. Last portion of curriculum addresses critical thinking and numerically analyzing the chemical problems.

COURSE CONTENT:

Molecular Structure & Bonding: VSEPR Model, Valance-Bond Theory, Molecular Orbital Theory, Molecular Orbital of Polyatomic Molecules.

Electrochemistry: Arrhenius theory of electrolytic dissociation, Transport Number, Kohlrausch's Law, Solubility Product, Redox Reaction, Electrochemical & Concentration Cells.

Chemical & Phase Equilibria: Phase Diagram for single component system (Water), Phase diagram for Binary Eutectic System (Copper-Silver), Corrosion of metals in acids, Corrosion by Oxygen, Corrosion by Metal Contact.

Reaction Dynamics: Order, Molecularity, Rate Law, Methods of determining order of reaction (1st & 2nd Order).

Polymers & Polymerization: Monomers, Polymers, their classification, thermoplastics & thermosetting with examples, Bio-Polymerization, Bio-Degradable Polymerization, Preparation, Properties & Technical Applications of PVC, PVA, Teflon, Nylon6, & Nylon6:6, Polyester, Phenol-Formaldehyde, Urea-Formaldehyde, Natural & Synthetic Rubber, Vulcanization of Rubber.

Photochemistry: Photo-excitation of organic molecules, Jablonski Diagram, Laws of Photochemistry and quantum yield, some examples of photochemical reactions, chemistry of vision and other applications of photochemistry.

Thermochemistry: Fundamental concept of first law, work, heat, energy and enthalpies, relation between C_v & C_p . Second Law: Entropy, Free Energy, (The Helmholtz and Gibbs) and chemical potential.

Numerical problems based on water analysis and water softening process. Determination of hardness by complexometry, Alkalinity and its determination and their relevant numerical problems, testing of lubricating oils, viscosity and viscosity index, flash & fire point, cloud & pour point, Aniline Point, Carbon Residue, Steam-emulsion number, Neutralization number, Saponification number.

LABORATORY

Experiments as suggested by the course coordinator.

COURSE OUTCOMES

Student after successful completion of course must possess skills to think critically and analyze chemical problems. They must also feel confident to work in teams as well as independently. Students are also expected to learn solving chemistry problems with an engineering purview. Laboratory work is intended for students to learn conducting experiments, and analyze experimental data.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment. Laboratory assessment will be based on assignments, presentations, and interview of each candidate.

REFERENCES

Lee, J. D, Author, Concise Inorganic Chemistry, Oxford University Press

Alberty, R. A., Physical Chemistry, John Wiley and Sons

N. Krishnamurthy, P. Vallinayagam, Engineering Chemistry, PHI Learning Pvt. Ltd.

Kuriacose J.C. and Rajaram J., Chemistry in Engineering and Technology, Tata McGraw Hill.

COURSE CONTENT:

Elasto-dynamics: Simple Harmonic Motion, Electric Flux, displacement vector, Columb law, Gradient, Divergence, Curl, Gauss Theorem, Stokes theorem, Gauss law in dielectrics, Maxwell's equation: Integral & Differential form in free space, isotropic dielectric medium.

Lasers: Properties of lasers, types of lasers, derivation of Einstein A & B Coefficients, Working He-Ne and Ruby lasers.

Fibre Optics: Light guidance through optical fibre, types of fibre, numerical aperture, V-Number, Fibre dispersion (through ray theory in step index fibre), block diagram of fibre optic communication system.

Quantum Mechanics: Black body radiation, ultraviolet catastrophe, Crompton effect, plates theory of radiation, phase and group velocity, particle in a box, uncertainty principle, well-behaved wave equation, Schrodinger equation, application to particle in a box

Optics: Interference, division of amplitude & division of wave front, young's double slit experiment, thin film interference, Newton Ring Experiment. Diffraction: Difference between interference and diffraction, types of diffraction, single slit, double slit & n-slit diffraction, Resolving power of grating.

Semiconductors: Crystalline and Amorphous solids, Band theory of solids, mobility and carrier concentrations, properties of P-N junction, Energy bands, hall effect, VI characteristics of photodiode, zener diode and photovoltaic cell

Nuclear Physics: Nuclear composition, mass defect, binding energy, nuclear force, liquid drop model, elementary idea about nuclear fission and fusion.

LABORATORY

Experiments as suggested by the course coordinator.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

A Bezier, Concepts of Modern Physics, McGraw Hills

Ghatak, Optics, McGraw Hills