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ES0011:Engineering Mathematics-I

Course Objectives

- To make aware students about the importance and symbiosis between Mathematics and Engineering.
- Achieve a fluency with Mathematical tools which is an essential weapon in modern Graduate Engineer's Armory.
- Balance between the development of understanding and mastering of solution techniques with emphasis being on the development of student's ability to use Mathematics with understanding to solve Engineering problems by retaining the philosophy of **"learning by doing"**

Unit-I Complex Numbers (07 Hours)

Polar form of a complex number. De Moivre's theorem and roots of a complex number. Exponential functions of a complex variable. Circular functions of a complex variable. Hyperbolic and inverse hyperbolic functions. Separation of real and imaginary parts of functions of complex variables.

Unit-II Differential calculus (07 Hours)

Successive differentiation, Leibnitz Rule. Mean value theorems, Rolle's Theorem. The theorem of the mean. Cauchy's generalized theorem of the mean. Taylor and Maclaurin's series. Infinite series and tests for its convergence, Special expansions, L'Hospital's rule.

Unit-III Partial derivatives and its Applications (07 Hours)

Functions of two or more variables. Partial derivatives. Differentials, Theorem on differentials. Differentiation of composite functions. Euler's theorem on homogeneous functions. Jacobians. Partial derivatives using Jacobians. Theorem on Jacobians. Transformations. Application to maxima and minima. Method of Lagrange's multipliers for maxima and minima.

Unit-IV Integral Calculus (07 Hours)

Reduction formulae for indefinite and definite integrals of trigonometric functions. The gamma function. The beta function. Miscellaneous results involving the gamma function and beta function and relation between them. Error function, Differentiation and Integration under the integral sign.

Unit-V Ordinary differential equations of first order (07 Hours)

Exact differential equations and reducible to exact differential equations. Linear differential equations and those reducible to that form. Total differential equations, Simultaneous total differential equations. Application of ordinary differential equations to orthogonal trajectories and engineering problems.

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Unit-VI Analytical solid Geometry (07 Hours)

The spherical and cylindrical coordinate systems in space. Sphere, Quadric Surfaces. Surface of revolution and Standard surfaces of revolution.

Outcomes

By the end of module students will be expected to demonstrate knowledge of

- ✓ Argand's diagram , Euler's formula , De Moivre's theorem and their applications
- ✓ Successive differentiation, Leibnitz theorem and mean value theorems.
- ✓ Convergence and divergence of a sequence and series with tests for convergence of the series.
- ✓ L'Hospital's rule, Euler's theorem on homogeneous functions, Jacobian and their applications.
- ✓ Maxima and minima of functions of several variables and Lagrange's method of multipliers.
- ✓ Special functions namely Gamma, beta and error function with applications.
- ✓ Application of rule of differentian and integration under the integral sign.
- ✓ Understanding the term exact differential equation and solution of linear differential equation using integrating factors.
- ✓ Finding orthogonal trajectories of Cartesian and polar equations and application of ODE.
- ✓ The three co-ordinate systems in the space , recognizing and using quadric surfaces.

Text Books

1 Erwin Kreyszig, 'Advanced Engineering Mathematics', John Wiley and sons, Inc., 8th Edition, 2003.
2. B.S. Grewal, 'Higher Engineering Mathematics', Khanna Publishers, Delhi, 38th Edition, 2000.

Reference Books

1. Murray R. Spiegel, 'Advanced Calculus', Schaum's out line series, McGraw Hill International Book Co., New Delhi, 1st Edition, 1981.
2. Thomas G. B.and Finney, 'Calculus and analytic Geometry', Wesley / Narosa, 6th Edition, 1985.
3. Dennis G. Zill and Michael R. Cullen, 'Advanced Engineering Mathematics',

CBS New Delhi, 2nd Edition, 2000.
4. Michael D.Greenberg, 'Advanced Engineering Mathematics', Prentice Hall International, 2nd Edition, 1998.
C. Ray Wylie, Louis C Barrett R, 'Advanced Engineering Mathematics', McGraw-Hill Book Company, 6th Edition, 2003.
6. Pipes and Harvill, 'Applied Mathematics for Engineers and Physicists', McGraw-Hill Book Company, 3rd Edition, 1984.
7. Alan Jeffrey**,** 'Advanced Engineering Mathematics', Academic Press, 1st Edition, 2002.

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ES0021: Physics-I

Course Objectives

- To understand fundamental principles of engineering physics specifically concern to optics, ultrasonics, nuclear physics and superconductivity and their engineering applications.
- To provide problem solving experience in engineering and physics, in both the classroom and the laboratory learning environment.

Unit-I

Interference (6 Hours)

Interference due to thin films of uniform and non - uniform thickness, colors in thin films, Fringe width. Newton's rings, Michelson's Interferometer, Engineering applications of interference (viz. optically flat surface, Antireflection coatings, interference filters).

Superconductivity (3 Hours)

Introduction to Superconductivity, Properties of Superconductors (Zero resistance, Persistent current, Meissner effect, Critical field, Thermodynamic properties, Isotope effect), BCS theory (Qualitative), Type I & II Superconductors Applications (Superconducting magnets, transmission lines etc.)

Unit -II

Diffraction (7 Hours)

Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at single slit (circular aperture), Plane diffraction grating (Qualitative results only), Dispersive power of grating, Resolving power, Rayleigh's criterion of resolution, Resolving power of grating and telescope, Applications -wavelength determination, X - ray diffraction from crystals, Bragg's X-ray spectrometer.

Ultrasonics (3 Hours)

Ultrasonic waves, Production of ultrasonic waves, Piezo-electric oscillator, Magnetostiction, Detection of ultrasonic waves, Properties of ultrasonic waves, Applications of ultrasonic waves (SONAR, Echo Signaling, Flaw detection Ultrasonic cleaning).

Unit-III

Polarization (5 Hours)

Polarization of light waves, Brewster's Law, Double refraction (Huygen's theory), Geometry of Calcite crystal, Positive and Negative crystals, Nicol's Prism, Dichroism, Law of Malus, Quarter and half wave plate, Application of polarized light-LCD, Natural phenomenon-Red Sunset, Antennas.

Nuclear Physics (4 Hours)

Introduction, Nuclear constituents, Nuclear forces, Atomic mass unit and mass energy equivalence, Mass defect and Packing fraction, Binding energy, Binding energy curve, Nuclear fission, Q - value of nuclear reaction, Uranium Chain reaction, Four factor formula, Nuclear fusion, Distinction between Nuclear fission and fusion, Fusion as a future energy source, Fusion reactions, Basic requirements for fusion reactors, Magnetic confinement scheme, Inertial confinement scheme, Laser fusion reactor

Outcomes

By the end of the course students will be able to

√ Students will acquire fundamental understanding of concepts specifically concern to optics, ultrasonics, nuclear physics and superconductivity and their engineering applications

√ Further develop the ability to recognize the appropriate physics that applies to experiments based on the Physics I

√ To develop a systematic, logical approach to problem-solving that can be applied to problems in physics and to problems in general.

Text Books

1. Resnick R & Halliday D: Physics – I, Wiley Eastern Ltd., New Delhi, 1991
2. Gaur R K & Gupta S L: Engineering Physics. Delhi. Dhanpat Rai And Sons, 1990

Reference Books

1. Serway Raymond A & Jewett John W Jr.: Principles of Physics. (3rd) Fort Worth. Thomson Brooks/Cole, 2003
2. Cohen B L: Concepts Of Nuclear Physics. Tata Mcgraw Hill Co New Delhi, 1989
3. Gupta A B & Ghosh Dipak: Automic & Nuclear Physics. Books & Allied (p) Ltd. Calcut, 1999
4. Wong S S M: Intro To Nuclear Physics. Prentice Hall Of India N Delhi, 1996
5. Francis J A: Fundamentals Of Optics. Mcgraw Hill Int. Book Co. Toky, 1983
6. Jenkins & White: Fundamentals Of Optics. M Hill Book Co, 1983
7. Ghatak Ajoy: Optics. (3rd) New Delhi. Tata McGraw Hill Pub Co, 2005
8. Hecht E: Optics. (4) Pearson Education New Delhi, 2002
9. Beiser Arthur: Concepts Of Modern Physics. (6th) New Delhi. Tata Mc Graw Hill Pub. Co, 2005.
10. Poole Charles P ,Jr: Handbook Of Superconductivity. USA. Academic Press, 2006
11. Ramakrishnan T V & Rao C N R: Superconductivity Today :an Elementary Intro. New Delhi. Wiley Eastern Ltd, 1992

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ES0031: Chemistry – I

Course Objectives

1. To develop analytical ability.
2. To integrate pure chemistry principles with engg. applications.
3. To understand the chemistry behind the development of engineering materials.

Unit-I Fuel (10 Hours)

Introduction; Classification of chemical fuels; Characteristics of good fuels; Determination of calorific value of solid, liquid & gaseous fuels by (a) Bomb Calorimeter (b) Boy's calorimeter.
Solid fuels: analysis of Coal:- (a) Proximate Analysis (b) Ultimate Analysis, (c) Carbonization of Coal
Liquid Fuels: (a) Cetane number of Diesel and Octane number of Petrol; (b) Green or Eco-friendly Fuels : Power Alcohol, Bio-diesel, Hydrogen gas as fuel.
Gaseous Fuels: Composition, Properties & Uses of Natural gas, LPG, LNG & CNG
Rocket Propellants
Combustion of fuels - Theoretical oxygen and air requirement, Numerical

Unit-II Analytical Chemistry (9 Hours)

Introduction; Types of analysis: quantitative and qualitative analysis;
Chromatographic methods: Principle, working and applications of paper, thin layer and column chromatography, Introduction to GC and HPLC;
Spectroscopic techniques: Electro magnetic radiations: it's characteristics and interaction with matter. Principle, working and applications of UV-visible and IR spectroscopy.

Unit-III Corrosion and Lubricants (9 Hours)

A) Corrosion: Introduction, Types of corrosion: Galvanic, Differential, Aeration Dry and wet corrosion: Mechanism, Factors affecting rate of corrosion: Nature of metal, Nature of environment, Method of prevention of corrosion – anodic & cathodic protection.

B) Lubricants: Introduction to Lubricants & Lubrication Functions of Lubricant; Mechanisms of lubrication: Boundary, Thick film and Extreme pressure lubrication; Classification of lubricants with examples; Criteria for selection of lubricant under given operating conditions

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Outcomes

By the end of the course students should be able

√ to carryout selection of fuel, separation of compound from mixture using chromatographic technique, identification of compounds using ultraviolet-visible and infrared spectroscopy, material selection on the basis of extend of corrosion in a given system, selection of lubricant for a given system.

Text Books

1. Jain and Jain Engineering Chemistry. (Dhanpat Rai Publishing Company), 14th edn., 2004
2. S.K. Singh, Fundamentals of Engineering Chemistry (Theory and Practice). (New Age International Publishers), 2nd edn, 2003

Reference books

1. A.K. De, Environmental Chemistry; John Wiley & sons. Inc. 8th edn 1999.
2. Gray D. Christian, Analytical chemistry, John wiley & sons. Inc 6th edn 2003.

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ME0011: Elements of Mechanical Engineering

Course Objectives

All F.E students are estimated to

- To learn basics of Elements of Mechanical Engineering.
- To interpret concepts of Thermodynamics and energy conversion.
- To list essential properties of Engineering Materials.
- To outline Basics of Machine Design & Automobiles.

Unit-I Fundamental Concept and Definitions (12 Hours)

Thermodynamic system, surroundings and boundary, thermodynamic properties, thermodynamic processes, **Reversible and Irreversible Processes**. Temperature and temperature scale. Macro and microscopic approach, **Pressure measurement.**

First Law of Thermodynamics:

Principle of conservation of mass and energy, Continuity equation, First law of thermodynamics, Joules experiment, Application of first low to flow and non-flow processes and cycles. Concept of internal energy, flow energy and enthalpy. Application of steady flow energy equation to nozzles, turbines, pumps, **compressors, Heat exchangers.**

Unit-II Power Producing Devices (6 Hours)

Boiler and Steam turbines, Reciprocating I.C.Engines **(Representation of Otto and Diesel cycles on P-V diagram),** Gas turbines, Hydraulic turbines, Compressed air motor.
(Theoretical study, using schematic diagrams, No numerical)

Power Absorbing Devices

Reciprocating pumps and compressors, centrifugal pumps, Rotary compressors, blowers. Study of household refrigerators **(representation of vapour compression cycle on P-h diagram)** and window air conditioner using schematic diagrams (elementary treatment only, No numerical)

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Unit-III Conventional and non-conventional energy sources (8 Hours)

Thermal, Hydraulic, Wind, Solar, (schematic of plant layout)

Heat transfer:

Basic modes of heat transfer: conduction, convection & radiation,
Statement and explanation of: Fourier's law of heat conduction, Newton's low of cooling, and Stefan Boltzman's law of radiation. (Numerical Treatment)
Emissivity and its value for practical interpretation.
Conducting and insulating materials and their properties,
Use and types of extended surfaces like fins. (Descriptive treatment only)
Description and types of heat exchanger.

Unit-IV Introduction to Engineering Design (6 Hours)

Design considerations: Need of design, Stress, Strain, Modes of failure, Factor of safety, Tolerance, limits, fits, Aesthetic & ergonomics Considerations

Introduction to Engineering Materials, properties of Materials, Ferrous Metals & alloys, Non-Ferrous metals, Selection of Material

Unit-V Mechanical Drives and Elements : (6 Hours)

Individual and group drives: belt drive, Rope drive, chain drive, gear drive and friction clutches & brakes (types and application only)

Machine elements: Power transmission shafts, axles, key, couplings, bush and ball bearings (types and application only)

Unit-VI Introduction to Automobiles (4 Hours)

Introduction, classification, Basic parts (Motor Cycle & Car), Specifications, performance parameters (Descriptive treatment only),

Engine Emission & Control: Air pollution, Euro & Bharat Norms, Hydro carbon, Carbon monoxide, NOx, particulates, catalytic converter

Outcomes

By the end of the course students will be able to do following things -

√ Make display board of various Temperature and Pressure measuring instruments.

√ Distinguish between Power producing and Power absorbing devices…

√ Display board of conducting and insulating materials with their properties.

√ Search and make a table of materials used for Mechanical/Electronics Industries.

√ Identify different Mechanical Drives and elements.

√ Carry out Home Assignment on their own

Text Books

1. P K NAG, 'Engineering Thermodynamics', Tata McGraw-Hill, Third Edition,2005
2. V B BHANDARI, 'Design of Machine Elements', Tata McGraw-Hill, Second, 2008

Reference Books

1. V GANESHAN, 'Internal Combustion Engines', Tata McGraw-Hill, Third Edition,2007

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ES0041: Environmental and Civil Engineering

Course Objectives

- To make the students aware of basic concepts and conventional as well as modern techniques used in civil engineering.
- To introduce basic areas in Civil engineering and fundamentals of environmental science to the students.

Unit-I Introduction to Civil Engineering

(A) Significance and nature of civil engineering, introduction to the various areas of specialization in Civil Engineering : (i) Surveying (ii) Quantity Surveying (iii) Structural Engineering (iv) Geotechnical and Foundation Engineering (v) Construction technology and Construction Management (vi) Water Resources Engineering (vii) Transportation Engineering (viii) Earthquake Engineering and Disaster Management. (ix) Environmental Engineering. **(4 Hours)**

(B) Role of civil engineer in various branches of engineering, difficult site (working) conditions, need of Infrastructure Development, use of modern equipment & techniques- EDM, Digital Theodolite, Digital Planimeter, GPS, GIS. Introduction and applications of software for Designing/Drafting.

(3 Hours)

Unit-II Surveying and Map Making

(A) Linear and angular measurements- Introduction to traditional methods like chaining and offsetting for linear measurements. Concepts for preparing the maps and introduction to digital cartography, Angular measurements- Compass (details), introduction of theodolite. **(4 Hours)**

(B) Levelling and introduction to contouring. **(3 Hours)**

Unit-III Materials and Construction

(A) Various materials of construction and their uses for specific purposes depending on their properties. Introduction to concrete and concrete mixes. Method of in-situ cement concreting. Introduction and applications of smart and composite materials. **(3 Hours)**

(B) Types of structures and suitability, introduction to foundations and machine foundations, Types of superstructure, components of superstructure with reference to suitability of materials, requirements of good masonry, use of construction machinery & automation in construction. **(4 Hours)**

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Unit-IV Building Planning and Legal Aspects

(A) Introduction of Building planning principles and building bylaws, interpreting the architectural, structural and working drawings. **(4 Hours)**

(B) Introduction to - Land Acquisition Act 1894, DC Rules, Environment Protection Act 1986 and other Legal provisions for control of Air, Water and Land Pollution, vehicles maintenance and catalytic converter**.** **(3 Hours)**

Unit-V Environmental Science

(A) Basic concepts - ecosystems and ecology, bio-diversity and extinction threats, Human centered and Life centered world views, development and sustainability. **(4 Hours)**

(B) Inter-relationship between population and resources, human impact on ecosystems, awareness and social responsibility. (**3 Hours)**

Unit-VI Environmental Pollution and Conservation of Natural Resources

(A) Industrialization and urbanization — global and Indian scenario, Types of pollution with focus on Air, Water and Land pollution — causes/sources, ill-effects and remedial / control measures, introduction to the measurement of pollutants. **(4 Hours)**

(B) Conservation of natural resources- forestation, rain water harvesting, inter-linking of water resources etc. Need for energy and utilization/extraction of energy sources, social responsibility, energy crisis, applying general simple principles/techniques such as recycling, vermiculture. Conservation of fossil fuels - promoting efficient and mass transportation systems. **(3 Hours)**

Outcome

By the end of course students should be able to,

√ learn logical processes (steps, formulas, methodology, principles, etc.) in various types of measurements, environmental conservation.

√ understand various aspects of building planning and drawing, constructions, plans and maps, relevant acts- rules and byelaws.

Text Books

1. T. P. Kanetkar, S.V.Kulkarni, 'Surveying and Levelling (Vol. I & II)', PVG Prakashan, Pune, 24th & 13 th editions.

2. G.Tyler Miller Jr, 'Environmental Science', Thomson, 10th edition

Reference Books

1. Arthur Rokinson, Joel Morrison, Phillips Muehrcke, 'Elements of cartography' Wiley Inc., 6 th edition.
2. Shah M.G., Kale C.M. , 'Building design and Drawing : an integrated approach to built environment ', T.M.H., 4 th edition
3. D. Hall, T.W. Clyne, 'An introduction to Composite materials', Cambridge University Press, 2nd edition
4. Bindra S.P., Arora S.P, 'Building Construction', Dhanpat Rai Publication, New Delhi, 4 th edition
5. Rao M.S.N., Rao H.V.M. , 'Air Pollution', T.M.H.,1st edition
6. B.C. Punmia, 'Surveying (Vol. I and II)', Laxmi Publication Bangalore.

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ES5021: Physics-I
(Laboratory Work)

Course Objectives

- To understand and experience the basics of physics through expert member.
- To learn the proper methods and techniques utilized in gathering experimental data.
- To become familiar with the proper use of basic measuring instruments commonly found in physics laboratories.
- To develop the ability to recognize and apply the appropriate physics introduced in the lecture course to actual experimental situations.
- To learn how to analyze data and then reach scientific conclusions based on analysis.
- To learn how to effectively communicate your results in standard scientific ways.

List of Practicals

Any Five Experiments

1. Use of diffraction grating for the determination of wavelength of spectral line.
2. Newton's rings experiment (Wavelength, radius, refractive index)
3. Experiment based on ultrasonic waves.
4. Resolving power of a telescope / Grating.
5. Determination of refractive indices for ordinary, extraordinary rays for a quartz crystal / Prism.
6. Demonstration of Lissajous figures using a CRO (Principle of interference) concepts of polarization
7. Michelson's Interferometer.
8. Determination of Brewster's angle for glass surface and to determine refractive index of glass.
9. Determination of Young's Modulus by Cornu's method.
10. To verify cosine square law of Malus for plane polarized light using photocell.
11. Birefringence and polarization with calcite.

Outcome

By the end of the course students should be able to

√ Perform experiments based on syllabus adopting the proper methodology.

√ Derive a scientific conclusion on the basis of experimental data.

Text Books

1. Resnick R & Halliday D: Physics -i. (2) Wiley Eastern Ltd New Delhi, 1991
2. Gaur R K & Gupta S L: Engineering Physics. (6) Delhi. Dhanpat Rai And Sons,, 1990

Reference Books

1. Serway Raymond A & Jewett John W Jr.: Principles of Physics. (3rd) Fort Worth. Thomson Brooks/Cole, 2003
2. Jenkins & White: Fundamentals Of Optics. M Hill Book Co, 1983
3. Beiser Arthur: Concepts Of Modern Physics. (6th) New Delhi. Tata Mc Graw Hill Pub. Co, 2005

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ES5031: Chemistry-I
(Laboratory Work)

Course Objectives

- To develop an analytical ability
- To integrate chemistry fundamentals with practical applications.
- To understand the chemistry behind physico-chemical phenomena.

List of Practicals **(**Any five of the following)

1. Estimation of moisture, volatile matter and ash content in a given sample of coal
2. Synthesis of bio-diesel and its characterization
3. Separation and identification of components of mixture by paper chromatography
4. Separation of mixture of ortho and para nitro aniline by column chromatography
5. Separation of mixture of organic compounds by TLC
6. Study of Beer-Lamberts law and its application to spectrophotometric analysis
7. Study of corrosion of metal in medium of different pH & current measurement
8. Determination of Aniline point of a given oil .

Outcome

By the end of the course students should be able

√ To carryout proximate analysis of fuel, to obtain the chromatogram of certain compounds, e.g. O&P nitro aniline, and also be able to separate them from mixture, to synthesize Bio-diesel, effect of environment on corrosion of metal and selection of lubricant for a given system.

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ME5011: Elements of Mechanical Engineering
(Laboratory Work)

Course Objectives

- Give exposure various Mechanical Devices/Elements to FE students
- To generate engineering awareness and relate it to day today life.

List of Practicals

Study and Demonstration of following Experiments

1. Water Tube Boiler
2. Steam Generator (Fire Tube Boiler)
3. Petrol Engine
4. Diesel Engine
5. Household refrigerator and Window Air conditioner
6. Centrifugal Pump
7. Shell and tube heat exchanger
8. Solar water heating system
9. NC/CNC Machines
10. Power Transmitting elements Shaft, Coupling and Gears
11. Clutch
12. Demonstration of Automobile

Outcomes

By the end of the course students should be able to

√ Classify Power producing and Power absorbing devices.

√ Identify various Power Transmitting elements.

Text Books

1. P K NAG, 'Engineering Thermodynamics', Tata McGraw-Hill, Third Edition, 2005
2. V B BHANDARI, 'Design of Machine Elements', Tata McGraw-Hill, Second, 2008

Reference Books :

1. V GANESHAN, 'Internal Combustion Engines', Tata McGraw-Hill, Third Edition,2007

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ES5041: Environmental and Civil Engineering

(Laboratory Work)

Course Objectives

- Impart knowledge about various types of measurements.
- Hands on experience of software for Designing / Drafting.
- Learn report writing and presentation skills.

List of Practicals

1. Linear Measurements – Offsetting.
2. Study and use of prismatic compass.
3. Simple Profile Levelling Exercise.
4. Differential Levelling Exercise.
5. Study of building drawings and Building Planning
6. Building planning and drawing
7. Study of modern equipment in Civil Engineering
8. Use of Digital Planimeter.
9. Use of GPS to determine position/coordinates of a station
10. Study of environmental impact assessment (report)
11 Hands on experience on any one Designing/Drafting software
12. Field visit and report writing

Outcomes

By the end of the course students should be able to,

√ Learn procedure and use of various types of measurements.

√ Interpret building plans and drawings.

√ Write field visit report

√ Understand use of one designing / drafting software

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ES5051: Workshop Practice – I
(Laboratory Work)

Course Objectives

- To give students 'hands on experience' of craftsmanship.
- To make students familiar with different work trades.
- To develop quality & safety consciousness amongst the students.
- To develop awareness of fire safety amongst the students.
- To develop respect towards labour work amongst the students.

List of Practicals

1. Carpentry

Introduction, use of marking tools & hand tools such as marking gauge, try squares, steel rules, saws, jackplane, chisels etc. Use of power tools, safety precautions.

Practical

One job involving different operations such as sawing, planning, chiseling etc.

2. Welding

Introduction, principle of manual metal are welding, equipment & it's operation, welding electrodes, welding joints, welding symbols, safety precautions.

Practical

One job on mild steel.

Demonstrations

1. Fire Safety

Introduction, fire prevention precautions, necessity of fire fighting, fire extinguishers, rules of fire fighting, risk elements in fire fighting and demonstration of use of fire extinguishers.

2. Gas cutting

Introduction, principle, equipment & it's operation, safety precautions and demonstration of Oxy-Acetylene Gas cutting process.

3. Plastic Injection Moulding

Introduction, principle, equipment & it's operation, mould introduction & setting, Safety precautions and demonstration of plastic injection molding process.

Assignments

Sketches and process description of the components made in Carpentry & Welding.

Outcomes

√ These will be as per the objectives mentioned above.

Comments

Students should wear safety apron and safety shoes during the practicals..

Text Books

1. S.K.Hajra Choudhary,Elements Of Workshop Technology,Media Promoters &Publishers Pvt.Ltd,

2. K.T.Kulkarni,Introduction to Industrial Safety,K.T.Kulkarni,Pune

Reference Books

1. Hwaiyu Geng, Manufacturing Engineering Handbook,McGraw Hill Publishing Co.Ltd.

2. Lawrence E.Doyle, Manufacturing Processes and Materials for Engineers,Prentice Hall Inc.

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ME0021: Engineering Graphics-I

(Theory)

Course Objectives :

- To make all F.E. students familiar with imagination and visualization.
- To interpret Basic concepts of First angle method of projections.
- To visualize basics of orthographic and isometric projections.
- To generate engineering drawing awareness and relate it to day to day life.

Unit-I Lines, Lettering, Dimensioning and Scales: (2 Hours)

Different types of lines used in drawing practice, method of dimensioning - aligned and unidirectional systems (According to SP-46: 1988 Engineering Drawing Practice for Schools and Colleges), scales.

Unit-II Orthographic Projections: (6 Hours)

Principal planes of Projection - Horizontal plane or horizontal reference plane, vertical plane or frontal reference plane, profile planes of projection, first and third angle methods of projection..
Orthographic projections on principal planes.
Sectional views: - full, half, partial (broken or local), offset, revolved, removed sections.

Unit-III Isometric Projections: (6 Hours)

Definition, isometric scale, drawing isometric view and isometric projections from the given orthographic views with reference to given origin.

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Outcomes

By the end of the course students should be able to

√ Understand basics of orthographic and isometric projections.

Text Books

1. N. D Bhatt, Elementary drawing, Charotar Publishing house, Anand India
2. K.L.Narayana & P.Kannaiah, Text Book on Engineering Drawing, Scitech Publications, Chennai.

Reference Books:

1. Warren Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi.
2. P.S.Gill, Engineering Graphics.
3. Frederock E. Giesecke, Alva Mitchell & others, Principals of Engineering Graphics., Maxwell McMillan Publication.

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ME5021: Engineering Graphics –I

(Laboratory Work)

Course Objectives

1) To visualise basics of orthographic and isometric projections.

2) To generate engineering drawing awareness and relate it to day to day life.

List of Practicals

The Term-Work shall consist of three A2 (420×594 mm) size-drawing sheets as detailed below.

Sheet No. 1: Lines, Lettering and Dimensioning.
Sheet No. 2: Two problems on orthographic projections.
Sheet No. 3: Two problems on Isometric projections.

Text Books

1. N. D Bhatt, Elementary drawing, Charotar Publishing house, Anand India
2. K.L.Narayana & P.Kannaiah, Text Book on Engineering Drawing, Scitech Publications, Chennai.

Reference Books:

1. Warren Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi.

2. Frederock E. Giesecke, Alva Mitchell & others, Principals of Engineering Graphics., Maxwell McMillan Publication.

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CS0011: Computer Fundamentals
(Theory)

Course objectives

- To make students aware of basics about computers, especially hardware and OS
- To provide introduction to C language.

Unit –I Computer Fundamentals, Modern Trends and Number Systems (4 Hours)

Block Diagram of Computer, Typical configuration of Personal Computer, Laptops & Palmtops, Multimedia PCs, Concept of Computer Network: LAN, WAN, MAN, PAN, Intranet & Internet Application of Computers. Representation of Data: Binary, Decimal, Octal, Hexadecimal number systems.

Unit-II Introduction to Programming (6 Hours)

Concept of an algorithm, Flowcharts, Pseudo code. Machine Level, Assembly level and higher level languages. Assemblers, Compliers, Linker, Loader, Interpreter and editor. Introduction to Operating System.
Structure of C program. C character set, identifiers, keywords, constants & variables. Data types and variable declarations. Preprocessor directives. Assignment and input output statements. Operators: arithmetic, logical, relational, Expressions & comments.

Unit-III Control Structures (4 Hours)

Program looping: for, while, & do…while statements. Decision making: if statement, Simple and Compound Conditions. Ternary operators, switch statement, goto, break, & continue statement. Nesting and control structure.

Outcomes

By the end of the course students should be able to

√ Be comfortable with Windows/Linux environment and able to write simple C programs

Text Books

1. P.K. Sinha, 'Computer Fundamentals', BPB Publication, 3rd Edition, 2003.
2. E.Balagurusamy,' Programmig in Ansi C ' TMH Publication, 4th Edition

Reference Books

1. B. Gottfried,' Programming with C- Schaum's outline Series ', McGraw Hill
2. Y. Kanetkar,' Let us C', BPB Publications, 2nd edition

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CS5011: Computer Fundamentals
(Laboratory Work)

Course Objectives

- To make students aware of basics about computers, especially hardware and OS.
- To provide introduction to C language.

List of Practicals

Simple programs in C language in Windows/LINUX platform based on the topics taught in Section 2 and Section 3. Sample list is given below. However staff is encouraged to modify them and produce a variety of such programs. For each of the following programs, student should write an algorithm, draw a flowchart and only then code the program

(Any 12 out of the following)

1. Study of basic blocks of a computer.
2. Assembling of a PC.
3. Study of DOS commands.
4. Study of Windows commands with use of Turbo C/ Borland C in the windows environment. Simple 'Hello World' Program can be done here.
5. Study of Linux environment. Use of editors like vi/emacs and basic LINUX commands.
6. Writing a simple 'Hello World' program in LINUX environment using vi editor, gcc compiler and LINUX debugger.
7. Write a program in C to reverse of given integer
8. Write a program in C to read an integer and display each of the digits of an Integer in English
9. Write a program in C to generate first N terms of Fibonacci series
10. Write a program in C generate Prime numbers between 1 to N.
11. Write a program in C to compute the GCD of given two integers
12. Write a program in C to compute Factorial of given positive integer
13. Write a program in C to compute the roots of a quadratic equation
14. Write a program in C to compute the average of given N elements.
15. Write a program in C to find largest element of given N elements.

Outcomes

By the end of the course

√ Students should be able comfortable with Windows/Linux environment and able to write simple C programs

Text Books

1. P.K. Sinha, 'Computer Fundamentals', BPB Publication, 3rd Edition, 2003.

2. E.Balagurusamy,' Programmig in Ansi C ' TMH Publication, 4th Edition

Reference Books

1. B. Gottfried ,' Programming with C- Shaum's outline Series ', McGraw Hill
2. Y. Kanetkar,' Let us C', BPB Publications, 2nd Edition

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Language Proficiency - I – English

Overview

This course is designed for students with a knowledge of English who now want to communicate and confidently in a range of job-related situations. It maximizes study time by focusing on essential language and skills and developing effective learning strategies. Students learn listening, speaking, reading and writing skills with exposure to business English. It will allow systematic coverage of Grammar & Vocabulary through natural recycling of language. The course to speak and write simple English in a range of everyday situations as well as communicate effectively in business environment. It will also focus on remedial teaching. (Inputs to be taken from the diagnostic test)

The course aims at enabling students to revise, consolidate and extend their command of English grammar and vocabulary.

Pre-requisites

Basic knowledge of English at 10+2 level

Diagnostic test

Course Objectives

- Provide a sound grammatical and functional framework and systematic practice of key language
- Present language in relevant and realistic situations
- Develop an essential business English vocabulary
- Integrate pronunciation practice with the main language points
- Build confidence by developing tactics to help learners control conversations and avoid communication breakdowns
- Motivate learners with activities to check their progress
- Encourage learners to talk about their own jobs and experiences
- Raise awareness of the cultural aspects of business communication

Unit-I Reading & Listening Skills (04 Hours)

Reading comprehension – 2 + 2

Listening Comprehension – 4

Unit-II Writing Skills (04 Hours)

How to write effectively

Paragraph writing – 2 + 2

Intra Organizational communication I (7)

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Unit-III Communication Skills (04 Hours)

Self-introduction, Institute's information, City profiles, Country profiles, Small conversation, Explaining locations.

Unit-IV Communication Skills (04 Hours)

Telephone etiquettes, Explaining various procedures, Extempore

Unit-V Grammar (06 Hours)

The sentence	-	Subject and predicate
The phrase and the clause	-	Parts of speech
The noun: Kinds of nouns	-	The noun: Gender
The noun: Number	-	The noun: Case
The adjective	-	Comparison of adjectives
Adjectives used as nouns	-	Position of the adjectives
The correct use of some adjectives	-	Articles

Assignments for each subunit – 2 + 2

Unit VI : Vocabulary (04 hours)

Vocabulary building: everyday expressions – 25
New words and their correct usage – 100
Same words used with several meanings – 10

Text Books

Course Material will be provided by the Institute.

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ES0061: ENGINEERING MATHEMATICS - II

Course Objectives

- To make aware students about the importance and symbiosis between Mathematics and Engineering.
- Achieve a fluency with Mathematical tools which is an essential weapon in modern Graduate Engineer's Armory.
- Balance between the development of understanding and mastering of solution techniques with emphasis being on the development of student's ability to use Mathematics with understanding to solve Engineering problems by retaining the philosophy of **"learning by doing".**

Unit-I Linear Algebra-I (07 Hours)

Rank of a Matrix, Solution of Linear Systems: Existence, Uniqueness, General Form. Linear Dependence and Independence. Linear transformations and Orthogonal transformations and its (2-D and 3-D) geometrical interpretation.

Unit-II Linear Algebra-II (07 Hours)

Eigenvalues, Eigenvectors,. Diagonalization. Reduction of quadratic forms to canonical forms, Some Applications of Eigenvalue problems.

Unit-III. Probability and Statistics (07 Hours)

Random variables, Probability distributions, Binomial, Poisson, and Normal distribution, Correlations and regression.

Unit-V Curve tracing and Applications of Integral Calculus (07 Hours)

Tracing of curves in Cartesian coordinates. Standard important curves in parametric and polar coordinate systems (only).Rectification, Areas of curves, volume of revolution, surface area of revolution, Mean values, and Root mean square values., centre of gravity of an arc length

Unit-V Multiple Integrals (07 Hours)

Double Integrals, Triple Integrals, Transformation of multiple integrals.

Unit-VI Applications of Multiple Integrals (07 Hours)

Plane area by double integration, centroid, moment of inertia of plane areas, volume under a surface, Area of a curved surface, centroid of volume, Moment of inertia of a volume, and masses of variable density.

Outcomes

By the end of the module students should be able to

- √ demonstrate knowledge of Matrix calculation as an elegant and powerful mathematical language in connection with rank of a matrix, linear system of equations, linear dependence and independence. .
- √ Interpret the eigen vectors and eigen values of a matrix in terms of the transformation it represents into a matrix eigen value problem
- √ Determine a modal matrix, and reducing a matrix to diagonal form.
- √ Define a quadratic form and determining its nature using eigen value.
- √ Basic concepts of probability theory which stems form the analysis of certain games of chance and has found applications in most branches of science and engineering.
- √ Determine the covariance of two random variables and understanding the concept of correlation and regression analysis and the principle method of least squares.
- √ Find the length of curve, area, surface area, and volume of solids of revolution.
- √ Find mean, RMS values of a function and CG of an arc of a curve.
- √ Interpret the concept and components of double integrals. Formulating and evaluating a triple integrals by expressing in other co-ordinate systems with Jacobian transformation.
- √ Apply the multiple integration

Text Books

1. Erwin Kreyszig, ' Advanced Engineering Mathematics', John Wiley and sons, Inc., 8th Edition ,2003.

2. Dr. B.S. Grewal, 'Higher Engineering Mathematics', Khanna Publishers, Delhi, 38th Edition, 2000.

Reference Books

1. Murray R. Spiegel, 'Advanced Calculus', Schaum's out line series, McGraw Hill International Book Co., New Delhi, 1st Edition ,1981.
2. Thomas G. B.and Finney, 'Calculus and analytic Geometry', Wesley / Narosa, 6th Edition, 1985.
3. Dennis G. Zill and Michael R. Cullen, 'Advanced Engineering Mathematics', CBS New Delhi, 2nd Edition, 2000.
4. Michael D.Greenberg, 'Advanced Engineering Mathematics', Prentice Hall International, 2nd Edition, 1998.
5. C. Ray Wylie, Louis C Barrett R, 'Advanced Engineering Mathematics', McGraw-Hill Book Company, 6th Edition, 2003.
6. Pipes and Harvill, 'Applied Mathematics for Engineers and Physicists', McGraw-Hill Book Company, 3rd Edition, 1984.
7. Alan Jeffrey, 'Advanced Engineering Mathematics', Academic Press, 1st Edition, 2002.

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ES0071: PHYSICS- II

Course Objectives

- To understand fundamental principles of engineering physics specifically concern to quantum mechanics, semiconductor physics, modern physics, nanotechnology and their engineering applications.
- To provide problem solving experience in engineering and physics, in both the classroom and the laboratory learning environment.

Unit-I

Wave Particle Duality (10 Hours)

Limitations of Classical Mechanics (discussed with reference to Theory of Relativity), Need for Quantum Mechanics on the basis of Photoelectric Effect and Black Body Radiation, Planks quantum theory (discussion of results only), De-Broglie's hypothesis, Wavelength of matter waves (De-Broglie's wavelength), Concept of Phase velocity and Group velocity, Qualitative Properties of matter waves, Heisenberg's Uncertainty Principle, electron diffraction at single slit.

Wave Equations

Concept of Wave Function ψ, Physical significance of ψ & ψ^2..probability interpretation, Schrödinger's wave equations (Time independent and time dependent), Applications of Schrödinger's time independent wave equations, Particle in a rigid box (Infinite potential well), Comparison of Particle in non-rigid box (Finite potential well), Applications: Tunneling effect, Tunnel Diode (Qualitative Only)

Unit-II

Semiconductor Physics (9 Hours)

Introduction, Classification of materials on the basis of electrical properties, Quantum numbers, Electronic configuration, Band theory of solids, Hybridization, Energy bands in Li, Br, Na, Si, and C - diamond, Valance band, Conduction band, Forbidden gap, Classification of solids on the basis of band theory, Types of Semiconductors, Hall Effect Fermi level, Fermi-Dirac probability distribution function, Fermi level in Intrinsic & Extrinsic semiconductors, PN junction diode, Working of PN junction diode on the basis of band diagram and it's characteristics, Transistor and it's working on the basis of energy band diagram, Photovoltaic effect, Solar cell, Solar cell applications (i) Industrial: Street lights, irrigation, solar panel for satellites (ii) Commercial, (iii) Domestic.

Introduction to Nanotechnology

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Introduction, Effect of size on materials properties, Current trends in Nanotechnology, Applications of Nanotechnology: Information Technology, Electronics, Biotechnology in Pharmacy, Medical, Automobiles, Textile, Cosmetics etc.

Unit-II

Laser's & Their Applications (9 Hours)

Introduction, Stimulated absorption, Spontaneous and Stimulated emission, Population inversion, Basic requirements for lasing action, Laser properties, Ruby Laser, He-Ne laser, Semiconductor laser, (Principal, construction and working), Applications of Lasers (Industry : Drilling, Welding and Micromachining etc., Communication: Fiber Optics, Military Applications: Laser range detection, Laser Guided Missiles)

Electron Optics

Motion of electron under the action of a) Electric Field, b) Magnetic Field, c) Simultaneous Electric and Magnetic Field, Electrostatic focusing, Magnetostatic focusing, Electron microscope, Scanning electron microscope, Scanning tunneling microscope

Outcomes

By the end of course students should able to

√ acquire fundamental understanding of concepts specifically concern to quantum mechanics, semiconductor physics, modern physics, nanotechnology and their engineering applications

√ Further develop the ability to recognize the appropriate physics that applies to experiments based on the Physics II

√ to develop a systematic, logical approach to problem-solving that can be applied to problems in physics and to problems in general.

Text Books

1. Gaur R K & Gupta S L: Engineering Physics. (6) Delhi. Dhanpat Rai And Sons,, 1990
2. Beiser Arthur: Concepts Of Modern Physics. (6th) New Delhi. Tata Mc Graw Hill Pub. Co, 2005.

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Reference Books

1. Resnick R & Halliday D: Physics -ii. (2) Wiley Eastern Ltd New Delhi, 1991
2. Theraja B L: Modern Physics. S. Chand & Co Ltd New Delhi, 1984
3. Rajam J B: Modern Physics. S. Chand & Co Ltd New Delhi, 1984
4. Rajam J B: Atomic Physics. New Delhi. S. Chand & Co Ltd, 1984.
5. Laud B B: Lasers And Non - Linear Optics. (2) New Delhi. New Age Int. Ltd, 1985.
6. Nambiar K R: Lasers Principles, Types And Applications. New Delhi. New Age International Publishers, 2004
7. Hecht Jeff: Laser Pioneers. (Revised Ed) Boston. Academic Press Inc, 1992
8. Michael Wilson: Nanotechnology: Basic Science and Emerging Technologies , Cambridge University Press 2007, 378 pages ISBN 0521855659
9. Mark A. Ratner, Daniel Ratner: Nanotechnology: A Gentle Introduction to the Next Big Idea, Prentice Hall PTR, 2003, 208 pages, ISBN 0131014005
10. Bhushan Bharat,ed: Springer Handnbook Of Nanotechnology. New York. Springer Verlag, 2003
11. Kenneth J. Klabunde: Nanoscale materials in chemistry, Wiley, John & Sons, 2001, ISBN: 0471383953,
12. Diwan Parag ,ed & Bharadwaj Ashish,ed: Nano Electronics. New Delhi. Pentagon Press, 2006
13. Diwan Parag & Bharadwaj Ashish: Nanomedicine. New Delhi. Pentagon Press, 2006
14. Diwan Parag, ed & Bhardwaj Ashish,ed: Nano Comosites. New Delhi. Pentagon Press, 2006

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ES0081: Chemistry – II

Course Objectives

- To develop an analytical ability, amongst students.
- To integrate pure chemistry principles with engineering applications.
- To learn the reflection of organization, microstructure on properties and utility.
- To understand the chemistry behind the development of fundamentals.
- To teach students to develop consciousness about environment and ecological balance.

Unit-I Environmental Chemistry (9 Hours)

A. Water: Introduction, Types of chemical analysis of water (a) hardness (b) chloride content by Mohr's method & iodometric method (c) alkalinity (d) chemical oxygen demand and biological oxygen demand; numericals on each type of chemical analysis. Domestic and industrial waste water treatment methods

B. Chemical Toxicology: Toxic chemicals in the environment, biochemical effects of arsenic, cadmium, lead, mercury, cyanide, pesticides and carcinogens.

Unit-II Crystallography & Phase Rule (10 Hours)

A. Crystallography

Introduction, laws of crystallography, APF, Radius ratio, Coordination no, No. of atoms/cell Packing arrangements of atoms; Numericals based on above aspects, Silicates structures, Liquid crystals.

B. Phase Rule

Basic terms - Phase, No. of components, Degrees of freedom, Phase rule statement & mathematical expression, Study of Phase digram for one component system - Water system,Two component system- Fe- Carbon system, Micro structure, Merits and limitations of phase rule.

Unit-II Specialty Polymers & Smart Materials (9 Hours)

A. Materials

Introduction and various examples;

1. Polymers

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Introduction, Classification with suitable examples, Techniques of polymerization,

2. Plastics

Thermoplastics and thermosetting, Rubber: Introduction, Advantages of vulcanized rubber over natural rubber, structure & properties

3. Specialty Polymers

Biodegradable, Thermally stable, Liquid crystal & Conducting polymer.

B. Smart Materials

Definition, some examples of smart materials and its mechanism
Piezoelectric materials: Introduction, Piezoelectricity, properties and applications.

Outcomes

By the end of course students should be able

√ to understand effect of toxic chemicals on environment, to analyze basic parameters in water analysis, to explain effect of temperature and pressure on one and two component system, properties of polymetric material and crystallographic analysis.

Text Books

1. Jain and Jain Engineering Chemistry. (Dhanpat Rai Publishing Company), 14th edn., 2004
2. S.K. Singh, Fundamentals of Engineering Chemistry (Theory and Practice). (New Age International Publishers), 2nd edn, 2003

Reference books

1. A.K. De, Environmental Chemistry; John Wiley & Inc. 8th edn 1999
2. Amitava Mitra, Fundamentals of Quality Control and Improvement.

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ES0091: Engineering Mechanics

Course Objectives

- To learn basic concepts, steps and methods used in the analysis of particles and rigid bodies at rest (statics)
- To introduce to the students, basic concepts in kinematics and kinetics of particles and rigid bodies in motion.

Unit-I Resultant of coplanar force system (7 Hours)

(A) Introduction, History, scope of the subject, Fundamental principles of Mechanics: Concept of particle and rigid body. Force and force systems. Resolution of forces into rectangular and skew components. Resultant of concurrent forces. Moment of a force, couple and its properties, varignon's theorem.

(B) Resultant of parallel and General Force System (non-concurrent non-parallel).centroid of plane lamina and wire bends (not involving rigorous integration)

Unit-II Equilibrium of force system (7 Hours)

(A) Free body diagram, types of loading (actions), Types of support and its reactions. Equilibrium of concurrent, parallel & general force system in a plane, Equilibrium of three forces in plane, Applications to simple and compound determinate beams.

(B) Non Co-planar force system: Force vector, and its components along x, y, z coordinate axes, unit vector, direction angles, direction cosine, moment of a force about a point and about an axis, Resultant and equilibrium of concurrent and parallel force system.

Unit-III Analysis of structures and friction (7 Hours)

(A) Two force member, analysis of Plane truss by: Method of joint and Method of Section. Multi force member, Plane frames, Difference between truss and frame

(B) Friction: Application of friction to inclined plane, wedges, ladders, Flat belt and band-brakes

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Unit-IV Rectilinear motion of particle (7 Hours)

(A) Kinematics: Introduction to dynamics and basic concepts, Braches of mechanics, types of Motion of particle and rigid body with examples (translation, rotation, GPM), comparative Study of terms used in rectilinear and circular motion, kinematical equations for Rectilinear and Circular motion for constant velocity, constant acceleration, equations of motion under gravity, Variable acceleration, Motion Curves, Relative motion

(B) Kinetics: Newton's second law of motion, dynamic equilibrium, and concept of FBDE. Application to. Problems on horizontal plane, inclined plane, Lift, dependent motion and others

Unit-V Curvilinear motion of a particle (7 Hours)

(A) Kinematics: Basic concept, equations of motion in Cartesian, path variable and Polar, co-ordinates systems, Motion of projectile

(B) Kinetics: Application of Newton's second law of motion for Cartesian, path variable co-ordinate systems.

Unit-VI Kinetics of particle and Rigid body (7 Hours)

(A) Energy and Momentum Methods for particle:

Work, Energy, power, conservation of energy, work Energy Principle for Rectilinear and curvilinear motion. Concepts of Impulse, linear momentum etc. Conservation of momentum, Impulse momentum principle, direct central impact, coefficient of restitution**.**

(B) Rotation of Rigid bodies and general plane motion:
Equations defining rotation of rigid bodies about a fixed axis.
Mass moment of Inertia*:* Application to Newton's Second law of motion

Outcome

By the end of course students should be able to,

√ Analyze and solve problems on particles, rigid bodies (at rest and in motion) and structures in a simple logical manner.

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Text Books

1. Ferdinand. P. Beer and E. Russell Johnson, 'Vector Mechanics for Engineers (Statics and Dynamics)', 7 th or 8th Edition.

2. R.C. Hibbler, 'Engineering mechanics (Statics and Dynamics)', McMilon Publications, 7th Edition.

Reference Books

1. Ferdinand L. Singer, 'Engineering Mechanics (Statics and Dynamics)', Harper and Ronic Publications

2. J.L. Meriam and Craig, 'Engineering Mechanics (Statics and Dynamics)', John Wiley and Sons Publications.

3. S.P. Timoshenko and D.H. Young, 'Engineering Mechanics (Statics and Dynamics)', McGraw Hill Publication

4. E.W. Nelson, C.L. Best, W.G. Mclean, 'Schaum's outlines Engineering Mechanics', The McGraw Hill Publication

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ES0101: Elements of Electrical Engineering

Course Objectives

- Understand basic concepts of electrical engineering.
- Gain knowledge of solving numerical problems related to electrical circuits.
- Understand the relevance of electrical engineering in day today practice regarding safety to human life.

Unit -I General Topics (8 Hours)

- Grid system in India, power flow in GTDU system, typical voltage levels, concept of receiving station and sub-station, statistical information about electrical power generation in India, concept of load shedding and load sharing, concept of captive power generation, load cycle, diversity factor, load curve, peak load hours, non-conventional energy sources like wind, tidal, geothermal, solar etc., study of a typical single phase consumer bill.
- Concept of p.d., emf and current, SI units of work, power and energy, conversion of electrical energy from one form to another in electrical, mechanical and thermal systems. (inclusive of mathematical problems)

Unit-II D.C. Circuits (7 Hours

- Batteries and cells, types, current capacity, rating of a battery, maintenance procedure. (no mathematical treatment)
- Classification electrical networks, current and voltage sources and their conversions, Ohm's law, Kirchhoff's laws and their application for network solutions, simplification of networks using series - parallel combinations and star - delta transformations, superposition theorem.

Unit-III Magnetism (7 Hours)

- Classical theory of magnetism, magnetic effect of electric current, cross and dot convention, right hand thumb rule, nature of magnetic field of a long straight conductor, solenoid and toroid. (no mathematical treatment)
- Concept of mmf, flux, flux density, reluctance, permeability, field strength - their units and relationships, simple series and parallel magnetic circuits, comparison between electric and magnetic circuits.
- Concept of coupling, energy stored in a magnetic field, BH curve, hysteresis loss and eddy current loss.

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Unit-IV Electromagnetism and AC Fundamentals (6 Hours)

- Electromagnetic induction, Faraday's experiment and Faraday's laws of electro-magnetic induction, statically and dynamically induced emf, concept of transformer and generator. (no mathematical treatment)
- Force between two long parallel conductors placed in vacuum, force on a current carrying conductor placed in a magnetic field, Fleming's left hand rule, motoring action. (no mathematical treatment)
- Concept of AC quantities, sinusoidal voltages and currents, their mathematical and graphical representations, concept of instantaneous, peak, average and rms value of AC quantity. Concepts of cycle, period, frequency, peak factor, form factor, phase difference, phasor diagrams, rectangular and polar coordinates, addition and subtraction of AC quantities.

Unit-V Single Phase AC Circuits (8 Hours)

- Study of AC through purely resistive, purely inductive and purely capacitive circuits with corresponding voltage and current phasor diagrams, concept of reactance and capacitance and impedance, study of RLC series and RLC parallel circuits, resonance in RLC series and RLC parallel circuits. Concept of conductance, susceptance and admittance.
- Concepts of active, reactive and apparent power, volt-amperes, power factor.

Unit-VI Three Phase Circuits and Safety (6 Hours)

- Concept of three phase supply and polyphase electric circuits, phase sequence, concepts of line, phase, neutral etc., power relations in a three phase balanced star and delta connections, three phase phasor diagrams, p.f. improvement in a three phase system.

- Electrical safety, safety precautions, electric shock, earthing - necessity, types and earthing procedures, earthing for a typical computer installation, lightning arrester etc.

Outcome

By the end of course student will able to

- ✓ understand the cause and effect relationship between different electrical parameters and their inter-dependence.
- ✓ convert a complicated network into a simpler one.
- ✓ calculate different parameters like active, reactive and apparent power and power factor in an electrical circuit.

Text books

1. Electrical Technology by Edward Hughes, 7th edition.
2. Electrical Technology - vol.- I by B. L. Theraja.

Reference books

1. Basic Electrical Engineering by Nagarath and Kothari.
2. Wiring, Estimation and Costing by S. L. Uppal.
3. Electrical Power by Soni, Gupta, Bhatnagar.
4. Delmar's standard textbook on electricity (2nd edition) by Stephan Herman, Delmar publications.
5. Principals of electrical engineering by Vincent Del Toro, PHI publications.
6. Electrical Technology by H. Cotton, CBS publication.

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ES5071: Physics - II
(Laboratory Work)

Course Objectives

- To understand and experience the basics by doing
- To learn the proper methods and techniques utilized in gathering experimental data.
- To become familiar with the proper use of some basic measuring instruments commonly found in physics laboratories.
- To develop the ability to recognize and apply the appropriate physics introduced in the lecture course to actual experimental situations.
- To learn how to analyze data and then reach scientific conclusions based on this analysis.
- To learn how to effectively communicate your results in standard scientific fashion.

List of Practicals (Any five of the following)

1. Determination of band gap of a semiconductor.
2. Characteristics of solar cell, calculation of fill factor.
3. Hall Effect, determination of Hall coefficient.
4. Characteristics of a photocell / photodiode.
5. Study of any three diodes (LED, Ge, Si, Zener)
6. Study of diode characteristics (PN, LED, Ge, Si)
7. Determination of thickness of wire using LASER.
8. Determination of wavelength of a given laser source

Outcomes

By the end of course student should be able to

√ perform experiments based on syllabus adopting the proper methodology.

√ derive a scientific conclusion on the basis of experimental data.

Text Books

1. Gaur R K & Gupta S L: Engineering Physics. (6) Delhi. Dhanpat Rai And Sons,, 1990
2. Beiser Arthur: Concepts Of Modern Physics. (6th) New Delhi. Tata Mc Graw Hill Pub. Co, 2005.

Reference Books

1. Resnick R & Halliday D: Physics -ii. (2) Wiley Eastern Ltd New Delhi, 1991
2. Theraja B L: Modern Physics. S. Chand & Co Ltd New Delhi, 1984
3. Laud B B: Lasers and Non - Linear Optics. (2) New Delhi. New Age Int. Ltd, 1985.
4. Nambiar K R: Lasers Principles, Types and Applications. New Delhi. New Age International Publishers, 2004

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ES5081: Chemistry-II
(Laboratory Work)

Course Objectives

- To develop an analytical ability amongst students.
- To integrate chemistry fundamentals with practical applications.
- To study the reflection of organization, microstructure on properties and utility.
- To understand the chemistry behind physico-chemical phenomena.
- To develop consciousness about environment and ecological balance.

List of Practicals (Any five of the following)

1. To determine the total hardness of water by EDTA method
2. To determine the chloride content of water Mohr's method
3. To determine alkalinity of water
4. Preparation of Phenol/ Urea Formaldehyde
5. To determine molecular weight of polymer
6. To find the radius of macromolecules by viscometer
7. Determination of Biochemical oxygen demand (BOD) & Chemical oxygen demand (COD).
8. Study of growth of crystal.

Outcomes

By the end of course student should be able

√ to carryout chemical analysis of water e.g. total hardness of water, chloride content of water and alkalinity of water, to find out molecular weight and synthetic way of preparation of polymers.

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ES5091: Engineering Mechanics
(Laboratory Work)

Objectives

- To reiterate and strengthen the basic concepts, laws / principles of mechanics of particles and rigid bodies.
- Basic course in mathematics and physics covering calculations and fundamentals an in Mechanics at the HSC level.

List of Practical

(A) Experiments:

Statics (Any three of the following)

1) Verification of: (a) Lami's (b) Varignon's Theorems.
2) Reactive forces in: (a) Simple (b) Compound beams.
3) Study of space force system: (a) Concurrent (b) Parallel
4) To find the forces in the members of truss or frame.

Dynamics (Any three of the following)

1) Study of dependent motion
2) Coefficient of Restitution
3) Verification of work energy principal
4) Curvilinear motion

(B) Graphical Solution

One exercise each on Statics and Dynamics

i) Simply supported beam ii) Truss
iii) Motion Curves iv) Relative velocity

(C) C.B.T.

Computer Based Teaching/Learning using software.

(D) Computer Application

Computer solution of 2 problems each on statics and Dynamics.

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Outcome

By the end of course student should be able to,

√ strengthen their basic concepts, laws / principles of mechanics of particles and rigid bodies. They will also get hands on experience of software.

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ES5101: Elements of Electrical Engineering

(Laboratory Work)

Course Objectives

- Understand connections of an electrical circuit
- Develop hands on experience of handling electrical appliances and instruments.
- Understand importance of safety in day today life.

List of Prcticals (First 3 compulsory. Any 3 out of the remaining 4)

1. Study of wires and wiring components.
2. Wiring exercise - 1. (parallel lamp wiring and staircase wiring)
3. Wiring exercise - 2. (Fluorescent tube wiring and fan-regulator wiring)
4. Study of single-phase energy meter.
5. Study of RL or RLC series circuit.
6. Verification of current and voltage relationships in a three-phase circuit.
7. Visit to a sub-station and study of a typical electrical control panel.

Outcome

By the end of course student should be able to

√ to develop confidence in making electrical connections.
√ calculate different electrical parameters and verification of the same.
√ gain knowledge about the safety and electrical hazards.

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ES5111: Workshop Practice – II
(Laboratory Work)

Course Objectives

- To give students 'hands on experience' of craftsmanship.
- To make students familiar with different work trades.
- To develop quality & safety consciousness amongst the students.
- To develop respect towards labour work amongst the students.

List of Practicals

1. Fitting

Introduction, use of marking tools and measuring instruments such as scriber, punch, marking blue, try square, vernier caliper, vernier height gauge, micrometer, combination set surface plate etc, use of hand tools such as hacksaw, chisels, files, hammer, drills, taps etc. safety precautions..

Practical

One job involving different operations such as sawing, filing, drilling, tapping , etc.

2. Sheet Metal Working

Introduction, use of marking, measuring & cutting tools such as scriber, steel rule, standard wire gauge, scissors, hammers mallets etc, types of metallic sheets, use of power tools,. introduction of soldering, types of solders, use of flux, soldering iron, safety precautions

Practical

One job involving different operations such as marking, cutting, notching, folding, bending, deburring, riveting or soldering etc.

Demonstrations

1. Press Work

Introduction, die & punch, basic operations such as punching, bending, shearing etc. safety precautions and demonstration of press working.

2. Electroplating

Introduction necessity, principle, safety precautions and demonstration of electroplating process.

Assignments

Sketches and process description of the components made in fitting & sheet metal working

Outcomes

√ These will be as per the objectives mentioned above.

Comments

Students should wear safety apron and safety shoes during the practicals..

Text Books

1. S.K.Hajra Choudhary,Elements Of Workshop Technology, Media Promoters & Publishers Pvt.Ltd,
2. K.T.Kulkarni,Introduction to Industrial Safety,K.T.Kulkarni,Pune

Reference Books

1. Hwaiyu Geng,Manufacturing Engineering Handbook,McGraw Hill Publishing Co.Ltd.
2.. Lawrence E.Doyle Manufacturing Processes and Materials for Engineers, Prenice Hall Inc.

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ME0521: Engineering Graphics-II

(Theory)

Course Objectives

- To make all F.E students familiar with imagination and visualization of objects.
- To understand basics of First angle method of projections
- To Learn Basic concepts of Lines, planes and solids..
- To generate engineering awareness and relate it to day to day life.

Unit-I **Projection of points and lines** **(4 Hours)**

Projection of points, projections of lines, inclined to both the principle planes (lines fully lying in the first quadrant only),

Unit-I **Projections of planes:** **(4 Hours)**

Projections of planes such as triangle, quadrilateral, regular polygon, circle.etc, Oblique Planes

Unit-III **Projection of solids:** **(4 Hours)**

Projection of solids such as tetrahedron, cube, right regular prism and pyramid, cylinder, cone, axis of the solid inclined to HP and VP,

Outcomes

By the end of course students should be able to

√ Interpret and visualize of lines, planes and solids at various inclinations.

√ Improve in imagination and visualization of objects.

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Comments

Only First angle projection method to be used for problems on Projections.

Text Books

1. N. D Bhatt, Engineering Drawing, Charotar Publishing house, Anand India
2. K.L.Narayana & P.Kannaiah, Text Book on Engineering Drawing, Scitech Publications, Chennai.

Reference Books:

1. Warren Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi.
2. AutoCAD Instant Reference George Omura ,BPB Publications
3. Frederock E. Giesecke, Alva Mitchell & others, Principals of Engineering Graphics., Maxwell McMillan Publication.

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ME5521: Engineering Graphics –II

(Laboratory Work)

Course Objectives

- To Learn Basic concepts of Lines, planes and solids.
- To generate engineering awareness and relate it to day to day life.

The Term-Work shall consist of three AutoCAD Assignments as described below

1. Orthographic Projections
2. Isometric Projections
3. Projection of Plane or Solid

Outcomes

By the end of course students should be able to

√ Understanding Autocad software and its applications..

Text Books

1 N. D Bhatt, Engineering Drawing, Charotar Publishing house, Anand India
2 K.L.Narayana & P.Kannaiah, Text Book on Engineering Drawing, Scitech Publications, Chennai.

Reference Books:

1 Warren Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi.
2 Frederock E. Giesecke, Alva Mitchell & others, Principals of Engineering Graphics., Maxwell McMillan Publication.
3 AutoCAD Instant Reference George Omura ,BPB Publications

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CS0021: Computer Programming (Theory)

Course Objectives

- To make students aware about fundamentals of programming
- To provide exposure to C programming language.

Unit-I Arrays and Structures (5 Hours)

Concept of an array, Declaration and initialization of an array. Multidimensional array, Strings and Character arrays. Structures: Notion, declaration and initialization, structure variables, accessing and assigning values of the fields, "size of" operator, functions and structures, arrays of structures, nested structures, pointers and structures, self-referential structures, enumerated data types Unions: Declaration, initialization, anonymous union, Bit Fields

Unit-II Functions (5 Hours)

Introduction to Built-in and User defined Functions. Function parameters, Local variables, Global variables and return types. Parameter passing. Function declaration and Function calls. Recursive functions.

Unit-III Pointers (4 Hours)

Concept of pointers, Declaration, pointer arithmetic. Parameter passing using pointers.

Outcomes

By the end of course students should be able

√ to write programs for engineering applications.

Text Book

1. P.K.Sinha, 'Computer Fundamentals', BPB Publication, 3rd Edition, 2003.
2. E.Balaguruswamy,' Programmig in Ansi C ' TMH Publication, 4th Edition

Reference Books

1. B. Gottfried , 'Programming with C - Schaum's outline Series' , McGraw Hill
2. Y. Kanetkar ,' Let us C ', BPB Publications, 2nd Edition.

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CS5021: Computer Programming (Laboratory Work)

Course Objectives

- To make students aware about fundamentals of programming.
- To provide exposure C programming language.

List of Practicals

Term work shall consist of a record of at least 13 assignments including printout of program listing. Simple programs in C language under Windows/LINUX platform based on the topics taught in the theory. Sample list is given below. However staff is encouraged to modify them and produce a variety of such programs. For each of the following programs, student should write an algorithm, draw a flowchart and only then code the program.

(Any 12 of the following)

1. Write a program in C to generate and display a table of n and n^2
2. Write a program in C to sort n integers using bubble sort
3. Write a program in C to perform computer addition/subtraction/multiplication of two Matrices.
4. Write functions to determine whether the matrix is symmetric and skewed
5. Write a program in C to carry out following operations on strings with or without
6. Write a program to understand various logical and bit wise operators
7. Write a program to generate permutations and combinations of a given list
8. Write a program to perform various operations such as union and intersection on sets
9. Matrix manipulations like saddle point, magic square etc. with and without pointers to arrays
10. Structure manipulation (for any database like students database) with and without pointers to structures.
11. Search a number in a given list using linear search or binary search.
12. Write a program to solve system of simultaneous equations using Cramer's rule, Gauss Seidal rule or Gauss Elimination method
13. To create a text file, read it and convert into uppercase & write the contents into another text file by using command line arguments
14. Write a program on Recursion.
15. Write any simple program on pointers.

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Outcomes

By the end of course students should be able

√ To write programs for Engineering applications.

Text Books

1. P.K.Sinha, 'Computer Fundamentals', BPB Publication, 3rd Edition, 2003.
2. E.Balagurusamy,' Programming in Ansi C' TMH Publication, 4th Edition

Reference Books

1. B. Gottfried, 'Programming with C - Schaum's outline Series', McGraw Hill
2. Y. Kanetkar ,' Let us C ', BPB Publications, 2nd Edition

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Language Proficiency - II – English

Overview

This course is designed for students who need to learn English for their job. Its language-driven syllabus gives them the thorough grounding in basic structures and skills which they need at this stage. Students learn listening, speaking, reading and writing skills with exposure to business English. It will allow systematic coverage of Grammar & Vocabulary through natural recycling of language. The course will enable students to speak and write simple English in a range of everyday situations as well as communicate effectively in business environment.

The course aims at enabling systematic revision and recycling as the course progresses, and a wide variety of activities ensuring a balanced approach to skills work. Functional Grammar of English employs a communicative rather than a structural approach to the learning of English grammar.

Course Objectives

The objective of the course is to prepare students to use English for their professional studies.

Unit-I Reading & Listening Skills (04 Hours)

Reading comprehension – 2 + 2 Listening Comprehension – 4
Discussions based on listening sessions – 2

Unit-II Writing Skills (04 hours)

Writing for computer and the internet - Resume writing Letter Writing - Report Writing

Enquiries - Email correspondence
Complaints - Intra Organizational communication II
Applications
Covering Letters

Unit-III Communication Skills (04 Hours)

Formality & Politeness Group Discussion Interview Skills

Unit-IV Communication Skills (04 Hours)

Public Speaking

Unit-V Grammar (06 Hours)

Types of pronouns
Active & Passive voice
Correct uses of the tense
The infinitive
The verb
Tenses: Introduction
The verb: Person & Number

Unit-VI Vocabulary (04 Hours)

Vocabulary building: everyday expressions – 25
New words and their correct usage – 100
Same words used with several meanings – 15

Text Books

Course material will be provided by the Institute.

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