This education is meant to prepare our students to thrive, to lead and to prepare them to achieve four Programme Educational Objectives (PEOs)

PEO 1: Adaptability to industry: Graduates of the programme will receive adequate academic input to adapt themselves in any aircraft and allied industries.

PEO 2: Successful Career Development: Graduates of the programme will have successful technical and professional careers in Aeronautical and allied industries and management.

PEO 3: Contribution to Aeronautical Field: Graduates of the programme will have innovative ideas and potential to contribute for the development and current needs of the aeronautical industries.

PEO 4: Sustainable interest for Lifelong learning: Graduates of the programme will have sustained interest continuously to learn and adapt new technology and development to meet the changing industrial scenarios.

The Technology Program in Aeronautical Engineering attains the following student learning Program Outcomes:

a. Graduate will demonstrate strong basics in mathematics, science and engineering.

b. Graduate will demonstrate the ability to design and conduct experiments, as well as to analyze and interpret data.

c. Graduate will demonstrate the ability to design a system or a component to meet the design requirements with constraints exclusively meant for Aeronautical Engineering.

d. Graduate will become familiar with modern engineering tools and analyze the problems within the domains of Aeronautical Engineering as a member of multidisciplinary teams.

e. Graduate will acquire the capability to identify, formulate and solve complex engineering problems of Aeronautical Engineering.

f. Graduate will demonstrate an understanding of professional and ethical responsibility with reference to their career in the field of Aeronautical Engineering and other professional fields.

g. Graduate will be able to communicate effectively both in verbal and non verbal forms.

h. Graduate will be trained towards developing and understanding the importance of design and development of Airplanes from system integration point of view.
i. Graduate will be capable of understanding the value for life-long learning.

j. Graduate will exhibit the awareness of contemporary issues focusing on the necessity to develop new material, design, testing and solution for environmental problems pertaining to aircraft industry.

k. Graduate will be able to use the techniques, skills and modern engineering tools that are necessary for engineering practice in the field of Aeronautical Engineering.

l. Graduation Graduate will have a firm scientific, technological and communication base that helps them to find a placement in the Aircraft industry and R & D organisations related to Aero Engineering and other professional fields.

m. Graduate will be capable of doing higher studies and research in inter and multidisciplinary areas.

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UNIVERSITY DEPARTMENTS  
B.E. AERONAUTICAL ENGINEERING  
REGULATIONS – 2015  
CHOICE BASED CREDIT SYSTEM  
CURRICULA I - VIII SEMESTERS  
AND  
SYLLABI I - III SEMESTERS  

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COURSE DESCRIPTION:
This course aims at developing the language skills necessary for the first year students of Engineering and Technology.

OBJECTIVES:
- To develop the four language skills – Listening, Speaking, Reading and Writing.
- To improve the students’ communicative competence in English.
- To teach students the various aspects of English language usage.

CONTENTS

UNIT I  GREETING AND INTRODUCING ONESELF  12
Listening – Types of listening – Listening to short talks, conversations; Speaking – Speaking about one’s place, important festivals etc. – Introducing oneself, one’s family/friend; Reading – Skimming a passage – Scanning for specific information; Writing – Guided writing – Free writing on any given topic (My favourite place/ Hobbies/ School life, writing about one’s leisure time activities, hometown, etc.); Grammar – Tenses (present and present continuous) - Question types - Regular and irregular verbs; Vocabulary – Synonyms and Antonyms.

UNIT II  GIVING INSTRUCTIONS AND DIRECTIONS  12
Listening – Listening and responding to instructions; Speaking – Telephone etiquette – Giving oral instructions/ Describing a process – Asking and answering questions; Reading – Reading and finding key information in a given text - Critical reading - Writing – Process description (non-technical) - Grammar – Tense (simple past & past continuous) - Use of imperatives – Subject – verb agreement – Active and passive voice; Vocabulary – Compound words – Word formation – Word expansion (root words).

UNIT III  READING AND UNDERSTANDING VISUAL MATERIAL  12
Listening – Listening to lectures/ talks and completing a task; Speaking – Role play/ Simulation – Group interaction; Reading – Reading and interpreting visual material; Writing – Jumbled sentences – Discourse markers and Cohesive devices – Essay writing (cause & effect/narrative); Grammar – Tenses (perfect), Conditional clauses – Modal verbs; Vocabulary – Cause and effect words; Phrasal verbs in context.

UNIT IV  CRITICAL READING AND WRITING  12
Listening – Watching videos/ documentaries and responding to questions based on them; Speaking – Informal and formal conversation; Reading – Critical reading (prediction & inference); Writing – Essay writing (compare & contrast/analytical) – Interpretation of visual materials; Grammar – Tenses (future time reference); Vocabulary – One word substitutes (with meanings) – Use of abbreviations & acronyms – Idioms in sentences.

UNIT V  LETTER WRITING AND SENDING E-MAILS  12
Listening – Listening to programmes/broadcast/ telecast/ podcast; Speaking – Giving impromptu talks, Making presentations on given topics - Discussion on the presentation; Reading – Extensive reading; Writing – Poster making – Letter writing (Formal and E-mail); Grammar – Direct and Indirect speech – Combining sentences using connectives; Vocabulary – Collocation;
TEACHING METHODS:
Interactive sessions for the speaking module.
Use of audio – visual aids for the various listening activities.
Contextual Grammar Teaching.

EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL: 60 PERIODS

OUTCOMES:
- Students will improve their reading and writing skills
- Students will become fluent and proficient in communicative English
- Students will be able to improve their interpersonal communication

TEXTBOOK:

REFERENCES:
3. Redston, Chris & Gillies Cunningham Face2Face (Pre-intermediate Student’s Book & Workbook) Cambridge University Press, New Delhi: 2005

MA7151 MATHEMATICS – I
(Common to all branches of B.E. / B.Tech. Programmes in 4 0 0 4 I Semester)

OBJECTIVES:
- The goal of this course is for students to gain proficiency in calculus computations. In calculus, we use three main tools for analyzing and describing the behavior of functions: limits, derivatives, and integrals. Students will use these tools to solve application problems in a variety of settings ranging from physics and biology to business and economics.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.
UNIT I  DIFFERENTIAL CALCULUS  12
Representation of functions - New functions from old functions - Limit of a function - Limits at infinity - Continuity - Derivatives - Differentiation rules - Polar coordinate system - Differentiation in polar coordinates - Maxima and Minima of functions of one variable.

UNIT II  FUNCTIONS OF SEVERAL VARIABLES  12

UNIT III  INTEGRAL CALCULUS  12
Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV  MULTIPLE INTEGRALS  12

UNIT V  DIFFERENTIAL EQUATIONS  12
Method of variation of parameters – Method of undetermined coefficients – Homogenous equation of Euler’s and Legendre’s type – System of simultaneous linear differential equations with constant coefficients.

TOTAL: 60 PERIODS

OUTCOMES:
- Understanding of the ideas of limits and continuity and an ability to calculate with them and apply them.
- Improved facility in algebraic manipulation.
- Fluency in differentiation.
- Fluency in integration using standard methods, including the ability to find an appropriate method for a given integral.
- Understanding the ideas of differential equations and facility in solving simple standard examples.

TEXTBOOKS:

REFERENCES:

PH7151 ENGINEERING PHYSICS
(Common to all branches of B.E / B.Tech programmes) 3 0 0 3

OBJECTIVE:
To introduce the basic physics concepts relevant to different branches of Engineering and Technology

UNIT I PROPERTIES OF MATTER

UNIT II ACOUSTICS AND ULTRASONICS

UNIT III THERMAL AND MODERN PHYSICS

UNIT IV APPLIED OPTICS
acceptance angle and numerical aperture - fibre optic communication system - active and passive sensors.

UNIT V CRYSTAL PHYSICS
9
Single crystalline, polycrystalline and amorphous materials – Single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices - interplanar distance for a cubic crystal - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - structure and significance of NaCl, CsCl, ZnS and graphite - crystal imperfections: point defects, line defects – Burger vectors, dislocations and stacking faults – Growth of single crystals: Bridgman and Czochralski methods.

OUTCOME:
The students will acquire knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.

TEXTBOOKS:

REFERENCES:

CY7151 ENGINEERING CHEMISTRY L T P C
3 0 0 3

OBJECTIVES:
• To develop an understanding about fundamentals of polymer chemistry.
• Brief elucidation on surface chemistry and catalysis.
• To develop sound knowledge photochemistry and spectroscopy.
• To impart basic knowledge on chemical thermodynamics.
• To understand the basic concepts of nano chemistry.

UNIT I POLYMER CHEMISTRY
9
Introduction: Functionality-degree of polymerization. Classification of polymers- natural and synthetic, thermoplastic and thermosetting. Types and mechanism of polymerization: addition (free radical, cationic, anionic and living); condensation and copolymerization. Properties of polymers: Tg, tacticity, molecular weight-weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension.
UNIT II SURFACE CHEMISTRY AND CATALYSIS

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY

UNIT IV CHEMICAL THERMODYNAMICS
Second law: Entropy—entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Free energy and work function: Helmholtz and Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius Clapeyron equation; Maxwell relations—Van’t Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation—variation of chemical potential with temperature and pressure.

UNIT V NANO CHEMISTRY
Basics—distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Preparation of nanoparticles—sol-gel and solvothermal. Preparation of carbon nanotube by chemical vapour deposition and laser ablation. Preparation of nanowires by VLS growth, electrochemical deposition and electro spinning. Properties and uses of nanoparticles, nanoclusters, nanorods, nanotubes and nanowires.

TOTAL: 45 PERIODS

OUTCOMES:
• Will be familiar with polymer chemistry, surface chemistry and catalysis.
• Will know the photochemistry, spectroscopy and chemical thermodynamics.
• Will know the fundamentals of nano chemistry.

TEXTBOOKS

REFERENCES
OBJECTIVES
• To develop in students, graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION)
Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HANDSKETCHING
Basic Geometrical constructions, Curves used in engineering practices-Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES
Orthographic projection- principles-Principal planes-First angle projection-Projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both the principal planes by rotating object method and auxiliary plane method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES
Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS
Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY)
Introduction to drafting packages and demonstration of their use.

L=45+T=30, TOTAL: 75 PERIODS
OUTCOMES:
On Completion of the course the student will be able to
- Perform free hand sketching of basic geometrical shapes and multiple views of objects.
- Draw orthographic projections of lines, planes and solids
- Obtain development of surfaces.
- Prepare isometric and perspective views of simple solids.

TEXT BOOK:

REFERENCES:

Publication of Bureau of Indian Standards:

Special points applicable to University Examinations on Engineering Graphics:
1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.
PHYSICS LABORATORY: (Any Seven Experiments)

OBJECTIVE:
To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc.
2. Non-uniform bending - Determination of young’s modulus.
4. Lee’s disc Determination of thermal conductivity of a bad conductor.
5. Potentiometer-Determination of thermo e.m.f of a thermocouple.
7. Air wedge - Determination of thickness of a thin sheet/wire.
8. a) Optical fibre - Determination of Numerical Aperture and acceptance angle.
   b) Compact disc- Determination of width of the groove using laser.
10. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids.
11. Post office box - Determination of Band gap of a semiconductor.
13. Viscosity of liquids - Determination of co-efficient of viscosity of a liquid by Poiseuille’s flow.

OUTCOME:
The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

CHEMISTRY LABORATORY:
(Minimum of 8 experiments to be conducted)

1. Estimation of HCl using Na₂CO₃ as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler’s method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline/thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
12. Pseudo first order kinetics-ester hydrolysis.
14. Determination of CMC.
15. Phase change in a solid.

TOTAL: 60 PERIODS
TEXTBOOKS

GE7162 ENGINEERING PRACTICES LABORATORY
(Common to all Branches of B.E. / B.Tech. Programmes)

OBJECTIVES
To provide exposure to the students with hands-on experience on various Basic Engineering Practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP – A (CIVIL & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICES

PLUMBING
Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.
• Laying pipe connection to the suction side of a pump.
• Laying pipe connection to the delivery side of a pump.
• Practice in connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK
Sawing, planing and making joints like T-Joint, Mortise and Tenon joint and Dovetail joint.

STUDY
• Study of joints in door panels and wooden furniture
• Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICES

• Basic household wiring using Switches, Fuse, Indicator and Lamp etc.,
• Stair case light wiring
• Tube – light wiring
• Preparation of wiring diagrams for a given situation.
• Study of Iron-Box, Fan Regulator and Emergency Lamp

GROUP – B (MECHANICAL AND ELECTRONICS)

3. MECHANICAL ENGINEERING PRACTICES

WELDING
• Arc welding of Butt Joints, Lap Joints, and Tee Joints
• Gas welding Practice.
• Basic Machining - Simple turning, drilling and tapping operations..
• Study and assembling of the following:
  a. Centrifugal pump
  b. Mixie
  c. Air Conditioner.
DEMONSTRATION ON FOUNDRY OPERATIONS.
4. ELECTRONIC ENGINEERING PRACTICES

- Soldering simple electronic circuits and checking continuity.
- Assembling electronic components on a small PCB and Testing.
- Study of Telephone, FM radio and Low Voltage Power supplies.

TOTAL: 60 PERIODS

OUTCOMES
- Ability to fabricate carpentry components and to lay pipe connections including plumbing works.
- Ability to use welding equipments to join the structures
- Ability to do wiring for electrical connections and to fabricate electronics circuits.

HS7251 TECHNICAL ENGLISH L T P C

OBJECTIVES
- To enable students acquire proficiency in technical communication.
- To enhance their reading and writing skills in a technical context.
- To teach various language learning strategies needed in a professional environment.

CONTENTS

UNIT I ANALYTICAL READING
Listening- Listening to informal and formal conversations; Speaking – Conversation Skills(opening, turn taking, closing )-explaining how something works-describing technical functions and applications; Reading –Analytical reading, Deductive and inductive reasoning; Writing- vision statement–structuring paragraphs.

UNIT II SUMMARISING
Listening- Listening to lectures/ talks on Science & Technology; Speaking –Summarizing/ Oral Reporting, Reading – Reading Scientific and Technical articles; Writing- Extended definition –Lab Reports – Summary writing.

UNIT III DESCRIBING VISUAL MATERIAL
Listening- Listening to a panel discussion; Speaking – Speaking at formal situations; Reading – Reading journal articles - Speed reading; Writing-data commentary-describing visual material-writing problem-process- solution-the structure of problem-solution texts- writing critiques

UNIT IV WRITING/ E-MAILING THE JOB APPLICATION
Listening- Listening to/ Viewing model interviews; Speaking –Speaking at different types of interviews – Role play practice ( mock interview); Reading – Reading job advertisements and profile of the company concerned; Writing- job application – cover letter –Résumé preparation.

UNIT V REPORT WRITING
Listening- Viewing a model group discussion; Speaking –Participating in a discussion - Presentation; Reading – Case study - analyse -evaluate – arrive at a solution; Writing–
Recommendations- Types of reports (feasibility report)- designing and reporting surveys- – Report format.- writing discursive essays.

TEACHING METHODS:
Practice writing
Conduct model and mock interview and group discussion.
Use of audio – visual aids to facilitate understanding of various forms of technical communication.
Interactive sessions.

EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL:60 PERIODS

OUTCOMES
• Students will learn the structure and organization of various forms of technical communication.
• Students will be able to listen and respond to technical content.
• Students will be able to use different forms of communication in their respective fields.

TEXTBOOK:

REFERENCES:
OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of the electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I MATRICES 12

UNIT II VECTOR CALCULUS 12
Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green’s, Gauss divergence and Stoke’s theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTION 12
Analytic functions – Necessary and sufficient conditions for analyticity - Properties - Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions \( w = z + c, \ ax, \frac{1}{z}, z^2 \) - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION 12

UNIT V LAPLACE TRANSFORMS 12

OUTCOMES:

- Upon successful completion of the course, students should be able to:
- Evaluate real and complex integrals using the Cauchy integral formula and the residue theorem
- Appreciate how complex methods can be used to prove some important theoretical
results.

• Evaluate line, surface and volume integrals in simple coordinate systems
• Calculate grad, div and curl in Cartesian and other simple coordinate systems, and establish identities connecting these quantities
• Use Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.

TEXTBOOKS:

REFERENCES:

PH7251 MATERIALS SCIENCE L T P C
(Common to Manufacturing, Industrial, Mining, Aeronautical, Automobile and Production Engineering)

3 0 0 3

OBJECTIVE:
• To introduce the essential principles of materials science for mechanical and related Engineering applications.

UNIT I PHASE DIAGRAMS 9
Solid solutions - Hume Rothery’s rules - The phase rule - single component system - one-component system of iron - binary phase diagrams - isomorphous systems - the tie-line rule - the lever rule - application to isomorphous system - eutectic phase diagram - peritectic phase diagram - other invariant reactions – free energy composition curves for binary systems - microstructural change during cooling.

UNIT II FERROUS ALLOYS AND HEAT TREATMENT 9
UNIT III MECHANICAL PROPERTIES

UNIT IV MAGNETIC, DIELECTRIC AND SUPERCONDUCTING MATERIALS

UNIT V NEW MATERIALS

OUTCOME:
• Upon completion of this course, the students can able to apply the different materials, their processing, and heat treatments in suitable application in mechanical engineering fields.

TEXTBOOKS:

REFERENCES:
UNIT I  INTRODUCTION  9
Introduction to Computers – Computer Software – Computer Networks and Internet - Need for logical thinking – Problem formulation and development of simple programs - Pseudo code - Flow Chart and Algorithms.

UNIT II  C PROGRAMMING BASICS  9

UNIT III  ARRAYS AND STRINGS  9

UNIT IV  POINTERS  9
Macros - Storage classes –Basic concepts of Pointers– Pointer arithmetic - Example Problems - Basic file operations

UNIT V  FUNCTIONS AND USER DEFINED DATA TYPES  9

TOTAL :  45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
• Write C program for simple applications
• Formulate algorithm for simple problems
• Analyze different data types and arrays
• Perform simple search and sort.
• Use programming language to solve problems.

TEXTBOOKS:

REFERENCES:
OBJECTIVES:

- To impart the knowledge about the various production processes available
- To expose the student on the principle and applications of the processes
- To make a decision on a relevant process based on the merits and demerits.

UNIT I   CASTING PROCESSES

UNIT II   METAL FORMING PROCESSES

UNIT III   MACHINING PROCESSES
Machine and machine tool – construction, types operations in the following machines with block diagrams – Lathe, Milling, Drilling and Grinding – Concept of NC/CNC machines – Comparison of CNC with conventional machines – sample manual part programming for CNC Lathe and milling.

UNIT IV   WELDING PROCESSES

UNIT V   UNCONVENTIONAL MACHINING PROCESSES
Need for unconventional – Construction, working principle merits, demerits and applications with block diagram only for AJM, AWJM, USM, CHM, ECM, EDM, EBM, LBM, PAM and IBM.

TOTAL: 45 PERIODS

OUTCOMES:

- Has enough knowledge on the various processes available to make a part.
- Confident to select the process to based on cost of time and quantities.
- Can determine processes for new materials.

TEXT BOOKS
1. Serope Kalpakjian, Steven R. Schmid, Manufacturing Engineering and Technology - Anna University, 4/e, Pearson Education, 2014

REFERENCE BOOKS:

GE7153 ENGINEERING MECHANICS

OBJECTIVE:
- The objective of this course is to inculcate in the student the ability to analyze any problem in a simple and logical manner and to predict the physical phenomena and thus lay the foundation for engineering applications.

UNIT I STATICS OF PARTICLES

UNIT II EQUILIBRIUM OF RIGID BODIES

UNIT III DISTRIBUTED FORCES
Centroids of lines and areas – symmetrical and unsymmetrical shapes, Determination of Centroids by Integration , Theorems of Pappus-Guldinus, Distributed Loads on Beams, Center of Gravity of a Three-Dimensional Body, Centroid of a Volume, Composite Bodies , Determination of Centroids of Volumes by Integration.
Moments of Inertia of Areas and Mass - Determination of the Moment of Inertia of an Area by Integration , Polar Moment of Inertia , Radius of Gyration of an Area , Parallel-Axis Theorem , Moments of Inertia of Composite Areas, Moments of Inertia of a Mass - Moments of Inertia of Thin Plates , Determination of the Moment of Inertia of a Three-Dimensional Body by Integration.

UNIT IV FRICTION
UNIT V  DYNAMICS OF PARTICLES

Kinematics - Rectilinear Motion and Curvilinear Motion of Particles.


L – 45 + T – 15 TOTAL: 60 PERIODS

OUTCOME:

• Upon completion of this course, students will be able to construct meaningful mathematical models of physical problems and solve them.

TEXT BOOK


REFERENCES


PR7261  PRODUCTION PROCESSESS LABORATORY  L  T  P  C
(Common to Aero/Auto/Rubber and Plastics)  0  0  4  2

OBJECTIVES:

• To get hands on experience in the machines for production
• To prepare the process planning sheets for all the operations and then follow the sequence during the machining processes.

LIST OF EXPERIMENTS:

1. Study of all the machining tools- identification of parts/mechanisms and position of tool and work piece.
2. Facing, plain turning/step turning operations in Lathe.
3. Tape Turning/Threading and knurling operations in Lathe.
5. Machining to make a cube using shaper
6. Machining to make a V-block using shaper.
7. Counter sinking, counter Boring and Tapping operations in a drilling machine.
8. Surfacing/pocket milling in a vertical milling machine.
9. Polygonal shape milling in a horizontal milling machine
10. Flat surface grinding and cylindrical grinding operations
11. Machining an internal spline in slotting machine.
12. To machine the given part drawing using Lathe and milling machines.

TOTAL: 60 PERIODS

OUTCOMES:
- Enough experience to operate machines and processes commonly used in production of components.
- Enable interpretation of process plan sheets to be followed for the machining of products.

GE7161  COMPUTER PRACTICES LABORATORY

OBJECTIVES:
- To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.
- To articulate where computer programs fit in the provision of computer-based solutions to real world problems.
- To learn to use user defined data structures.

LIST OF EXPERIMENTS
1. Search, generate, manipulate data using MS office/ Open Office
2. Presentation and Visualization – graphs, charts, 2D, 3D
3. Problem formulation, Problem Solving and Flowcharts
4. C Programming using Simple statements and expressions
5. Scientific problem solving using decision making and looping.
6. Simple programming for one dimensional and two dimensional arrays.
7. Solving problems using String functions
8. Programs with user defined functions
9. Program using Recursive Function
10. Program using structures and unions.

TOTAL: 60 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Write and compile programs using C programs.
- Write program with the concept of Structured Programming
- Identify suitable data structure for solving a problem
- Demonstrate the use of conditional statement.

LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS
30 Systems with C compiler
OBJECTIVE:
- To introduce fundamental concepts in thermodynamics, heat transfer, and refrigeration and air conditioning. Apply Mathematical foundations, principles in solving thermodynamics problems.

UNIT I FIRST LAW OF THERMODYNAMICS 9
Concept of continuum-Macroscopic approach-thermodynamic systems-properties-state, path and process, quasi-static process-work and heat-zeroth law and first law of thermodynamics-internal energy-enthalpy- applications of first law of thermodynamics to closed and open system.

UNIT II SECOND LAW OF THERMODYNAMICS 10
Second law of thermodynamics-Kelvin's and Clausius statements of second law-reversibility and irreversibility-carnot theorem-carnot cycle-reversed carnot cycle-clausius inequality-concept of entropy-principle of energy-availability and unavailability-Exergy for closed and open systems.

UNIT III PROPERTIES OF PURE SUBSTANCES AND POWER CYCLE 8

UNIT IV AIR STANDARD CYCLES AND IC ENGINES 9

UNIT V REFRIGERATION, AIR CONDITIONING AND PSYCHROMETRY 9

TOTAL: 45 PERIODS

OUTCOME:
- This course provides the basic knowledge about thermodynamic laws and relations, and their application to various processes.

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
- To introduce the concepts of flying, International standard atmosphere, structural aspects of airplanes, brief description of systems of instruments used in airplanes and power plants used.

UNITI HISTORY OF FLIGHT 8
Balloon flight-ornithopers-Early Airplanes by Wright Brothers, biplanes and monoplanes, Developments in aerodynamics, materials, structures and propulsion over the years.

UNITII AIRCRAFT CONFIGURATIONS AND ITS CONTROLS 10
Different types of flight vehicles, classifications-Components of an airplane and their functions-Conventional control, powered control- Basic instruments for flying-Typical systems for control actuation.

UNIT III BASICS OF AERODYNAMICS 9

UNIT IV BASICS OF PROPULSION 9
Basic ideas about piston, turboprop and jet engines – use of propeller and jets for thrust production- Comparative merits, Principle of operation of rocket, types of rocket and typical applications, Exploration into space.

UNIT V BASICS OF AIRCRAFT STRUCTURES 9

OUTCOME:
- On completion of the course, the students will understand the basic concepts of Aerospace, their power plants and the Mechanics of its flight.

TEXT BOOKS

REFERENCES
OBJECTIVE:

- The student is introduced to the mechanics of fluids through a thorough understanding of the properties of the fluids. The dynamics of fluids is introduced through the control volume approach which gives an integrated understanding of the transport of mass, momentum and energy. The applications of the conservation laws to flow through pipes and hydraulics machines are studied.

UNIT I INTRODUCTION

8

Units and dimensions- Properties of fluids- mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapor pressure, surface tension and capillarity. Flow characteristics – concept of control volume - application of continuity equation, energy equation and momentum equation.

UNIT II FLOW THROUGH CIRCULAR CONDUITS

9


UNIT III DIMENSIONAL ANALYSIS

8

Need for dimensional analysis – methods of dimensional analysis – Similitude --types of similitude - Dimensionless parameters- application of dimensionless parameters – Model analysis.

UNIT IV TURBINES

10


UNIT V PUMPS

10


TOTAL: 45 PERIODS

OUTCOME:

- On completion of the course, students will be familiar with all the basic concepts of fluids and fluid flow phenomenon, conservation equations and their applications to simple problems.

TEXT BOOKS:


REFERENCES:

OBJECTIVE:

- To introduce various behavior of structural components under various loading conditions.
- Also to introduce about the deflection of beams, stresses and strains in torsional members.

UNIT I STRESS-STRAIN – AXIAL LOADING
Definition of stress and strain- Stress-Strain relation- Relation between material constants.-Bar under axial loading- Statically determinate and indeterminate cases – Thermal stress-Impact Loading

UNIT II STRESSES IN BEAMS
Types of beams and loadings – Relation between shear force and bending moment - Shear force and bending moment diagrams – Euler beam theory - Bending stress in beams – Shear stress in beam – Composite beam.

UNIT III DEFLECTION OF BEAM

UNIT IV TORSION – SPRINGS
Shear stress and twist relation for circular section – Comparison of hollow shaft and solid shaft – Compound shaft – Power transmission by circular shafts – Springs – Deflection expression for close coiled helical spring – Stress in springs.

UNIT V BIAXIAL STRESS
Thin walled cylinder under internal pressure – Principal stresses for general biaxial stress field – Mohr’s circle - Stresses in combined loading

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course

- Students will be familiarizing with the fundamentals of deformation, stresses, and strains in structural elements and pressure vessels.
- Students will be familiarizing the beam of different cross sections for shear force, bending moment, slope and deflection.

TEXT BOOKS:

REFERENCES:
EE7151 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING L T P C 3 0 0 3

OBJECTIVES:
- To impart the knowledge on basic concepts of electrical circuits and electrical machines.
- To impart the knowledge on basic concepts of electronic components, devices and circuits.

UNIT I BASIC CONCEPTS AND DC CIRCUITS
- Ohm’s law - Electrical resistance - Series /Parallel resistive circuits - Star/Delta transformations - Kirchoff’s law - Node and Mesh analysis - Thevenin’s and Norton's theorem.

UNIT II A.C.CIRCUITS
- RMS and average value of periodic waves - Form factor - Phase and Phase difference - Simple RC,RL and RLC circuits - series and parallel resonance - power and power factor - introduction to three phase systems – power measurement in 3 phase system.

UNIT III D.C. MACHINES

UNIT IV ELECTRONIC COMPONENTS AND DEVICES
- Operating principle and characteristics of Simple PN Junction Diodes, Zener diode, Bipolar Junction transistor - Field Effect Transistors – UJT – SCR.

UNIT V ANALOG CIRCUITS
- Rectifier and Power Supply Circuits, clipper, clamper using diodes, Operational Amplifiers (Ideal) - properties and typical circuits like differentiator, integrator, summer, comparator.

TOTAL: 45 PERIODS

OUTCOME:
- Ability to use the various electrical machines like AC/ DC, electronic components and applications of analog circuits

REFERENCES:
MA7354  NUMERICAL METHODS  L T P C
4 0 0 4

OBJECTIVES:

- To provide the mathematical foundations of numerical techniques for solving linear system, Eigen value problems, interpolation, numerical differentiation and integration and the errors associated with them;
- To demonstrate the utility of numerical techniques of ordinary and partial differential equations in solving engineering problems where analytical solutions are not readily available.

UNIT I  SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS  12

UNIT II  INTERPOLATION AND APPROXIMATION  12
Interpolation with unequal intervals - Lagrange interpolation – Newton’s divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton’s forward and backward difference formulae – Least square method - Linear curve fitting.

UNIT III  NUMERICAL DIFFERENTIATION AND INTEGRATION  12

UNIT IV  INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS  12

UNIT V  BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS  12
Finite difference methods for solving two-point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat-flow equation by explicit and implicit (Crank-Nicholson) methods - One dimensional wave equation by explicit method.

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of this course, the students will be able to:

- Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions.
- Apply numerical methods to obtain approximate solutions to mathematical problems.
- Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
- Analyse and evaluate the accuracy of common numerical methods.
TEXT BOOKS:

REFERENCES:

EE7261 ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY L T P C 0 0 4 2

OBJECTIVE:
• To train the students in performing various tests on electrical drives, sensors and circuits.

LIST OF EXPERIMENTS:
1. Load test on separately excited DC shunt generator
2. Load test on DC shunt moor
3. Load test on S Transformer
4. Load test on Induction motor
5. Regulation of 3 Alternator
6. Study of CRO
7. Logic gates
8. Operational amplifiers
9. Time constant of RC circuit
10. Characteristics of LVDT
11. Calibration of Rotometer
12. RTD and Thermistor
13. Flapper Nozzle system

TOTAL: 60 Periods

OUTCOMES:
• Ability to perform speed characteristic of different electrical machine
• Ability to use of diodes, transistors for rectifiers
• Ability to use of operational amplifiers
OBJECTIVE:
- To train the students in testing and quantifying the mechanical properties of Engineering Materials, Engines.

LIST OF EXPERIMENTS:
**Material Testing Lab**
- Tension Test
- Torsion Test
- Testing of springs
- Impact test i) Izod, ii) Charpy
- Hardness test i) Vickers, ii) Brinell, iii) Rockwell, iv) Shore
- Deflection of Beams
- Dye Penetrant Test
- Tensile testing of polymers.
- Flex Fatigue test for Elastomers.
- Injection moulding machine operation.

**IC Engines Lab**
- Performance test on a 4 stroke engine
- Viscosity determination of the given fluid
- Moment of inertia of connecting rod
- Determination of Effectiveness of a parallel and counter flow heat exchangers.
- Valve timing of a 4 stroke engine and port timing of a 2 stroke engine.
- Determination of Flash point and Fire point of the given oil.

OUTCOME:
- Upon completion of this course, the students can able to apply determine the strength materials and thermal properties.