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Director

Centre for Academic Courses
Anna University, Chennai-600 025
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**TOTAL CREDITS:** 27 + 25 + 24 + 22 + 23 + 24 + 12 = 179
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<td>6.</td>
<td>AU8006</td>
<td>Combustion Thermodynamics and Heat Transfer</td>
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<td>AU8008</td>
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<td>9.</td>
<td>AU8009</td>
<td>Hybrid and Electric Vehicles</td>
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<td>10.</td>
<td>AU8010</td>
<td>Hydraulic and Pneumatic Systems</td>
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<td>AU8011</td>
<td>Noise, Vibration and Harshness</td>
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<td>AU8017</td>
<td>Virtual Instrumentation in Automobile Engineering</td>
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<td>Human Rights</td>
<td>3</td>
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OBJECTIVES:
- To enable all students of engineering and technology develop their basic communication skills in English.
- To give special emphasis to the development of speaking skills amongst the students of engineering and technology students.
- To ensure that students use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading for pleasure.

UNIT I
Listening - Introducing learners to GIE - Types of listening - Listening to audio (verbal & sounds); Speaking - Speaking about one's place, important festivals etc. - Introducing oneself, one's family / friend; Reading - Skimming a reading passage - Scanning for specific information - Note-making; Writing - Free writing on any given topic (My favourite place / Hobbies / School life, etc.) - Sentence completion - Autobiographical writing (writing about one's leisure time activities, hometown, etc.); Grammar - Prepositions - Reference words - Wh-questions - Tenses (Simple); Vocabulary - Word formation - Word expansion (root words / etymology); E-materials - Interactive exercises for Grammar & Vocabulary - Reading comprehension exercises - Listening to audio files and answering questions.

UNIT II
Listening - Listening and responding to video lectures / talks; Speaking - Describing a simple process (filling a form, etc.) - Asking & answering questions - Telephone skills - Telephone etiquette; Reading - Critical reading - Finding key information in a given text - Sifting facts from opinions; Writing - Biographical writing (place, people) - Lab descriptions (general/specific description of laboratory experiments) - Definitions - Recommendations; Grammar - Use of imperatives - Subject-verb agreement; Vocabulary - Compound words - Word Association; E-materials - Interactive exercises for Grammar and Vocabulary - Listening exercises with sample telephone conversations / lectures - Picture-based activities.

UNIT III
Listening - Listening to specific task - focused audio tracks; Speaking - Role-play - Simulation - Group interaction - Speaking in formal situations (teachers, officials, foreigners); Reading - Reading and interpreting visual material; Writing - Jumbled sentences - Coherence and cohesion in writing - Channel conversion (flowchart into process); Types of paragraph (cause & effect / compare & contrast / narrative / analytical) - Informal writing (letter/e-mail/blogs) - Paraphrasing; Grammar - Tenses (Past) - Use of sequence words - Adjectives; Vocabulary - Different forms and uses of words, Cause and effect words; E-materials - Interactive exercises for Grammar and Vocabulary - Excerpts from films related to the theme and follow up exercises - Pictures of flow charts and tables for interpretations.

UNIT IV
Listening - Watching videos / documentaries and responding to questions based on them; Speaking - Responding to questions - Different forms of interviews - Speaking at different types of interviews; Reading - Making inference from the reading passage - Predicting the content of a reading passage; Writing - Interpreting visual materials (line graphs, pie charts etc.) - Essay writing - Different types of essays; Grammar - Adverbs - Tenses - future time reference; Vocabulary - Single word substitutes - Use of abbreviations & acronyms; E-
OUTCOMES:
Learners should be able to

- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- Read different genres of texts adopting various reading strategies.
- Listen/view and comprehend different spoken discourses/excerpts in different accents.

TEXT BOOKS:

REFERENCES:

EXTENSIVE READERS:

WEBSITE RESOURCES
1. www.ufap.com
2. www.esicafe.com
3. www.listen-to-english.com
4. www.owenenglish.purdue.edu
5. www.chompchomp.com
OUTCOMES:
This course equips students to have basic knowledge and understanding in one field of materials, integral and differential calculus.
TEXT BOOKS:

REFERENCES:

PH8151 ENGINEERING PHYSICS

(Common to all branches of B.E. / B.Tech. Programmes in 1 Semester)

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 PHYSICS

UNIT IV APPLIED OPTICS
OUTCOMES:

- The students will have 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.

OBJECTIVES:

- To make the students conversant with basics of polymer chemistry.
- To make the student acquire sound knowledge of second law of thermodynamics and second law based derivations of importance in engineering applications in all disciplines.
- To acquaint the student with concepts of important photophysical and photochemical processes and spectroscopy.
- To acquaint the students with the basics of nano materials, their properties and applications.

UNIT I  CHEMICAL THERMODYNAMICS

Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Clausius inequality. 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 II  POLYMER CHEMISTRY

Introduction: Classification of polymers – Natural and Synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerisation. Types and mechanism of polymerisation: Addition (Free Radical, cationic, anionic and living); condensation and copolymerisation. Properties of polymers: Tg, Tacticity, Molecular weight – weight average, number average and polydispersity index. Techniques of polymerisation: Bulk, emulsion, solution and suspension.
OUTCOMES:
- The knowledge gained on polymer chemistry, thermodynamics, spectroscopy, phase rule and nano materials will provide a strong platform to understand the concepts on these subjects for further learning.

OBJECTIVES:
The students should be made to:
- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudo code or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.
OUTCOMES:
At the end of the course, the student should be able to:

- Design C Programs for problems.
- Write and execute C programs for simple applications.

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 HAND SKETCHING

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 one of the principal planes by rotating object method and auxiliary plane method.

UNIT IV  PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES
Sectioning of above 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.

TOTAL: 75 PERIODS
OUTCOMES:
On Completion of the course the student will be able to

- perform free hand sketching of basic geometrical constructions and multiple views of objects.
- do orthographic projection of lines and plane surfaces.
- draw projections and solids and development of surfaces.
- prepare isometric and perspective sections of simple solids.
- demonstrate computer aided drafting.

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.

PH8161

PHYSICS LABORATORY

(Common to all branches of B.E. / B.Tech. Programmes in I Semester)

OBJECTIVES:

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

Attended

[Signature]

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OUTCOMES:

- 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.

OBJECTIVES:

- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
- To acquaint the students with the determination of molecular weight of a polymer by vacometry.

LIST OF EXPERIMENTS:

1. Torsional pendulum: Determination of rigidity modulus of wire and moment of inertia of disc.
5. Air wedge: Determination of thickness of a thin sheet of paper.
6. i. Optical fibre: Determination of Numerical Aperture and acceptance angle.
   ii. Compact disc: Determination of width of the groove using laser.

TOTAL: 30 PERIODS

CY8161
CHEMISTRY LABORATORY
(Common to all branches of B.E. / B.Tech. Programmes in I Semester)
OUTCOMES:

- The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

OBJECTIVES:

The student should be made to:

- Be familiar with the use of Office software.
- Be exposed to presentation and visualization tools.
- Be exposed to problem solving techniques and flow charts.
- Be familiar with programming in C.
- Learn to use Arrays, strings, functions, structures and unions.

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 and conversion from given program to flow chart.
10. Program using structures and unions.

OUTCOMES:

At the end of the course, the student should be able to:

- Apply good programming design methods for program development.
- Design and implement C programs for simple applications.
- Develop recursive programs.
2. ELECTRICAL ENGINEERING PRACTICE

- Basic household wiring using switches, fuse, indicator – lamp etc.,
- Preparation of wiring diagrams
- Stair case light wiring
- Tube – light wiring
- Study of iron-box, fan with regulator, emergency lamp

GROUP – B (MECHANICAL AND ELECTRONICS)

3. MECHANICAL ENGINEERING PRACTICE

WELDING

- Arc welding of butt joints, lap joints, tee joints
- Gas welding Practice.
- Basic Machining
- Simple turning, drilling and tapping operations.
- Machine assembly Practice.
- Study and assembling the following:
- Centrifugal pump, mixies and air conditioners.
- Demonstration on
  (a) Smithy operations like the production of hexagonal bolt.
  (b) Foundry operation like mould preparation for grooved pulley.
OUTCOMES:

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

Learners should be able to:

- Speak convincingly, express their opinions clearly, initiate a discussion, negotiate, argue using appropriate communicative strategies.
- Write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- Read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentation.
- Listen/view and comprehend different spoken excerpts critically and infer unspoken and implied meanings.
TEXT BOOKS:

REFERENCE BOOKS:

EXTENSIVE READERS

WEB RESOURCES
1. www.esl-lab.com
2. www.englishgrammar.org
3. www.englishclub.com
4. www.mindtools.com
5. www.esl.about.com

MA8251 MATHEMATICS – II
(Common to all branches of B.E. / B.Tech. Programmes in II Semester)

OBJECTIVES:
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- 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 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 DIFFERENTIAL EQUATIONS 9+3
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.

UNIT II VECTOR CALCULUS 9+3
Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral and volume integral - Green’s, Gauss divergence and Stoke’s theorems – Verification and application in evaluating line, surface and volume integrals.
OUTCOMES:
- The subject helps the students to develop the fundamentals and basic concepts in vector calculus, ODE, Laplace transform and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.

TEXT BOOKS:

REFERENCES:
UNIT I MECHANICAL PROPERTIES

UNIT II PHASE DIAGRAMS
Solid solutions - Hume Rothery’s rules - free energy of solid solution - intermediate phases - The phase rule - single component system - one-component system of iron - binary phase diagrams - isomorphous systems - the tie-line rule - the level rule - application to isomorphous system - eutectic phase diagram - peritectic phase diagram - other invariant reactions - microstructural change during cooling.

UNIT III FERROUS ALLOYS AND HEAT TREATMENT

UNIT IV ELECTRONIC MATERIALS
Classification of solids - energy bands - concept of Fermi level - conductor, semiconductor, insulator - Semiconductors: intrinsic, extrinsic - carrier concentration expression (qualitative) - compound semiconductors (qualitative) - dielectric materials - polarization mechanisms - dielectric breakdown - magnetic materials - ferromagnetic materials & hysteresis - ferrites - superconducting materials, properties, types and applications.

UNIT V NEW MATERIALS AND APPLICATIONS

TOTAL : 45 PERIODS

OUTCOMES:
- 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.

TEXT BOOK:

REFERENCE BOOKS:
OUTCOMES:

- ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
- ability to analyse the forces in any structures.
- ability to solve rigid body subjected to dynamic forces.
OUTCOMES:

- At the end of the course, the student can understand the importance, manufacturing methods, testing methods, combustion methodology of automotive fuels and lubricants.
TEXT BOOKS:

REFERENCES

PR8252 MANUFACTURING PROCESSES L T P C 3 0 0 3

OBJECTIVE:
To learn the basic processes available to make a part/product. Will help the students to select the best manufacturing process based on quality/time/cost/mechanical properties.

UNIT I CASTING PROCESSES 9

UNIT II WELDING PROCESSES 9

UNIT III METAL FORMING PROCESSES 9

UNIT IV MACHINING PROCESSES 9

UNIT V PLASTIC MATERIAL PROCESSES 9

TOTAL : 45 PERIODS
OUTCOMES:
- The students will be in a position to select and employ a particular non traditional machining process as well as a rapid prototyping technique based upon the application in industries.

TEXT BOOKS:

REFERENCE BOOKS:

AU8211
CONVENTIONAL MACHINING PROCESSES LABORATORY
L T P C 0 0 3 2

OBJECTIVE:
- To get hands on experience in the conventional machines.
- To prepare the process planning sheets for all the operations and then follow the sequences during the machining processes.

LIST OF EXPERIMENTS:
1. Study of all the conventions machines – Identification of parts / Mechanisms and Position of tool and work piece.
2. Facing, plain turning /Step Turning operations in Lathe.
3. Taper Turning/ Threading, Knurling operations in Lathe.
5. Machining to make a cube using shaper.
6. Machining to make a V-Block in shaper.
7. Counter sinking, Counter Boring, Tapping operation in a drilling machine.
8. Surfacing/Pocket Milling in a vertical milling machine.
10. Flat surface grinding and cylindrical grinding operations.
11. Machining an internal spline in a slotting machine.
12. To machine the given part drawing using Lathe and milling machines.

TOTAL : 45 PERIODS

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OUTCOMES:

The Students can able to use different machining process and use this in industry for component production

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PR8263

OBJECTIVE:
- To impart practical knowledge in modeling.
- To get hands on experience in drafting of automotive / typical industrial components, etc.

LIST OF EXPERIMENTS:
1. Practice on Drafting software using Measuring Commands; Basic Draw Commands; Display Commands GRID, SNAP, CIRCLE, LINE, ARC, LIMITS, ZOOM, PAN
2. Practice on using Editing Commands; Creating Layers; CHANGE, ERASE, EXTEND, TRIM, GRIDS, LAYER, Construction Commands ARRAY, COPY, MIRROR, MOVE, OFFSET, FILLET, CHAMFER, OSNAP
3. Placing lettering on a drawing; Crosshatching a drawing TEXT, BHATCH
4. 2D drafting of automobile components like engine crank shaft, connecting rod etc.
5. 2D drafting of machine components.
6. 2D drafting of machine shop drawing.
7. 2D drafting of pin joints, cotter joints and bearings.

TOTAL : 45 PERIODS

OUTCOMES

- Students can able to understand uses of computer aided drafting
- Students can able to understand any given drawing of a component and draw the different views of components

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MA8353

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 9+3
OUTCOMES:

- The students will have a clear perception of the power of numerical techniques, ideas and would be able to demonstrate the applications of these techniques to problems drawn from industry, management and other engineering fields.

TEXT BOOKS:


REFERENCES:


AE8351 SOLID MECHANICS

OBJECTIVE:

- To introduce various behavior of structural components under various loading conditions.
OUTCOMES:
• Solve the problems related to the structural components under various loading conditions

TEXT BOOKS:
2. Timoshenko and Young “Strength of Materials” Vol. I & II

REFERENCES:

AU8301

AUTOMOTIVE PETROL ENGINES

OBJECTIVE:
To impart the knowledge on basic concepts on Automotive SI Engines and its various sub components along with its functions.

UNIT I
ENGINE CONSTRUCTION AND OPERATION
OUTCOMES:

- Understand the working principles and constructional details of automotive SI Engines
- Understand the different sub systems of S.I Engine like Fuel and ignition system, lubricating system, cooling system etc.

OBJECTIVES:

- To impart the knowledge on basics of measurements and sensors
- To impart the knowledge on automotive measurements and instruments
OUTCOME:
- Students gained the basic knowledge on measurements and sensor.
- Familiarized in application of automotive sensors.

TEXT BOOKS:
OUTCOMES:
- It helps the students to have a clear idea of application of thermodynamics and heat transfer. The student would be able to identify the applications of these techniques in their engineering fields.
OUTCOMES:

- The students will be able to construct analog and digital circuits with electrical and electronics component. They will be familiar with the use of electrical and electronic measuring systems.
OUTCOMES:
- The students can gain knowledge on some basic testing procedure of the engine and its fuel to calculate some of the mechanical properties like Viscosity, Moment of Inertia etc. The students can get practical knowledge on testing the engine and calculating its performance in the field.
OUTCOMES:
- The students will gain practical experience in designing robots in Mechatronics approach

GE8351 ENVIRONMENTAL SCIENCE AND ENGINEERING

OBJECTIVES
To the study of nature and the facts about environment:
- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth’s interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.
Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.
UNIT II  ENVIRONMENTAL POLLUTION
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.
Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES
Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.
Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT

UNIT V HUMAN POPULATION AND THE ENVIRONMENT

OUTCOMES:
Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
- Public awareness of environmental is at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in std. of living has lead to serious environmental disasters

TEXT BOOKS

REFERENCE BOOKS
OUTCOMES:

- Upon completion of this course, the students can able to apply mathematical knowledge to predict the properties and characteristics of a fluid.
- Can critically analyse the performance of pumps and turbines.

TEXT BOOKS:
1. White, F.M., Fluid Mechanics

REFERENCES:
OBJECTIVE:
Study of the Constructional details and Theory of important drive line, Structural, Steering, Braking and Suspension Systems of Automobiles. Problem–Solving in Steering Mechanism, Propeller Shaft, Braking and Suspension Systems are to be done.

UNIT I LAYOUT, FRAME, FRONT AXLE AND STEERING SYSTEM

UNIT II DRIVE LINE, FINAL DRIVE AND DIFFERENTIAL

UNIT III REAR AXLES, WHEELS, RIMS AND TYRES

UNIT IV SUSPENSION SYSTEM

UNIT V BRAKING SYSTEM

TOTAL : 45 PERIODS

OUTCOMES:

- The students will understand the constructional, working principle of various sub system of an automobile.

TEXT BOOKS

REFERENCES
3. Milliken & Milliken, "Race Car Vehicle Dynamics", SAE
OUTCOMES:
- The students can understand the construction and basic principle of operation of various types of engines and its various fuel induction systems. Also the students can have the basic knowledge on theory of combustion and its types, different types of combustion chamber, air motion etc. Also the students will get the knowledge on the design advances in IC engines; Electronic fuel injection system will also be introduced to the students. At the end of the course the students will have command over automotive engine operation and its fuel injection system.
OUTCOMES:
- Upon completion of this course, the students can apply mathematical knowledge to predict the properties and characteristics of a fluid.
- Can critically analyse the performance of pumps and turbines.
OBJECTIVE:
- To familiarize and train the students on the constructional arrangements of different automotive chassis components.

OUTCOMES:
- At the end of course the students will get familiarized on the constructional arrangements of different chassis systems.
At the end of course the students familiarize on the constructional arrangements of different engine components.

Outcomes:

- Ability to characteristic and chase the fuels and Lubricantes for the automobiles.
LIST OF EQUIPMENTS
1. Redwood Visometer - 1 No.
2. Saybolt Viscometer - 1 No.
3. Flash and Fire point apparatus - 1 No.
4. Cloud and pour point apparatus - 1 No.
5. Distillation test apparatus - 1 No.
7. Bomb Calorimeter - 1 No.
8. Ash content test apparatus - 1 No.

OUTCOMES:
- At the end of course the students familiarize on the design procedure of different automotive components

AU8501    AUTOMOTIVE COMPONENTS DESIGN
L T P C
3 0 0 3

OBJECTIVE:
- To familiarize the various steps involved in the Design Process
- To understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.
- To learn to use standard practices and standard data
- To learn to use catalogues and standard machine components

UNIT I INTRODUCTION

UNIT II DESIGN OF SHAFTS AND SPRINGS

UNIT III GEAR DESIGN

UNIT IV FLYWHEELS
Determination of the mass of a flywheel for a given co-efficient of speed fluctuation. Engine flywheels stresses of rim of flywheels. Design of hubs and arms of flywheel – Turning moment diagram.

UNIT V DESIGN OF BEARINGS
Design of journal bearings - Ball and Roller bearings – Types of Roller bearings – Bearing life – Static load capacity – Dynamic load capacity – Bearing material – Boundary lubrication – Oil flow and temperature rise.

TOTAL : 45 PERIODS
OBJECTIVES

- Knowledge in vehicle electrical and electronics components for engine operation.
- Enhancing the knowledge of reversor and microprocessor applications in vehicle control systems.
- Gaining information's on modern safety system in vehicle braking.

OUTCOMES:

- The student will have to know about all theoretical information and about electrical components used in a vehicle.
OBJECTIVES:

- To know about the various transmission and drive line units of automobiles.

OUTCOMES

- The students will understand the constructional, working principle of various types of manual and automotive transmission of an automobile.
OUTCOMES:

- The students can able to understand the various subsystem of two and three wheeler and also know how it is different from light motors and heavy motor vehicles.
OBJECTIVES:

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

OUTCOMES:

- The students can able to understand the various principle electrical and electronic components.
OUTCOMES:
At the end of this course the student should be able to
- Can understand the design concept and principles of various engine components.
- Understand the concepts and principles are familiarized for design of components.

OBJECTIVES:
- The main objective of this course is to impart knowledge in automotive pollution control. The detailed concept of formation and control techniques of pollutants like UBHC, CO, NOₓ, particulate matter and smoke for both SI and CI engine will be taught to the students. The instruments for measurement of pollutants and emission standards will also be introduced to the students. At the end of the course the students will have command over automotive pollution and control.

UNIT I
INTRODUCTION

UNIT II
EMISSIONS IN SI ENGINE
Chemistry of SI engine combustion – HC and CO formation in SI engines – NO formation in SI engines – Smoke emissions from SI engines – Effect of operating variables on emission formation.

UNIT III
EMISSIONS IN CI ENGINE
Basics of diesel combustion – Smoke emission and its types in diesel engines – NOx emission and its types from diesel engines – Particulate emission in diesel engines. Odor, sulfur and Aldehyde emissions from diesel engines – effect of operating variables on emission formation.
OUTCOMES:

- Upon the completion of the course, the student will understand the fundamentals of formation of automobile pollutions in SI and CI Engines, various control techniques, test procedures etc.

TEXT BOOKS:

REFERENCES:
3. SAE Transactions, Vehicle emission, 1982 (3 volumes).

OBJECTIVES:

- The main objective of this course is to impart knowledge in the construction of vehicle, aerodynamic, concept, paneling of passenger car body trim. At the end of the course the student will be well versed in the design and construction of external body of the vehicles.

UNIT I  CAR BODY DETAILS
Types of Car body - Saloon, convertibles, Limousine, Estate Van, Racing and Sports car – Visibility regulations, driver’s visibility, improvement in visibility and tests for visibility. Driver seat design - Car body construction-Various panels in car bodies. Safety aspect of car body.

UNIT II  BUS BODY DETAILS
Types of bus body: based on capacity, distance traveled and based on construction. - Bus body lay out for various types, Types of metal sections used – Regulations – Constructional details: Conventional and integral. driver seat design- Safety aspect of bus body.
OUTCOMES:
Upon completion of the course, students will

- Know about different aspects of car body and bus body, types, commercial vehicle.
- Role of various aerodynamic forces and moments, measuring instruments
- Know about the material used in body building, tools used, body repairs.

OBJECTIVES:
- The course is designed to know about automotive system dynamics, different controllers and tuning of different controllers.
UNIT I INTRODUCTION TO VEHICLE CONTROL SYSTEM
Steps in vehicle control system design- Influence of vehicle system design on vehicle control-examples w.r.to vehicle sub system - Degree of freedom for vehicle control- Calculation of the Control degree of freedom- Effect of feedback on Control degree of freedom- selection of controlled, manipulated, measured disturbance variables- classification of the variables in various automotive systems like engines, suspension, braking, air conditioning – General types of vehicle controller configurations- Feedback, Inferential, Feed-Forward, Ratio control

UNIT II DYNAMIC BEHAVIOUR AND HARDWARE OF VEHICLE CONTROL SYSTEMS
Transfer function and state-space models- Dynamic behavior of first order and second order vehicle system- Standard vehicle system inputs- Dynamic responses characteristics of more complicated vehicle system- Development of empirical models from vehicle system data
Hardware elements like vehicle plant, measuring instruments, transducers, transmission lines, controller, final control elements, recording elements- Use of digital computers in vehicle control

UNIT III FEEDBACK AND ADVANCED CONTROLLERS FOR VEHICLE CONTROL SYSTEM
Introduction- Basic Control modes- Proportional Control- Integral Control- Reset windup-Derivative Control- various forms of PID control- Enhancements of PID controllers- On-off controllers- Typical responses of feedback control systems- Digital Version of PID controllers
Feed-Forward control-Cascade control- Design considerations for cascade control, Time delay compensation, Inferential control- Nonlinear control- Adaptive control

UNIT IV ENGINE CONTROL SYSTEM
Fuel control- Ignition control- Lambda control- Idle speed control- Knock control- Adaptive knock control- Combustion torque estimation

UNIT V VEHICLE DRIVELINE, BRAKING AND SUSPENSION CONTROL SYSTEM
Driveline modeling- Modeling for neutral Gear- driveline Control- Driveline Speed Control- Driveline control for gear shifting- Active suspension control
Antilock braking control - Traction Control - Electronic stability Program control

OUTCOMES
- Knowing the procedure for modeling different automotive sub system, various control actions and get the exposure of different automotive actuators, tuning controllers.
- Get familiarized with various complex control schemes for automotive systems

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
The students should be made to:
- To make the students aware of the outline of managerial functions relating to manufacturing

OUTCOMES:
At the end of the course, the student should be able to:
- The students would be able to understand the basic application of operational tools and manufacturing.

TEXT BOOKS:
OUTCOMES:
• The students will have enough confidence to present themselves well using proper oral and written communication skills to any interview (or) discussion (or) presentation.

REFERENCES:
OBJECTIVES:
To find and enhance the creativity of the student.

OUTCOME:
Student’s creativity can be identified and improved
OBJECTIVES:
- To train the students in testing of the Engines.

LIST OF EXPERIMENTS:
1. Study and use of IC engine testing Dynamometers.
2. Study of 2 and 4 wheeler chassis Dynamometers.
3. Study and use of Pressure pickups, charge amplifier, storage oscilloscope and signal analyzers used for IC engine testing.
5. Performance study of diesel engine.
6. Calculation of frictional power on petrol engines.
8. Testing of 2 and 4 wheelers using chassis dynamometers.
9. Study of NDIR Gas Analyzer and FID.
10. Study of Chemiluminescent NOx analyser.
12. Diesel smoke measurement.

OUTCOMES:
- The student will get familiarized with the basics of engine testing of engine performance, combustion process and emission characteristics.

TEXT BOOK:

REFERENCES:
OUTCOMES:
- The student will be familiar with the basics of simulation, combustion process, SI Engine modeling and simulation process.

OBJECTIVES:
- To know about the application of basic mechanics principles for dynamic analysis of vehicles.
OUTCOMES:
- The student will understand how passenger comfort is achieved along with vehicle stability.

TEXT BOOKS:

REFERENCES:
1. Dean Karnopp, Vehicle Stability, 1st edition, Marcel Dekker, 2004
OBJECTIVES:
- To know about the various methods of maintaining vehicles and their subsystems.

OUTCOMES:
- Upon the completion of the course, the student can understand the importance of maintenance and also the step by step procedure for maintaining the various automotive sub-systems.

TEXT BOOKS:
3. Vehicle Service Manuals of reputed manufacturers
OUTCOMES:
At the end of this course the student should be able to
- Can understand the design concept and principles of various chassis components.
- Familiarized with the design of chassis components.

OBJECTIVES:
- To experience and understand real life situations in industrial organizations and their related environments and accelerating the learning process of how student's knowledge could be used in a realistic way.
- To understand the formal and informal relationships in an industrial organization so as to promote favorable human relations and teamwork.
• To provide the exposure to practice and apply the acquired knowledge “hands-on” in the working environment.

1. The students have to undergo practical industrial training for four weeks in recognized industrial establishments during their vacation periods.

2. At the end of the training they have to submit a report with following information:
   a. Profile of the industry
   b. Product range
   c. Organization structure
   d. Plant layout
   e. Processes/Machines/Equipments/Devices
   f. Personnel welfare schemes
   g. Details of the training undergone
   h. Projects undertaken during the training, if any
   i. Learning points

The assessments will be based equally on the report in the prescribed format and viva-voce examination by a committee nominated by the Head of the Department

OUTCOMES:
• Demonstrate a thorough understanding of current engineering practice and the role of automotive engineering in the wider industrial and commercial context
• Demonstrate practical engineering skills in the current use and apply industry codes of practice and standards.

OBJECTIVES
• To impart practical knowledge in automotive maintenance
• To understand the different procedures involved in any maintenance shop
• To impart practical knowledge in reconditioning of degraded parts
• To impart practical knowledge in Tuning the vehicle for best performance

STUDY EXPERIMENTS:
1. Tools and instruments required for maintenance
2. Safety aspects with respect to man, machine and tools
3. General procedures for servicing and maintenance schedule
4. Wheel Alignment procedure
OUTCOMES
- Students can able to do understand the functioning of maintenance shop
- Students can able to perform different maintenance procedures
- Students can able to rectify and replace and damaged parts
- Students can able to do some minor tuning on engine and vehicle

OBJECTIVES:
- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The objective of project work is to enable the students, to work in convenient groups of not more than four members in a group, on a project involving some design and fabrication work or theoretical and experimental studies related to the respective engineering discipline.

Every project work shall have a Guide who is a member of the faculty of the University. Twelve periods per week shall be allotted in the Time table for this important activity and this time shall be utilized by the students to receive directions from the Guide, on library reading, laboratory work, computer analysis, or field work as assigned by the Guide and also to present in periodical seminars or viva to review the progress made in the project.
OUTCOMES:

- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

OBJECTIVES:

- Knowledge in usage of software for simulating the performance of IC engines
- Acquiring ability to simulate the various types combustion processes of IC engines.
- Knowledge in performance simulation of IC engines.

UNIT I

COMBUSTION OF FUELS


UNIT II

ENGINE CYCLE ANALYSIS

Ideal air, fuel air cycle and actual cycle analysis. Progressive combustion analysis in SI engines. Parametric studies on work output, efficiency and other engine performance.

UNIT III

COMBUSTION MODELLING


UNIT IV

NON-CONVENTIONAL IC ENGINES


UNIT V

COMBUSTION ANALYSIS IN IC ENGINES

Photographic studies of combustion processes – Analysis of Pressure crank angle diagrams in SI and CI engines. Knock study for Pressure crank angle histories. Apparent heat release rate and Wiebe’s law analysis for combustion. Calculation of Ignition delay and combustion duration. – Hot wire and laser Doppler anemometry and velocimetry for flow and combustion analysis in IC engines.

TOTAL : 45 PERIODS
OUTCOMES:
- At the end of the course, the student can able to model and simulate the engine cycle, perform combustion analysis, instruments used in measurement, recent developments in the IC engines.

TEXTBOOKS:

REFERENCES:

AU8002 ADVANCE VEHICLE TECHNOLOGY

OBJECTIVES:
- To learn and understand the programming, data acquisition hardware and implementing small automotive related projects in virtual instrumentation

UNIT I POWERTRAIN
Modern Engine Technology like DTS-I, DTS-FI, DTS-SI, VVT, Camless Engine, GDi, CRDi

UNIT II VEHICLE SAFETY
Anti lock braking systems - Traction Control system - Electro-hydraulic brakes - Occupant safety systems - Airbags, seat belt tightening system, collision warning systems, child Lock - Power windows - Power Sunroof - Seat and steering Column - Biometric systems - Driver-assistance systems - Adaptive cruise control

UNIT III VEHICLE SECURITY AND COMFORT SYSTEM
Vision enhancement, road recognition system, Anti theft technologies, smart card system, number plate coding, Locking system - Central locking system - Acoustic signaling devices Active suspension systems, requirement and characteristics, different types, Vehicle Handling and Ride characteristics of road vehicle, pitch, yaw, bounce control, Climate control management system

UNIT IV VEHICLE INFORMATION AND COMMUNICATION
OUTCOMES:
- On completion of the course, the student will understand the new developments in the area of automobile area.

OBJECTIVES
- To know about the types of alternative fuels and energy sources for IC engines.
OUTCOMES:
- On completion of the course, the student will understand the various alternative fuels available, its properties, performance characteristics, combustion characteristics, emission characteristics, engine modifications required etc.

REFERENCES:
4. Transactions of SAE on Biofuels (Alcohols, vegetable oils, CNG, LPG, Hydrogen, Biogas etc.).
OUTCOMES:
- Upon completion of this course, the students will understand the fundamentals of aerodynamics, vehicle body optimisation, measuring aerodynamics forces etc.

OBJECTIVES:
- The main objective of this course is to provide theoretical and applicative knowledge in automobile test instrumentation engineering based on virtual reality technologies through advanced instrumentation techniques, programming and data acquisition hardware and implementing small automobile related projects in virtual instrumentation environment.
OUTCOMES:
- Possess knowledge in virtual instrumentation and how it can be applied in data acquisition and instrument control in automobile engineering.
- Can Experiment and analyze the automobile laboratory prototype measurement systems using a computer, plug-in DAQ interfaces.

REFERENCES:
1. A.W. JUDGE, Engineering Precision Measurement, Chapman and Hall Ltd, Essex Street W.C.,1951,
2. T.G. Beckwith and Buck, Mechanical Measurements, Oxford and IBH Publishing House, New Delhi, 1995

AU8006 COMBUSTION THERMODYNAMICS AND HEAT TRANSFER
L T P C
3 0 0 3

OBJECTIVES:
The objectives of this course are to make the students to understand the principle of general and engine combustion. To understand engine heat release rate and various heat transfer models and to study the experimental methods for combustion and heat transfer in engines.

UNIT I THERMODYNAMICS OF COMBUSTION 10
Premixed and diffusion combustion process in IC engines. First and Second Law of Thermodynamics applied to combustion- combustion Stoichiometry- chemical equilibrium, spray formation and droplet combustion.

UNIT II CHEMICAL KINETICS OF COMBUSTION 10

UNIT III FLAMES 10
Laminar premixed – flame speed correlations- quenching, flammability, and ignition, flame stabilization, laminar diffusion flames, turbulent premixed flames-Damkohler number.

UNIT IV HEAT TRANSFER IN IC ENGINES 8

UNIT V EXPERIMENTS IN IC ENGINES 7
Cylinder pressure measurement. Rate of heat release calculation – hot wire and laser Doppler anemometry and velocimetry for flow and combustion analysis in IC engines.

TOTAL : 45 PERIODS
OUTCOMES:
Get familiarized with the following
- The principle of general and engine combustion, heat release rate and various heat transfer models.

REFERENCES:

AU8007
COMPUTATIONAL FLUID MECHANICS

AIM
This course aims to introduce numerical modeling and its role in the field of heat and fluid flow, it will enable the students to understand the various discretisation methods and solving methodologies and to create confidence to solve complex problems in the field of heat transfer and fluid dynamics.

OBJECTIVES:
- To develop finite difference and finite volume discretized forms of the CFD equations.
- To formulate explicit & implicit algorithms for solving the Euler Eqns & Navier Stokes Eqns.

UNIT I
GOVERNING DIFFERENTIAL EQUATION AND FINITE DIFFERENCE METHOD
Classification, Initial and Boundary conditions – Initial and Boundary Value problems – Finite difference method, Central, Forward, Backward difference, Uniform and non-uniform Grids, Numerical Errors, Grid Independence Test.

UNIT II
CONDUCTION HEAT TRANSFER
Steady one-dimensional conduction, Two and three dimensional steady state problems, Transient one-dimensional problem, Two-dimensional Transient Problems.

UNIT III
CONVECTION HEAT TRANSFER AND FEM
OUTCOMES:
Upon completion of this course, the students can able
- To create numerical modeling and its role in the field of fluid flow and heat transfer
- To use the various discretization methods, solution procedures and turbulence modeling to solve flow and heat transfer problems.

OBJECTIVES:
- To provide detailed knowledge to students on Automobile management training, operation, vehicle maintenance, vehicle scheduling, fixation of fare and its structure. In addition the knowledge about vehicle parts supply management, budget allocation and the details of motor vehicle act will be imparted.

UNIT IV    INCOMPRESSIBLE FLUID FLOW

UNIT V    TURBULENCE MODELS

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES
OUTCOMES:

- Demonstrate effective vehicle management skills such as scheduling, fare fixation for optimal usage on roads.
- Possess an extensive knowledge and understanding of the business and management practices on vehicles in fleets and their maintenance.

TEXT BOOK:

REFERENCES:

AU8009 HYBRID AND ELECTRIC VEHICLES

OBJECTIVES:

- To understand the methods of representation of system and their transfer function models
- To provide adequate knowledge in the time response of systems and steady state error analysis
- To give basic knowledge in obtaining the open loop and closed loop frequency responses of system
- To understand the concept of stability of control system and methods of stability analysis
- To study the three way of designing compensators for a control system
OUTCOMES:
- Get familiarized with hybrid and electric vehicle.

TEXT BOOKS:

REFERENCES:
2. Lino Guzzella, "Vehicle Propulsion System". Springer Publications, 2005

AU8010  HYDRAULIC AND PNEUMATIC SYSTEMS

OBJECTIVES:
- To understand the hydraulic and pneumatic principles, components and its selection
- To design the hydraulic circuit and control for automotive applications
- To design the Pneumatic circuit and control for automotive applications
OUTCOMES:

- Students will be able to understand the components of the hydraulic and pneumatic system and their functions and the latest developments in this field.
- Students will be able to understand the hydraulic and pneumatic circuit design, electro pneumatics and PLC circuits.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- knowledge in basic of vibration and noise
- Understanding the effect of noise on human comfort and environment
- Knowing the methods of vibration and noise measurement

OUTCOMES:
- At the end of the course, the student will understand the sources, effects, prediction, control techniques, measurement techniques of noise, vibration pertain to an automobile.
OBJECTIVES:

The subject exposes students to the basics of polymer, vibration and rubber spring and fluid sealing and flexible couplings.

OUTCOMES:

- Use of techniques for polymer processing.
- Ability to develop structure – property relationship in polymer.

REFERENCES:

2. Hobel, E.F., Rubber Springs Design
OBJECTIVES:

- To understand the methods of representation of system and their transfer function models
- To provide adequate knowledge in the time response of systems and steady state error analysis
- To give basic knowledge in obtaining the open loop and closed loop frequency responses of systems
- To understand the concept of stability of control system and methods of stability analysis
- To study the three way of designing compensators for a control system

UNIT I SYSTEM AND THEIR REPRESENTATION
Basic elements in control systems-Open loop and Closed loop system-Feedback characteristics- Effects of feedback-mathematical modeling of physical systems: mechanical, Thermal, hydraulic and Pneumatic systems-Transfer function-AC and DC servomotor-Block diagram reduction techniques-signal flow graph-control system components – computer simulation.

UNIT II TIME RESPONSE ANALYSIS
Time response- Types of test inputs- First and Second order responses- Error coefficient-Generalized error series- Steady state error- Time domain specifications- Problems related to automotive domain- Computer simulation

UNIT III FREQUENCY RESPONSE ANALYSIS
Frequency response- Frequency domain specifications-Bode plot-Polar plot- Determination of phase margin and gain margin- Constant M and N circles-Nichols chart- Determination of closed loop responses from open loop response- Problems related to automotive domain Computer simulation.

UNIT IV STABILITY OF CONTROL SYSTEM

UNIT V CONTROL SYSTEM DESIGN
PID controllers -Performance criteria- Selection of controller modes-lag, Lead, and lag-Lead networks-Compensator design for desired response using root locus and Bode diagrams-Problems related to automotive domain-Computer simulation

TOTAL: 45 PERIODS

OUTCOMES:
Get familiarized with the followings
- Mathematical modeling concepts of systems and their transfer functions models
- The time response of system and steady state error analysis

TEXT BOOKS:

74
REFERENCES:
2. Dorf Bishop, "Modern Control System", Prentice Hall, 2004

AU8014

RENEWABLE SOURCES OF ENERGY

OBJECTIVES:

- To understand the energy conversion, utilization and storage for renewable technologies such as wind, solar, biomass, and other renewable energy sources such as geothermal and ocean.
- To study the potential of using renewable energy technologies as a complement to the extent possible, replacement for conventional technologies, and the possibility of combining renewable and non-renewable energy technologies in hybrid systems.
- To understand the environmental consequences of energy conversion and how renewable energy can reduce air pollution and global climate change and present the strategies for enhancing the future use of renewable energy resources.

UNIT I INTRODUCTION TO RENEWABLE ENERGY SOURCES


UNIT II SOLAR ENERGY


UNIT III BIOMASS AND BIOENERGY


UNIT IV WIND ENERGY

OUTCOMES:

- Upon completion of this course, the students can able to identify the new methodologies / technologies for effective utilization of renewable energy sources.

OBJECTIVES:

- To know about the various types of special types of vehicles, equipment and their working principles and applications.
OUTCOMES:
- Get familiarized with various types of special vehicles and equipment.

OBJECTIVES:
- The course is designed to know about basic air-conditioning concepts, Principles, types, components and maintenance aspects of vehicle air-conditioning system.
OUTCOMES:
- Students will be able to understand the components of the automotive air-conditioning and their functions and the latest developments in this field.
- Students will be able to understand the components of the automotive air-conditioning and their functions and the latest developments in this field.

TEXT BOOKS:

REFERENCES:

AU8017 VIRTUAL INSTRUMENTATION IN AUTOMOBILE ENGINEERING

OBJECTIVES:
- To learn and understand the programming, data acquisition hardware and implementing small automotive related projects in virtual instrumentation.
OUTCOMES:

- Possess knowledge in virtual instrumentation and how it can be applied in data acquisition and instrument control in automobile engineering.
- Experiment and analyze the automobile laboratory prototype measurement systems using a computer, plug-in DAQ interfaces.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To introduce the concepts of Mathematical Modeling of Engineering Problems.
- To appreciate the use of FEM to a range of Engineering Problems.

OUTCOMES:
- Upon completion of this course, the students can able to understand different mathematical Techniques used in FEM analysis and use of them in Structural and thermal problem.

TEXT BOOKS:

REFERENCES:
OUTCOMES:
- Upon completion of this course, the students can able to know the methodology for manufacturing casted engine and forged engine components.

TEXT BOOK:

REFERENCES:
2. Newton and steels, the motor vehicle, ELBS, 1990
OBJECTIVES:
- To learn the fundamentals of nano science
- To learn the methods to make the nano particles
- To learn the characterization of nano particles

UNIT I  INTRODUCTION
Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II  PREPARATION METHODS
Bottom-up Synthesis-Top-down Approach: Precipitation, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III  PATTERNING AND LITHOGRAPHY FOR NANOSCALE DEVICES
Introduction to optical/UV electron beam and X-ray Lithography systems and processes, Wet etching, dry (Plasma /reactive ion) etching. Etch resists-dip pen lithography

UNIT IV  PREPARATION ENVIRONMENTS
Clean rooms: specifications and design, air and water purity, requirements for particular processes, Vibration free environments: Services and facilities required. Working practices, sample cleaning, chemical purification, chemical and biological contamination, Safety issues, flammable and toxic hazards, biohazards.

UNIT V  CHARACTERISATION TECHNIQUES
X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation

TOTAL : 45 PERIODS

OUTCOMES:
- Get familiarized with the following
  - Fundamentals of nano science and nanopreparation methods
  - patterning and lithography for nanoscale devices
  - Characterisation Techniques

TEXT BOOKS

REFERENCES
OBJECTIVES:
- To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

OUTCOMES;
- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.
TEXT BOOK

REFERENCES:

WEB SOURCES:
1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

MG8654
TOTAL QUALITY MANAGEMENT
L T P C
3 0 0 3

AIM
To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

OBJECTIVES
- To understand the various principles, practices of TQM to achieve quality.
- To learn the various statistical approaches for Quality control.
- To understand the TQM tools for continuous process improvement.
- To learn the importance of ISO and Quality systems.

UNIT I INTRODUCTION
**OUTCOMES**
- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

**TEXT BOOK:**

**REFERENCE BOOKS:**

**OBJECTIVES:**
- To introduce fundamental concepts on automotive materials and its selection criteria, materials for engine, transmission system, structure and application.
OUTCOMES:

- Student can able to know fundamental concepts about materials and its selection. Study on the materials Material costs, Availability, Recyclability, Environmental consideration Enhance knowledge on materials used for various automotive components, chassis, and its applications.

TEXTBOOKS:

REFERENCES:
OUTCOMES:
- The student will be in a position to plan for energy saving machinery, energy economy equipment
OBJECTIVES:
- To study the kinematics, drive systems and programming of robots.

OUTCOMES:
- Upon completion of this course, the students can apply the basic engineering knowledge for the design of robotics.

TEXT BOOK:
OUTCOMES:

The students will be able to
(i) Formulate the given problem into a suitable model
(ii) Apply the appropriate optimisation technique
OBJECTIVES:

- To impart the knowledge of the quality control, control charts and application and construction of various quality control charts and the selection.
- To study the significance of design of experiments and its application.
- To train the students in the field of reliability and its estimation.

OUTCOMES:

- The students will be able to solve engineering problems in 1D, 2D problems by various methods like classical method and nodal approximation method.
GE8072                DISASTER MANAGEMENT                  L   T   P   C
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OBJECTIVES:
- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR).
- To enhance awareness of institutional processes in the country.
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity.

UNIT I               INTRODUCTION TO DISASTERS                     9
Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II              APPROACHES TO DISASTER RISK REDUCTION (DRR)      9
Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III             INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV              DISASTER RISK MANAGEMENT IN INDIA                 9
Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V               DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9
Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS
OUTCOMES:
The students will be able to

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.

TEXTBOOK:

REFERENCES
1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005

GE8073 HUMAN RIGHTS

OBJECTIVES:

- To sensitize the Engineering students to various aspects of Human Rights.

UNIT I

UNIT II

UNIT III
Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV
Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V

TOTAL : 45 PERIODS

OUTCOME:

- Engineering students will acquire the basic knowledge of human rights.

REFERENCES: