THE VISION OF THE DEPARTMENT OF MECHANICAL ENGINEERING

Department of Mechanical Engineering strives to be recognized globally for excelling in Engineering education and research leading to innovative, entrepreneurial and competent graduates in Mechanical Engineering and allied disciplines.

THE MISSION OF THE DEPARTMENT OF MECHANICAL ENGINEERING

1. To provide a world-class education through the conduct of pioneering and cutting-edge research that inculcate professional, technical, critical-thinking, and communication skills necessary for students and faculty to make impactful contributions to society.
2. To create future leaders in the science and art of mechanical and allied engineering streams.
3. To expand the frontiers of engineering science and to encourage technological innovation while fostering academic excellence and scholarly learning in a collegial environment.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The PEOs of the Mechanical Engineering Programme are to make our graduates

1. To achieve success in careers that deal with the design, simulation and analysis of engineering systems, experimentation and testing, manufacturing, technical services, and research.
2. To communicate effectively with peers, and updating and adapting their core knowledge and abilities to ethically compete in the ever-changing multicultural global enterprise.
3. To conduct multi-disciplinary research and development (via graduate study or industry) resulting in tangible applications that advance technology and foster innovation in order to compete successfully in the global economy.
4. To exchange and apply knowledge to create new opportunities that advance our society and proactively address through team efforts to solve a variety of technical, environmental and societal problems.
5. To actively embrace impactful leadership roles in the practice of Mechanical Engineering in industry and government organizations (including both traditional and emerging technical areas) as well as in public service organizations.

PROGRAMME OUTCOMES (POs):

On successful completion of the Mechanical Engineering Degree programme, the graduates shall exhibit the following:

<table>
<thead>
<tr>
<th>PO</th>
<th>Graduate Attribute</th>
<th>Programme Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Engineering knowledge</td>
<td>Apply knowledge of mathematics, basic science and engineering science.</td>
</tr>
</tbody>
</table>
2. Problem analysis
Identify, formulate and solve engineering problems.

3. Design/development of solutions
Design a system or process to improve its performance, satisfying its constraints.

4. Conduct investigations of complex problems
Conduct experiments & collect, analyze and interpret the data.

5. Modern tool usage
Apply various tools and techniques to improve the efficiency of the system.

6. The Engineer and society
Conduct themselves to uphold the professional and social obligations.

7. Environment and sustainability
Design the system with environment consciousness and sustainable development.

8. Ethics
Interacting industry, business and society in a professional and ethical manner.

9. Individual and team work
Function in a multidisciplinary team.

10. Communication
Proficiency in oral and written Communication.

11. Project management and finance
Implement cost effective and improved system.

12. Life-long learning
Continue professional development and learning as a life-long activity.

PROGRAMME SPECIFIC OUTCOMES (PSOs):
On successful completion of the Mechanical Engineering Degree programme, the graduates shall exhibit the following:

1. Understand, apply, analyze, design and develop engineering systems adopting thermal, design and manufacturing concepts.
2. Utilize computational and design tools for efficient product development.
3. Apply the acquired knowledge for innovative solutions to cater societal needs and industrial problems.

PEO / PO Mapping:

<table>
<thead>
<tr>
<th>PROGRAMME EDUCATIONAL OBJECTIVES</th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
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PROGRAMME OUTCOMES
# MAPPING OF COURSE OUTCOMES WITH POs and PSOs

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<th>COURSE NAME</th>
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<tr>
<td>Engineering Mathematics - I</td>
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<td>Engineering Chemistry</td>
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<tr>
<td>Basic Sciences Laboratory</td>
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<tr>
<td>Workshop Practices Laboratory</td>
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### YEAR-1/SEM-1

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<td>Problem Solving and Python Programming</td>
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<td>Engineering Mechanics</td>
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<tr>
<td>Fluid Mechanics and Machinery</td>
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<tr>
<td>Problem Solving and Python Programming Laboratory</td>
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<td>Engineering Materials and Metallurgy</td>
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<td>Metal Cutting and Machine Tools</td>
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<td>Applied Thermodynamics</td>
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<td>Engineering Physics</td>
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<td>Engineering Graphics</td>
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<td>Basic Sciences Laboratory</td>
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<td>Design of Machine elements</td>
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<td>Thermal Engineering</td>
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<td>Metrology and Dynamics Laboratory</td>
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<td>Industrial Training/Internship*</td>
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<td>Design of Transmission Systems</td>
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<td>Environmental Sciences</td>
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<td>Heat and Mass transfer</td>
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<td>Heat Transfer and Refrigeration and Air-conditioning Laboratory</td>
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<td>Geometric Modeling and Simulation Laboratory</td>
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<td>Energy Conversion Techniques</td>
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<td>Finite Element Analysis</td>
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<td>Computer Integrated Manufacturing</td>
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<td>Project II</td>
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ANNA UNIVERSITY, CHENNAI  
UNIVERSITY DEPARTMENTS  
B.E. MECHANICAL ENGINEERING  
REGULATIONS - 2019  
CHOICE BASED CREDIT SYSTEM  
CURRICULA AND SYLLABI FOR I TO VIII SEMESTERS  
(Applicable to students admitted from the Academic Year 2022 – 2023 onwards)

### SEMESTER I

<table>
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<tr>
<th>SL. NO.</th>
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<th>PERIODS PER WEEK</th>
<th>TOTAL CONTACT PERIODS</th>
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**THEORY**

**PRACTICALS**

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$^*$Skill Based Course

### SEMESTER II

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**THEORY**

**PRACTICALS**

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$^*$value added course
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$ Skill Based Course

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*Audit Course is optional.

* The students will undergo industrial training / Internship during previous vacation

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# ENGINEERING SCIENCE COURSE (ESC)

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Registration for any of these courses is optional to students

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# EMPLOYABILITY ENHANCEMENT COURSES (EEC)

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## SUMMARY

Name of the Programme: B.E. Mechanical Engineering

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OBJECTIVES

- To build lexical competency and accuracy that will help learners to use language effectively.
- To learn various reading strategies that will enable learners to comprehend the different modes of reading materials of varied levels of complexity.
- To comprehend the linguistic aspects of various rhetorical structures and functions of Technical English and use them effectively in writing.

UNIT I  INTRODUCING ONESELF  9
Theory:
Reading: Descriptive passages (From Newspapers / Magazines) – Writing: Writing a coherent paragraph (Native Place, School Life) – Grammar: Simple present tense, Present continuous tense – Vocabulary development: One word substitution.

UNIT II  DIALOGUE WRITING  9
Theory:
Reading: Reading a print interview (Comprehension and inference questions) - Writing: Writing a checklist - Dialogue writing – Grammar: Simple past tense – Question formation (Wh-Questions, ‘Yes’ or ‘No’ Questions, Tag Questions) – Vocabulary Development: Lexical items relevant to the theme of the given unit.

UNIT III  FORMAL LETTER WRITING  9
Theory:

UNIT IV  WRITING LETTERS OF COMPLAINT  9
Theory:

UNIT V  WRITING DEFINITIONS AND PRODUCT DESCRIPTION  9
Theory:

TOTAL : 45 PERIODS

LEARNING OUTCOMES:
On completion of the course, the students will be able to:

- Use appropriate language structures and lexical items in authentic contexts.
- Read both general and technical texts and comprehend their denotative and connotative meanings.
- Write different kinds of formal documents with grammatical and lexical appropiacy.

Assessment Pattern

- Two written internal assessments to test learner’s progress in grammar, vocabulary, reading and writing skills.
- End Semester exam to be tested in two parts: Theory exam for three hours and listening and speaking skills for two hours.
COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT I  MATRICES


UNIT II  DIFFERENTIAL CALCULUS


UNIT III  FUNCTIONS OF SEVERAL VARIABLES


UNIT IV  INTEGRAL CALCULUS

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 V  MULTIPLE INTEGRALS


TOTAL :60 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

- Use the matrix algebra methods for solving practical problems.
- Apply differential calculus tools in solving various application problems.
- Able to use differential calculus ideas on several variable functions.
- Apply different methods of integration in solving practical problems.
- Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS:


REFERENCES:

PH5151  ENGINEERING PHYSICS
(At common to all branches of B.E / B.Tech programmes)

COURSE OBJECTIVES:
- To make the students in understanding the importance of mechanics.
- To equip the students on the knowledge of electromagnetic waves.
- To introduce the basics of oscillations, optics and lasers.
- To enable the students in understanding the importance of quantum physics.
- To elucidate the application of quantum mechanics towards the formation of energy bands in crystalline materials.

UNIT I  MECHANICS

UNIT II  ELECTROMAGNETIC WAVES
Gauss’s law – Faraday’s law - Ampere’s law - The Maxwell’s equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

UNIT III  OSCILLATIONS, OPTICS AND LASERS

UNIT IV  BASIC QUANTUM MECHANICS
Photons and light waves - Electrons and matter waves - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization - Particle in a infinite potential well - Normalization, probabilities and the correspondence principle.
UNIT V      APPLIED QUANTUM MECHANICS

The harmonic oscillator - Barrier penetration and quantum tunneling - Tunneling microscope - Resonant diode - Finite potential wells - particle in a three dimensional box - Bloch’s theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands.

COURSE OUTCOMES:
After completion of this course, the students should be able to
- Understanding the importance of mechanics.
- Express the knowledge of electromagnetic waves.
- Know the basics of oscillations, optics and lasers.
- Understanding the importance of quantum physics.
- Apply quantum mechanical principles towards the formation of energy bands in crystalline materials.

TEXT BOOKS

REFERENCES

CY5151        ENGINEERING CHEMISTRY

(COMMON TO ALL BRANCHES)

COURSE OBJECTIVES:
- To introduce the basic concepts of polymers, their properties and some of the important applications.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To facilitate the understanding of the laws of photochemistry, photoprocesses and instrumentation & applications of spectroscopic techniques.
- To familiarize the operating principles and applications of energy conversion, its processes and storage devices.
- To inculcate sound understanding of water quality parameters and water treatment techniques.

UNIT I   POLYMER CHEMISTRY

UNIT II  NANO CHEMISTRY
Basics-distinction between molecules, nanomaterials and bulk materials; size-dependent properties. Types – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY
Spectroscopy: Electromagnetic spectrum - absorption of radiation - electronic, vibrational and rotational transitions. Width and intensities of spectral lines. Atomic absorption spectroscopy, UV-Vis and IR spectroscopy- principles, instrumentation (Block diagram) and applications.

UNIT IV ENERGY CONVERSIONS AND STORAGE
Nuclear fission - controlled nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant – fast breeder reactor. Solar energy conversion - solar cells. Wind energy. Batteries - types of batteries – primary battery (dry cell), secondary battery (lead acid, nickel-cadmium and lithium-ion-battery). Fuel cells – H2-O2 and microbial fuel cell. Explosives – classification, examples: TNT, RDX, Dynamite; Rocket fuels and propellants – definition and uses.

UNIT V WATER TECHNOLOGY

TOTAL: 45 PERIODS

COURSE OUTCOMES:
- To recognize and apply basic knowledge on different types of polymeric materials, their general preparation methods and applications to futuristic material fabrication needs.
- To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
- To identify and apply suitable spectroscopic technique for material analysis and study different forms of photochemical reactions.
- To recognize different forms of energy resources and apply them for suitable applications in energy sectors.
- To demonstrate the knowledge of water and their quality in using at different industries.

TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Drawing free hand sketches of basic geometrical shapes and multiple views of objects.
2. Drawing orthographic projections of lines and planes.
3. Drawing orthogonal projections of solids.
4. Drawing development of the surfaces of objects.
5. Drawing isometric and perspective views of simple solids.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION) 1
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 14
Basic Geometrical constructions, Curves used in engineering practices-Conics – Construction of ellipse, parabola and hyperbola by different methods – 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 15
Orthographic projection- principles-Principle 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 15
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 15
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 12
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) 3
Introduction to drafting packages and demonstration of their use

TOTAL  (L: 15 + P: 60)=75 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Draw free hand sketching of basic geometrical shapes and multiple views of objects.
2. Draw orthographic projections of lines and planes
3. Draw orthographic projections of solids
4. Draw development of the surfaces of objects
5. Draw isometric and perspective views of simple solids.
TEXT BOOKS:

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.
4. The students will be permitted to use appropriate scale to fit solution within A3 size.
5. The examination will be conducted in appropriate sessions on the same day.
ஆண்டு II  பாணியும் சுட்டேடுறு செய்யும் வேளும் தமிழ் குடியுரைக்குப் படுத்தி கைவிடுநர்: 3

ஆண்டு III பல்கிற்குழு கணினி பதிவு என்று கிறித்தானை: 3

ஆண்டு IV கிறித்தானை கணினி பதிவு: 3

ஆண்டு V இரண்டு கூட்டுக்குழு பதிவு என்று கிறித்தானை பதிவு: 3

TEXT-CUM-REFERENCE BOOKS
1. சிலிங்கு செய்யும் – மங்களம் பரிபாடு விளக்கம் (சுமதமிகம்: தமிழகத்தின் பாரம்பரிய குலம்)
2. குறிப்பிட்டு குறிப்பிட்டு – குறிப்பிட்டு இடியப்பட்டு குறிப்பிட்டு (சுமதமிகம்: பிரித்து)
3. சுருள் – தண்டு குறிப்பிட்டு சுருள் தண்டு தவறு (சுமதமிகம்: தென்னிந்திய புத்தர்)
4. போராட்டு – குறிப்பிட்டு போராட்டு (சுமதமிகம்: சுமதமிகம்)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - ‘Sangam City Civilization on the banks of river Vaigai’ (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
UNIT I LANGUAGE AND LITERATURE

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE

UNIT III FOLK AND MARTIAL ARTS
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV THINAI CONCEPT OF TAMILS
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE
Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS
1. தமிழ் வரலைக் கற்று – மத்திய பதிப்புருடன் – தகவுக்கு (தவளியீடு).
2. கல்விக் கல்விக் கல்விக் - மாணவர் மயம் தமிழ் கல்விக் கல்விக் (தவளியீடு).
3. சிபாக் – சொந்தக் கல்விக் கல்விக் கல்விக் கல்விக் (தவளியீடு).
4. பாடல்கள் – கண்டத்கள் கண்டத்கள் (சுந்தரம் பிள்மள).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
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11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
PHYSICS LABORATORY: (Any Seven Experiments)

COURSE OBJECTIVES:
- To inculcate experimental skills to test basic understanding of physics of materials including properties of matter, thermal and optical properties.
- To induce the students to familiarize with experimental determination of velocity of ultrasonic waves and band gap determination.

LIST OF EXPERIMENTS:
1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc
2. Non-uniform bending - Determination of Young’s modulus
3. 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
6. Laser- Determination of the wave length of the laser using grating
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. Photoelectric effect
14. Michelson Interferometer.
16. Melde’s string experiment

TOTAL: 30 PERIODS

COURSE OUTCOMES:
Upon completion of the course, the students will be able
- To determine various moduli of elasticity and also various thermal and optical properties of materials.
- To determine the velocity of ultrasonic waves, band gap determination and viscosity of liquids

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

COURSE OBJECTIVES:
- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and polymers by spectroscopy and viscometry methods.

LIST OF EXPERIMENTS:
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. Phase change in a solid.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

- To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.
- To determine the amount of metal ions through volumetric and spectroscopic techniques
- To determine the molecular weight of polymers by viscometric method.
- To quantitatively analyse the impurities in solution by electroanalytical techniques
- To design and analyse the kinetics of reactions and corrosion of metals

TEXT BOOKS:


GE5162 WORKSHOP PRACTICES LABORATORY (Common to all Branches of B.E / B.Tech. Programmes)

COURSE OBJECTIVES:

The main learning objective of this course is to provide hands on training to the students in:

1. Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in common household wood work.

2. Wiring various electrical joints in common household electrical wire work.

3. Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.

4. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES

PLUMBING WORK:

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.

b) Preparing plumbing line sketches.

c) Laying pipe connection to the suction side of a pump

d) Laying pipe connection to the delivery side of a pump.

e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.
WOOD WORK:

a) Sawing,
b) Planing and 
c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

Wood Work Study:

a) Studying joints in door panels and wooden furniture 
b) Studying common industrial trusses using models.

PART II  ELECTRICAL ENGINEERING PRACTICES 15

WIRING WORK:

a) Wiring Switches, Fuse, Indicator and Lamp etc. such as in basic household,
b) Wiring Staircase light.
c) Wiring tube – light.
d) Preparing wiring diagrams for a given situation.

Wiring Study:

a) Studying an Iron-Box wiring.
b) Studying a Fan Regulator wiring.
c) Studying an Emergency Lamp wiring.

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III  MECHANICAL ENGINEERING PRACTICES 15

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
b) Practicing gas welding.

BASIC MACHINING WORK:

a) (simple)Turning.
b) (simple)Drilling.
c) (simple)Tapping.

ASSEMBLY WORK:

a) Assembling a centrifugal pump.
b) Assembling a household mixer.
c) Assembling an air conditioner.

SHEET METAL WORK:

a) Making of a square tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations.

PART IV  ELECTRONIC ENGINEERING PRACTICES 15

SOLDERING WORK:
a) Soldering simple electronic circuits and checking continuity.

**ELECTRONIC ASSEMBLY AND TESTING WORK:**

a) Assembling and testing electronic components on a small PCB.

**ELECTRONIC EQUIPMENT STUDY:**

a) Studying a FM radio.
b) Studying an electronic telephone.

**TOTAL = 60 PERIODS**

**COURSE OUTCOMES:**

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

1. Understand the concept of plumbing work and fittings in common household applications.
2. Ability to saw, plan and join wood materials used in common household wood applications.
3. Become familiar with wiring various electrical joints in common household electrical applications.
4. Perform various weld joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical household equipments; Make a tray out of metal sheet using sheet metal work.
5. Become familiar with soldering and testing simple electronic circuits; Assemble and test simple electronic components on PCB.

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**OBJECTIVES:**

- To improve the communicative competence of learners
- To help learners use language effectively in academic/work contexts
- To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.
- To build on students’ English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- To use language efficiently in expressing their opinions via various media.

**UNIT I \ INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION**

Listening for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form. Speaking - making telephone calls-Self Introduction; Introducing a friend; - politeness strategies- making polite requests, making polite offers, replying to polite requests and offers- understanding basic instructions( filling out a bank application for example).

**UNIT II \ NARRATION AND SUMMATION**

Listening - Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities. Speaking - Narrating personal experiences / events-Talking about current and temporary situations & permanent and regular situations* - describing experiences and feelings-engaging in small talk- describing requirements and abilities.
UNIT III DESCRIPTION OF A PROCESS / PRODUCT 6
Listening - Listen to product and process descriptions; a classroom lecture; and advertisements about products. Speaking – Picture description- describing locations in workplaces- Giving instruction to use the product- explaining uses and purposes- Presenting a product- describing shapes and sizes and weights- talking about quantities(large & small)-talking about precautions.

UNIT IV CLASSIFICATION AND RECOMMENDATIONS 6
Listening – Listening to TED Talks; Listening to lectures - and educational videos. Speaking – Small Talk; discussing and making plans-talking about tasks-talking about progress- talking about positions and directions of movement-talking about travel preparations- talking about transportation-

UNIT V EXPRESSION 6
Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions. Speaking –making predictions- talking about a given topic-giving opinions-understanding a website-describing processes

TOTAL : 30 PERIODS

LEARNING OUTCOMES:
At the end of the course, learners will be able
- To listen and comprehend complex academic texts
- To speak fluently and accurately in formal and informal communicative contexts
- To express their opinions effectively in both oral and written medium of communication

ASSESSMENT PATTERN
- One online / app based assessment to test listening /speaking
- End Semester ONLY listening and speaking will be conducted online.
- Proficiency certification is given on successful completion of listening and speaking internal test and end semester exam.

MA5252 ENGINEERING MATHEMATICS – II L T P C
(Common to all branches of B.E. / B.Tech. Programmes in II Semester)
3 1 0 4

COURSE OBJECTIVES:
- To acquaint the students with the concepts of vector calculus which naturally arises in many engineering problems.
- To develop an understanding of the standard techniques of complex variable theory in particular analytic function and its mapping property.
- To familiarize the students with complex integration techniques and contour integration techniques which can be used in real integrals.
- To acquaint the students with Differential Equations which are significantly used in Engineering problems.
- To make the students 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 VECTOR CALCULUS 12

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

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

UNIT V  LAPLACE TRANSFORMS

TOTAL : 60 PERIODS

COURSE OUTCOMES:
Upon successful completion of the course, students will be able to:

• Calculate grad, div and curl and use Gauss, Stokes and Greens theorems to simplify calculations of integrals.
• Construct analytic functions and use their conformal mapping property in application problems.
• Evaluate real and complex integrals using the Cauchy’s integral formula and residue theorem.
• Apply various methods of solving differential equation which arise in many application problems.
• Apply Laplace transform methods for solving linear differential equations.

TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES:
The main learning objective of this course is:

1. To provide the knowledge on the working principles of various metal casting processes.
2. To explain the working principles of various metal joining processes.
3. To discuss the working principles of bulk deformation of metals.
4. To render the knowledge on the working principles of sheet metal forming process.
5. To get familiarize with the working principles of plastics molding.

UNIT I METAL CASTING PROCESSES 9

UNIT II METAL JOINING PROCESSES 9

UNIT III BULK DEFORMATION PROCESSES 9

UNIT IV SHEET METAL PROCESSES 9

UNIT V MANUFACTURE OF PLASTIC COMPONENTS 9

TOTAL = 45 PERIODS

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

1. Explain the working principles of various metal casting processes.
2. Categorise and select appropriate metal joining process.
3. Compare the working principles of bulk deformation of metals.
4. Analyze the principles of sheet metal forming process.
5. Illustrate the methods in the manufacture of plastics components.

TEXT BOOKS:
REFERENCES:

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GE5153         PROBLEM SOLVING AND PYTHON PROGRAMMING            L T P C
                                                3 0 0 3

COURSE OBJECTIVES:
- To know the basics of algorithmic problem solving.
- To develop Python programs with conditionals and loops.
- To define Python functions and use function calls.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

UNIT I         INTRODUCTION TO COMPUTING AND PROBLEM SOLVING 9
Pseudocodes and Flowcharts – Instructions – Algorithms – Building Blocks of Algorithms –
Introduction to Python Programming – Python Interpreter and Interactive Mode – Variables and

SUGGESTED ACTIVITIES:
- Developing Pseudocodes and flowcharts for real life activities such as railway ticket booking
  using IRCTC, admission process to undergraduate course, academic schedules during a
  semester etc.
- Developing algorithms for basic mathematical expressions using arithmetic operations.
- Installing Python.
- Simple programs on print statements, arithmetic operations.

SUGGESTED EVALUATION METHODS:
- Assignments on pseudocodes and flowcharts.
- Tutorials on Python programs.

UNIT II         CONDITIONALS AND FUNCTIONS 9
Operators – Boolean Values – Operator Precedence – Expression – Conditionals: If-Else
Constructs – Loop Structures/Iterative Statements – While Loop – For Loop – Break Statement –
Function Call and Returning Values – Parameter Passing – Local and Global Scope – Recursive
Functions.
SUGGESTED ACTIVITIES:
- Simple Python program implementation using Operators, Conditionals, Iterative Constructs and Functions.
- Implementation of a simple calculator.
- Developing simple applications like calendar, phone directory, to-do lists etc.
- Flow charts for GCD, Exponent Functions, Fibonacci Series using conditionals and iterative statements.
- External learning - Recursion vs. Iteration.

SUGGESTED EVALUATION METHODS:
- Tutorials on the above activities.
- Group discussion on external learning.

UNIT III  SIMPLE DATA STRUCTURES IN PYTHON
10

SUGGESTED ACTIVITIES:
- Implementing python program using lists, tuples, sets for the following scenario:
  Simple sorting techniques
  Student Examination Report
  Billing Scheme during shopping.
- External learning - List vs. Tuple vs. Set – Implementing any application using all the three data structures.

SUGGESTED EVALUATION METHODS:
- Tutorials on the above activities.
- Group Discussion on external learning component.

UNIT IV  STRINGS, DICTIONARIES, MODULES
10

SUGGESTED ACTIVITIES:
- Implementing Python program by importing Time module, Math package etc.
- Creation of any package (student’s choice) and importing into the application.

SUGGESTED EVALUATION METHODS:
- Tutorials on the above activities.

UNIT V  FILE HANDLING AND EXCEPTION HANDLING
7
Introduction to Files – File Path – Opening and Closing Files – Reading and Writing Files – File Position – Exception: Errors and Exceptions, Exception Handling, Multiple Exceptions.

SUGGESTED ACTIVITIES:
- Developing modules using Python to handle files and apply various operations on files.
- Usage of exceptions, multiple except blocks - for applications that use delimiters like age, range of numerals etc.
- Implementing Python program to open a non-existent file using exceptions.

SUGGESTED EVALUATION METHODS:
- Tutorials on the above activities.
- Case Studies.

TOTAL: 45 PERIODS
COURSE OUTCOMES:
On completion of the course, students will be able to:
CO1: Develop algorithmic solutions to simple computational problems.
CO2: Develop and execute simple Python programs.
CO3: Write simple Python programs for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries etc.
CO6: Read and write data from/to files in Python programs.

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TEXT BOOKS:

REFERENCES:

EE5251 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING L T P C 3 0 0 3

COURSE OBJECTIVES:
• To understand the basic concepts of electric circuits, magnetic circuits and wiring.
• To understand the operation of AC and DC machines.
• To understand the working principle of electronic devices and circuits.

UNIT I BASIC CIRCUITS AND DOMESTIC WIRING

UNIT II THREE PHASE CIRCUITS AND MAGNETIC CIRCUITS
UNIT III ELECTRICAL MACHINES
9

UNIT IV BASICS OF ELECTRONICS
9
Intrinsic semiconductors, Extrinsic semiconductors – P-type and N-type, P-N junction, VI Characteristics of PN junction diode, Zener effect, Zener diode, Zener diode Characteristics-Rectifier circuits-Wave shaping.

UNIT V CURRENT CONTROLLED AND VOLTAGE CONTROLLED DEVICES
9
Working principle and characteristics - BJT, SCR, JFET, MOSFET.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1 To be able to understand the concepts related with electrical circuits and wiring.
CO2 To be able to study the different three phase connections and the concepts of magnetic circuits.
CO3 Capable of understanding the operating principle of AC and DC machines.
CO4 To be able to understand the working principle of electronic devices such as diode and zener diode.
CO5 To be able to understand the characteristics and working of current controlled and voltage controlled devices.

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TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:

1. Applying the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D and 3D.
2. Applying the concept of reaction forces (non-concurrent coplanar and noncoplanar forces) and moment of various support systems with rigid bodies in 2D and 3D in equilibrium. Reducing the force, moment, and couple to an equivalent force - couple system acting on rigid bodies in 2D and 3D.
3. Applying the concepts of locating centroids/center of gravity of various sections / volumes and to find out area moments of inertia for the sections and mass moment of inertia of solids.
4. Applying the concepts of frictional forces at the contact surfaces of various engineering systems.
5. Applying the various methods of evaluating kinetic and kinematic parameters of the rigid bodies subjected to concurrent coplanar forces.

UNIT I  STATICS OF PARTICLES  (9+3)

UNIT II  EQUILIBRIUM OF RIGID BODIES  (9+3)

UNIT III  DISTRIBUTED FORCES  (9+3)
Centroids of lines and areas – symmetrical and unsymmetrical shapes, Determination of Centroids by Integration, Theorems of Pappus-Guldinus, Distributed Loads on Beams, Centre 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  (9+3)

UNIT V  DYNAMICS OF PARTICLES  (9+3)

TOTAL (L: 45 + T: 15)=60 PERIODS
COURSE OUTCOMES:
Upon completion of this course, the students will be able to:

1. Apply the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D and 3D.
2. Apply the concept of reaction forces (non-concurrent coplanar and noncoplanar forces) and moment of various support systems with rigid bodies in 2D and 3D in equilibrium. Reducing the force, moment, and couple to an equivalent force - couple system acting on rigid bodies in 2D and 3D.
3. Apply the concepts of locating centroids / center of gravity of various sections / volumes and to find out area moments of inertia for the sections and mass moment of inertia of solids.
4. Apply the concepts of frictional forces at the contact surfaces of various engineering systems.
5. Apply the various methods of evaluating kinetic and kinematic parameters of the rigid bodies subjected to concurrent coplanar forces.

TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVE:
To introduce the students about properties of the fluids, behaviour of fluids under static conditions and to impart basic knowledge of the dynamics of fluids and to expose to the applications of the conservation laws to a) flow measurements b) flow through pipes (both laminar and turbulent) and c) forces on pipe bends with an exposure to the significance of boundary layer theory and its thicknesses with expose to basic principles of working of hydraulic machineries and to design Pelton wheel, Francis and Kaplan turbine, centrifugal and reciprocating pumps.

UNIT I  FLUID PROPERTIES AND FLOW CHARACTERISTICS  10
Properties of fluids- Pressure Measurements-Buoyancy and floatation-Flow characteristics- Eulerian and Lagrangian Principle of fluid flow– concept of control volume and system – Reynold’s transportation theorem- continuity equation, energy equation and momentum equation-Applications.

UNIT II  FLOW THROUGH PIPES AND BOUNDARY LAYER  9

UNIT III  DIMENSIONAL ANALYSIS AND MODEL STUDIES  7
Fundamental dimensions - Dimensional homogeneity - Rayleigh’s method and Buckingham Pi theorem - Dimensionless parameters - Similitude and model studies - Distorted and undistorted models.

UNIT IV  TURBINES  10

UNIT V  PUMPS  9
Classification of pumps- Centrifugal pumps– working principle - Heads and efficiencies– Velocity triangles- Work done by the impeller - performance curves - Reciprocating pump working principle – indicator diagram and it’s variations – work saved by fitting air vessels.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to
CO1 Understand the difference between solid and fluid, its properties and behaviour in static conditions.
CO2 Understand the conservation laws applicable to fluids and its application through fluid kinematics and dynamics.
CO3 Formulate the relationship among the parameters involved in the given fluid phenomenon and to predict the performances of prototype by model studies.
CO4 Estimate losses in pipelines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel.
CO5 Understand the concept of boundary layer and its application to find the drag force excreted by the fluid on the flat solid surface.

TEXT BOOKS:

REFERENCES:

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<td>Conceptualization and evaluation of engineering solutions to Civil Engineering Issues</td>
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L - Low, M - Medium, H - High
அலகு I  தமிழ் வரலை மற்றும் கல்வி நுட்பம்: 3
தமிழ் வரலை தமிழ் நூல் - பாணத்தை நூல் - கல்வி நூல் - கல்வி பணிகள் - கல்வி கல்விக்கழகம்.

அலகு II  பொற்றுட் தந்தை நுட்பம்: 3
தமிழ் வரலை தமிழ் நூல் - பாணத்தை நூல் - கல்வி நூல் - கல்வி பணிகள் - கல்வி கல்விக்கழகம் - கெம்பிங்கோர் கல்வி அம்மன் - கல்வி பணிகள் - கல்வி கல்விக்கழகம் - கல்வி பணிகள்.

அலகு III  சிற்பமைப்பு நுட்பம்: 3
பொற்றுட் தந்தை நூல் - பாணத்தை நூல் - கல்வி நூல் - கல்வி பணிகள் - கல்வி கல்விக்கழகம் - கெம்பிங்கோர் கல்வி அம்மன் - கல்வி பணிகள் - கல்வி கல்விக்கழகம் - கல்வி பணிகள்.

அலகு IV  மேல்பருமானம் நுட்பம்: 3
சிற்பமைப்பு நூல் - பாணத்தை நூல் - கல்வி நூல் - கல்வி பணிகள் - கல்வி கல்விக்கழகம் - கெம்பிங்கோர் கல்வி அம்மன் - கல்வி பணிகள் - கல்வி கல்விக்கழகம் - கல்வி பணிகள்.

அலகு V  அறிவியல் நுட்பம்: 3
அறிவியல் நூல் - பாணத்தை நூல் - கல்வி நூல் - கல்வி பணிகள் - கல்வி கல்விக்கழகம் - கெம்பிங்கோர் கல்வி அம்மன் - கல்வி பணிகள்.

TEXT-CUM-REFERENCE BOOKS
1. தமிழ் வரலை - பாணத்தை - கல்வி (பணிகள்: தமிழ் நூல் - பாணத்தை நூல் - கல்வி பணிகள்).
2. கல்வி பணிகள் (பணிகள்: கல்வி நூல் - பாணத்தை நூல்).
3. கல்வி பணிகள் (பணிகள்: கல்வி நூல் - பாணத்தை நூல்).
4. பாணத்தை நூல் (பணிகள்: தமிழ் நூல் - பாணத்தை நூல்).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr. M. Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - ‘Sangam City Civilization on the banks of river Vaigai’ (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr. K. K. Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

GE5252 TAMILS AND TECHNOLOGY L T P C

UNIT I  WEAVING AND CERAMIC TECHNOLOGY 3
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II  DESIGN AND CONSTRUCTION TECHNOLOGY 3
Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple) - Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III  MANUFACTURING TECHNOLOGY 3

UNIT IV  AGRICULTURE AND IRRIGATION TECHNOLOGY 3
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V  SCIENTIFIC TAMIL & TAMIL COMPUTING 3

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS
1. தமிழக வரலொறு – மக்களும் பண்பொடும் – மா.மா. பிள்மள (தவளியீடு: தமிழ்நொடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முமனவர் இல.சுந்தரம். (விகடன் பிரசுரம்).
3. இண்மு – பாலேட் நிதிகருளின் கதைகளும் கதை தாக்கங்கள் (காலநிலை கதை தவளியீடு).
4. சமயநிகழ்ச்சியும் புதுக்கரியம் (சென்னையில் முதல் விளக்கம்)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
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10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

GE5161 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY L T P C 0 0 4 2

COURSE OBJECTIVES:
- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To articulate where computing strategies support in providing Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

EXPERIMENTS:
1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same.
2. Python programming using simple statements and expressions.
3. Scientific problems using Conditionals and Iterative loops.
4. Implementing real-time/technical applications using Lists, Tuples.
5. Implementing real-time/technical applications using Sets, Dictionaries.
6. Implementing programs using Functions.
7. Implementing programs using Strings.
9. Implementing real-time/technical applications using File handling.
10. Implementing real-time/technical applications using Exception handling.
12. Developing a game activity using Pygame like bouncing ball, car race etc.

COURSE OUTCOMES:
On completion of the course, students will be able to:
CO1: Develop algorithmic solutions to simple computational problems
CO2: Develop and execute simple Python programs.

TOTAL: 60 PERIODS
CO3: Structure simple Python programs for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python data structures.
CO6: Apply Python features in developing software applications.

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EE5261 ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY

COURSE OBJECTIVES

1. To impart hands on experience in verification of circuit laws and measurement of circuit parameters
2. To train the students in performing various tests on electrical motors.
3. It also gives practical exposure to the usage of CRO, power sources & function generators

LIST OF EXPERIMENTS

1. Verification of Kirchhoff’s Law.
2. Steady state response of AC and DC circuits (Mesh, Node Analysis)
3. Frequency response of RLC circuits.
5. Regulation of single phase transformer.
6. Performance characteristics of DC shunt generator.
7. Performance characteristics of single phase induction motor.
8. Characteristics of PN diode and Zener diode
9. Characteristics of Zener diode
10. Half wave and full wave Rectifiers
11. Application of Zener diode as shunt regulator.
12. Characteristics of BJT and JFET

TOTAL: 60 PERIODS

COURSE OUTCOMES:

1. To become familiar with the basic circuit components and know how to connect them to make a real electrical circuit;
2. Ability to perform speed characteristic of different electrical machines
3. Ability to use logic gates and Flip flops
OBJECTIVES
- To identify varied group discussion skills and apply them to take part in effective discussions in a professional context.
- To be able to communicate effectively through writing.

UNIT I
Speaking: Role Play Exercises Based on Workplace Contexts, - talking about competition-discussing progress toward goals-talking about experiences- talking about events in life- discussing past events-Writing: writing emails (formal & semi-formal).

UNIT II
Speaking: discussing news stories-talking about frequency-talking about travel problems- discussing travel procedures- talking about travel problems- making arrangements-describing arrangements-discussing plans and decisions- discussing purposes and reasons- understanding common technology terms-Writing: - writing different types of emails.

UNIT III
Speaking: discussing predictions-describing the climate-discussing forecasts and scenarios- talking about purchasing-discussing advantages and disadvantages- making comparisons- discussing likes and dislikes- discussing feelings about experiences-discussing imaginary scenarios Writing: short essays and reports-formal/semi-formal letters.

UNIT IV
Speaking: discussing the natural environment-describing systems-describing position and movement- explaining rules-(example-discussing rental arrangements)- understanding technical instructions-Writing: writing instructions-writing a short article.

UNIT V
Speaking: describing things relatively-describing clothing-discussing safety issues( making recommendations) talking about electrical devices-describing controlling actions- Writing: job application( Cover letter + Curriculum vitae)-writing recommendations.

LEARNING OUTCOMES
- Speak effectively in group discussions held in a formal/semi formal contexts.
- Write emails and effective job applications.

Assessment Pattern
- One online / app based assessment to test speaking and writing skills
- Proficiency certification is given on successful completion of speaking and writing.

MA5355 TRANSFORM TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

COURSE OBJECTIVES:
- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes;
- To introduce Fourier series analysis which is central to many applications in engineering :
- To develop the analytic solutions for partial differential equations used in engineering by Fourier series;
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic;
- To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems.
UNIT I  PARTIAL DIFFERENTIAL EQUATIONS  12
Formation – Solutions of first order equations – Standard types and Equations reducible to standard
types – Lagrange’s Linear equation – Solution of linear equations of higher order with constant
coefficients – Linear non-homogeneous partial differential equations.

UNIT II  FOURIER SERIES  12
Dirichlet’s conditions – General Fourier series – Odd and even functions – Half-range Sine and
cosine series – Complex form of Fourier series – Parseval’s identity – Harmonic Analysis.

UNIT III  APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATION  12
Classification of partial differential equations- Method of separation of variables – Solutions of one
dimensional wave equation and one-dimensional heat equation – Steady state solution of two-
dimensional heat equation – Fourier series solutions in cartesian coordinates.

UNIT IV  FOURIER TRANSFORM  12
Fourier integral theorem – Fourier transform pair - Sine and cosine transforms – Properties –
Transform of elementary functions – Convolution theorem – Parseval’s identity.

UNIT V  Z – TRANSFORM AND DIFFERENCE EQUATIONS  12
Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and final
value theorems – Formation of difference equation – Solution of difference equation using Z -
transform.

TOTAL : 60 PERIODS

COURSE OUTCOMES :
At the end of the course, students will be able to
• Solve partial differential equations which arise in application problems.
• Analyze the functions as an infinite series involving sine and cosine functions.
• Obtain the solutions of the partial differential equations using Fourier series.
• Obtain Fourier transforms for the functions which are needed for solving application
problems.
• Manipulate discrete data sequences using Z transform techniques.

TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES:
The main learning objective of this course is to prepare students for:

1. To develop the understanding of the principle concepts behind stress, strain and deformation of solids for various engineering applications.
2. Analyzing the transverse loading on beams and stresses in beam for various engineering applications.
3. Analyzing the torsion principles on shafts and springs for various engineering applications.
4. Analyzing the deflection of beams for various engineering applications.
5. Analyzing the thin and thick shells and principal stresses in beam for various engineering applications.

UNIT I  STRESS, STRAIN AND DEFORMATION OF SOLIDS
Rigid bodies and deformable solids – Tension, Compression and Shear Stresses – Deformation of simple and compound bars – Thermal stresses – Elastic constants – Volumetric strains

UNIT II  TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAM

UNIT III  TORSION
Torsion formulation stresses and deformation in circular and hollows shafts – Stepped shafts – Deflection in shafts fixed at the both ends – Stresses in helical springs – Deflection of helical springs, carriage springs.

UNIT IV  DEFLECTION OF BEAMS
Double Integration method – Macaulay’s method – Area moment Theorems for computation of slopes and deflections in beams - Conjugate beam and strain energy – Maxwell’s reciprocal theorems.

UNIT V  THICK & THIN SHELLS & PRINCIPAL STRESSES
Stresses in thin cylindrical shell due to internal pressure, circumferential and longitudinal stresses and deformation in thin cylinders – spherical shells subjected to internal pressure – Deformation in spherical shells – Lame’s theory – Application of theories of failure – Stresses on inclined planes – principal stresses and principal planes – Mohr’s circle of stress.

TOTAL: 45 PERIODS

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

1. Quote the stress and strain relationship and also distinguish the determinate and indeterminate structures.
2. Determine the shear force and bending moment diagrams for s beams for various engineering applications.
3. Estimate the torsional load and stresses on shafts and springs for various engineering applications.
4. Analyze the deflection of beams for various engineering applications.
5. Illustrate principle stresses, knowledge of calculating deformation in thin cylindrical and spherical shells.

TEXT BOOKS:

REFERENCES:
### COURSE OBJECTIVES:

The main learning objective of this course is to prepare students for:

1. Understanding the basics and application of zeroth and first law of thermodynamics.
2. Analysing the second law of thermodynamics for performance of thermal systems.
3. Imparting the knowledge on availability and applications of second law of thermodynamics.
4. Interpreting the various properties of steam.

### UNIT I  BASICS, ZEROOTH AND FIRST LAW


### UNIT II  SECOND LAW AND ENTROPY


### UNIT III  AVAILABILITY AND APPLICATIONS OF II LAW

Ideal gases undergoing different processes - principle of increase in entropy. Applications of II Law. High and low grade energy. Availability and Irreversibility for open and closed system processes - I and II law Efficiency.

### UNIT IV  PROPERTIES OF PURE SUBSTANCES

Steam - formation and its thermodynamic properties - p-v, p-T, T-v, T-s, h-s diagrams. PVT surface. Determination of dryness fraction. Calculation of work done and heat transfer in non-flow and flow processes using Steam Table and Mollier Chart.

### UNIT V  GAS MIXTURES AND THERMODYNAMIC RELATIONS


**TOTAL =45 PERIODS**
COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Apply zeroth and first lawsto thermodynamic systems.
2. Relate the second law of thermodynamics towards analyzing the performance of thermal systems.
3. Adopt the concept of entropy and availability in thermal systems.
4. Evaluate the various properties of steam using thermodynamic relations.
5. Compute the macroscopic properties of gas mixtures.

TEXT BOOKS:

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ME5351 COMPUTER AIDED DESIGN

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Applying the fundamental concepts of computer graphics and its tools in a generic framework.
2. Creating and manipulating geometric models using curves, surfaces and solids.
3. Applying concept of CAD systems for 3D modeling and visual realism.
4. Creating and adding geometric tolerances in assembly modeling.
5. Applying CAD standard practices in engineering design.

UNIT I FUNDAMENTALS OF COMPUTER GRAPHICS
Product cycle- Design process - Computer Aided Design – Computer graphics – co-ordinate systems- 2D and 3D transformations- homogeneous coordinates - graphic primitives (point, line, circle drawing algorithms) - Clipping- viewing transformation.

UNIT II GEOMETRIC MODELING
Representation of curves - Hermite cubic spline curve, Bezier curve, B-spline curves, Surface Modeling – Surface Entities, Representation of Surface, Bezier Surface, B-Spline Surface and Coons Surface. Solid Modeling - Solid Entities, Solid Representation, Boundary Representation (B-Rep), Sweeps Representation, Constructive Solid Geometry (CSG).
UNIT III VISUAL REALISM  

UNIT IV PART ASSEMBLY  
Mass properties - Assembly modeling – Inference of position and orientation – Geometric Dimensioning and Tolerancing – Functional importance of various types of fits, Geometrical dimensioning and Tolerancing, Tolerance stacking – types and remedies.

UNIT V CAD STANDARDS  
Standards for computer graphics- Graphical Kernel System (GKS) - Open Graphics Library (OpenGL) - Data exchange standards - IGES, STEP, ACIS and DXF - communication standards.  
TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Apply the fundamental concepts of computer graphics and its tools in a generic framework.
2. Create and manipulating geometric models using curves, surfaces and solids.
3. Apply concept of CAD systems for 3D modeling and visual realism.
4. Create and adding geometric tolerances in assembly modeling.
5. Apply standard CAD practices in engineering design.

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COURSE OBJECTIVES: The main learning objective of this course is to prepare the students to

1. Construct the phase diagrams and understand the iron-iron carbide phase diagram.
2. Select and apply proper heat treatment processes based on the application requirements.
3. Identify and use suitable ferrous and non-ferrous alloys for engineering applications.
4. Understand the applications of polymer, ceramics and composites.
5. Explain different testing procedures and failure mechanisms.

UNIT I CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS

UNIT II HEAT TREATMENT

UNIT III FERROUS AND NON-FERROUS METALS

UNIT IV NON-METALLIC MATERIALS

UNIT V MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Construct the iron-iron carbide phase diagram and estimate the phases present in the microstructure.
2. Select a suitable heat treatment process for ferrous alloys based on the requirements.
3. Choose suitable ferrous and non-ferrous alloys for specific engineering applications.
4. Use different polymer, ceramics and composites for a specific engineering applications.
5. Describe testing procedures and failure mechanisms.

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CE5361 STRENGTH OF MATERIALS AND FLUID MACHINERY LABORATORY

COURSE OBJECTIVES:
1. To study the mechanical properties of materials when subjected to different types of loading.
2. To verify the principles studied in Fluid Mechanics theory by performing experiments in lab.

PART – I STRENGTH OF MATERIALS 30

LIST OF EXPERIMENTS
1. Tension test on mild steel rod
2. Torsion test on mild steel rod
3. Hardness test on metal beam (Rockwell and Brinell Hardness Tests)
4. Compression test on helical spring
5. Deflection test on carriage spring

PART – II FLUID MECHANICS AND MACHINES LABORATORY 30

LIST OF EXPERIMENTS
A. FLOW MEASUREMENT
1. Verification of Bernoulli’s theorem
2. Flow through orifice/venturi meter
3. Friction factor for flow through pipes
4. Impact of jet on fixed plate

B. METACENTER
5. Determination of metacentric height

C. PUMPS
6. Characteristics of centrifugal pumps
7. Characteristics of gear pump
8. Characteristics of submersible pump
9. Characteristics of reciprocating pump

**D. TURBINES**
10. Characteristics of Pelton wheel turbine

**TOTAL: 60 PERIODS**

**COURSE OUTCOMES:**
On completion of the course, the student is expected to be able to
1. Perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials.
2. Use the measurement equipment’s for flow measurement.
3. Perform test on different fluid machinery.
4. Verify and apply Bernoulli equation for flow measurement like orifice/venturi meter.
5. Measure friction factor in pipes and compare with Moody diagram and verify momentum conservation law.
6. Determine the performance characteristics of rotodynamic pumps.
7. Determine the performance characteristics of positive displacement pumps.
8. Determine the performance characteristics of turbine.

**REFERENCES:**

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ME5361  COMPUTER AIDED MACHINE DRAWING  L T P C
0 0 4 2

COURSE OBJECTIVES:
The main learning objective of this course is to provide hands on training to the students in:
1. Applying standard drawing practices using fits and tolerances.
4. Preparing standard drawing layout for modeled parts or assemblies with BoM.
5. Gaining practical experience in handling 2D drafting software systems.

PART I     DRAWING STANDARDS & FITS AND TOLERANCES  4

PART II    2D DRAFTING  56
Drawing, Editing, Dimensioning, Layering, Hatching, Block, Array, Detailing, Detailed Drawing.
1. Bearings – Bush Bearing
3. Couplings – Flange, Oldham’s, Muff, Gear couplings.
5. Engine parts – Piston, Connecting Rod, Crosshead (vertical and horizontal), Stuffing box, Multi-plate clutch.

Total: 20% of classes for theory classes and 80% of classes for practice

Note: 25% of assembly drawings must be done manually and remaining 75% of assembly drawings must be done by using any CAD software. The above tasks can be performed manually and using standard commercial 2D CAD software.
TOTAL (L: 4 + P: 56) = 60 PERIODS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Practice drawing standards using fits and tolerances.
3. Model orthogonal views of assembled components.
4. Prepare standard drawing layout for modeled parts or assemblies with BoM.
5. Create standard drawing for modeled parts or assemblies using modeling software.

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GE5361 PROFESSIONAL DEVELOPMENT

OBJECTIVES:
- To be proficient in important Microsoft Office tools: MS WORD, EXCEL, POWERPOINT.
- To be proficient in using MS WORD to create quality technical documents, by using standard templates, widely acceptable styles and formats, variety of features to enhance the presentability and overall utility value of content.
- To be proficient in using MS EXCEL for all data manipulation tasks including the common statistical, logical, mathematical etc., operations, conversion, analytics, search and explore, visualize, interlink, and utilizing many more critical features offered.
- To be able to create and share quality presentations by using the features of MS PowerPoint, including: organization of content, presentability, aesthetics, using media elements and enhance the overall quality of presentations.

MS WORD:
- Create and format a document
- Working with tables
- Working with Bullets and Lists
- Working with styles, shapes, smart art, charts
- Inserting objects, charts and importing objects from other office tools
- Creating and Using document templates
- Inserting equations, symbols and special characters
- Working with Table of contents and References, citations
- Insert and review comments
- Create bookmarks, hyperlinks, endnotes footnote
- Viewing document in different modes
- Working with document protection and security
- Inspect document for accessibility

10 Hours

MS EXCEL:
- Create worksheets, insert and format data
- Work with different types of data: text, currency, date, numeric etc.
- Split, validate, consolidate, Convert data
- Sort and filter data
- Perform calculations and use functions: (Statistical, Logical, Mathematical, date, Time etc.,)
- Work with Lookup and reference formulae

10 Hours
Create and Work with different types of charts
Use pivot tables to summarize and analyse data
Perform data analysis using own formulae and functions
Combine data from multiple worksheets using own formulae and built-in functions to generate results
Export data and sheets to other file formats
Working with macros
Protecting data and Securing the workbook

**MS POWERPOINT:**
Select slide templates, layout and themes
Formatting slide content and using bullets and numbering
Insert and format images, smart art, tables, charts
Using Slide master, notes and handout master
Working with animation and transitions
Organize and Group slides
Import or create and use media objects: audio, video, animation
Perform slideshow recording and Record narration and create presentable videos

**TOTAL: 30 PERIODS**

**OUTCOMES:**
On successful completion the students will be able to
- Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements
- Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding
- Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.

**ME5451 HYDRAULICS AND PNEUMATICS**

**COURSE OBJECTIVES:**
The main learning objective of this course is to prepare the students for:
1. Applying the working principles of fluid power systems and hydraulic pumps.
2. Applying the working principles of hydraulic actuators and control components.
3. Designing and develop hydraulic circuits and systems.
4. Applying the working principles of pneumatic power system and its components.
5. Solving problems and troubles in fluid power systems.

**UNIT I FLUID POWER PRINCIPLES AND HYDRAULIC PUMPS**

**UNITII HYDRAULIC ACTUATORS AND CONTROL COMPONENTS**
UNIT III HYDRAULIC CIRCUITS AND SYSTEMS
Accumulators, Intensifiers, Industrial hydraulic circuits – Regenerative, Pump Unloading, Double-Pump, Pressure Intensifier, Air-over oil, Sequence, Reciprocation, Synchronization, Fail-Safe, Speed Control, Deceleration circuits ,Sizing of hydraulic systems, Hydrostatic transmission, Electro hydraulic circuits,–Servo and Proportional valves – Applications- Mechanical ,hydraulic servo systems.

UNIT IV PNEUMATIC AND ELECTRO PNEUMATIC SYSTEMS

UNIT V TROUBLE SHOOTING AND APPLICATIONS

TOTAL = 45 PERIODS

Note: (Use of standard Design Data Book is permitted in the University examination)

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Apply the working principles of fluid power systems and hydraulic pumps.
2. Apply the working principles of hydraulic actuators and control components.
3. Design and develop hydraulic circuits and systems.
4. Apply the working principles of pneumatic power system and its components.
5. Solve problems and troubles in fluid power systems.

TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Applying the basic components of mechanisms, analyzing the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism and design cam mechanisms for specified output motions.
2. Applying the basic concepts of toothed gearing and kinematics of gear trains
3. Analyzing the effects of friction in machine elements
4. Analyzing the force-motion relationship in components subjected to external forces and analyzing of standard mechanisms.
5. Analyzing the undesirable effects of unbalances resulting from prescribed motions in mechanism and the effect of dynamics of undesirable vibrations.

UNIT I  KINEMATICS OF MECHANISMS  9+3

UNIT II  GEARS AND GEAR TRAINS  9+3

UNIT III  FRICTION IN MACHINE ELEMENTS  9+3
Surface contacts – Sliding and Rolling friction – Friction drives – Friction in screw threads – Bearings and lubrication – Friction clutches – Belt and rope drives – Friction aspects in brakes– Friction in vehicle propulsion and braking.

UNIT IV  FORCE ANALYSIS  9+3

UNIT V  BALANCING AND VIBRATION  9+3

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Apply the basic components of mechanisms, analyze the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism and design cam mechanisms for specified output motions.
2. Apply the basic concepts of toothed gearing and kinematics of gear trains
3. Analyze the effects of friction in machine elements
4. Analyze the force-motion relationship in components subjected to external forces and analyze of standard mechanisms.
5. Analyze the undesirable effects of unbalances resulting from prescribed motions in mechanism and the effect of dynamics of undesirable vibrations.

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ME5402 METAL CUTTING AND MACHINE TOOLS L T P C 3 0 0 3

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. To impart the knowledge, aspects and the significance of material removal processes.
2. To demonstrate the operations of turning and automatic machine tools.
3. To explain the principle of reciprocating, milling and gear cutting machines.
4. To illustrate the principles of abrasive and broaching processes.
5. To get familiarize with CNC machines and its programming.

UNIT I THEORY OF METAL CUTTING 9
Mechanics of chip formation, forces in machining, Types of chip, cutting tools – single point cutting tool nomenclature, orthogonal and oblique metal cutting, thermal aspects, cutting tool materials, tool wear, tool life, surface finish, cutting fluids and Machinability.

UNIT II TURNING MACHINES 9

UNIT III RECIPROCATING, MILLING AND GEAR CUTTING MACHINES 9
Reciprocating machine tools: shaper, planer, slotter: Types and operations- Hole making: Drilling, reaming, boring, tapping, type of milling operations-attachments- types of milling cutter- machining time calculations- Gear cutting, gear hobbing and gear shaping – gear finishing methods.

UNIT IV ABRASIVE PROCESSES AND BROACHING 9

UNIT V COMPUTER NUMERICAL CONTROL MACHINE TOOLS 9
Numerical Control (NC) machine tools – CNC types, constructional details, special features, machining centre and part programming fundamentals – manual part programming and computer assisted part programming.

TOTAL = 45 PERIODS
COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Apply the principles of material removal processes.
2. Determine the machining parameters of turning process and select appropriate automates.
3. Categorise the reciprocating, milling & hole making processes and calculate the gear cutting parameters.
4. Classify the abrasive and broaching processes
5. Construct the CNC part programming for machining and turning centres.

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ME5403  APPLIED THERMODYNAMICS

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Applying the concepts and laws of thermodynamics to predict the operation of thermodynamic cycles and performance of Internal Combustion(IC) engines and Gas Turbines.
2. Analyzing the performance of steam nozzle and computing critical pressure ratio
3. Evaluating the performance of steam turbines
4. Understanding the working of IC engines and its auxiliaries
5. Determining the performance parameters of IC engines

UNIT I  THERMODYNAMIC CYCLES

UNIT II  STEAM NOZZLES AND INJECTOR
Types and Shapes of nozzles, Flow of steam through nozzles, Critical pressure ratio, Variation of mass flow rate with pressure ratio. Effect of friction. Metastable flow.
UNIT III  STEAM AND GAS TURBINES

UNIT IV  INTERNAL COMBUSTION ENGINES – FEATURES AND COMBUSTION

UNIT V  INTERNAL COMBUSTION ENGINE PERFORMANCE AND AUXILIARY SYSTEMS

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Analyse the thermodynamic cycles under different operating conditions
2. Design a steam nozzle as per specific requirements.
3. Assess the performance of steam turbines
4. Explain the working of all IC engine components
5. Compute the performance of IC engines

TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES:
The main learning objective of this course is to provide hands on training to the students in:
1. Select appropriate tools, equipments and machines to complete a given job.
2. Develop component using casting processes.
3. Perform various joints by Gas Metal Arc Welding (GMAW) processes.
4. Perform various manufacturing processes such as rolling, drawing, turning, shaping, drilling, milling.
5. Fabricate gears using gear making machines.

LIST OF EXPERIMENTS
1. Fabricating simple structural shapes using Gas Metal Arc Welding machine.
2. Preparing green sand moulds with cast patterns.
3. Casting aluminum parts using stir casting machine.
4. Reducing the thickness of the plates using rolling machine.
5. Reducing the diameter of on circular parts using wire drawing process machine.
6. Taper Turning and Eccentric Turning on circular parts using lathe machine.
7. Knurling, external and internal thread cutting on circular parts using lathe machine.
8. Shaping – Square and Hexagonal Heads on circular parts using shaper machine.
11. Cutting spur and helical gear using milling machine.
15. Broaching components using broaching machine.

Total (P: 60) = 60 Periods

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Select appropriate tools, equipments and machines to complete a given job.
2. Create components using casting processes.
3. Perform various welding process using GMAW.
4. Perform various machining process such as rolling, drawing, turning, shaping, drilling, milling.
5. Fabricate the gears using various gear generation and forming processes.
COURSE OBJECTIVES:
The main learning objective of this course is to provide hands on training to the students in:
1. Applying the fundamental working principle of CNC machine tool.
2. Programming G & M Code programming and simulate the CNC program.
3. Generating part programming data through CAM software.
4. Integrating CNC and unconventional machine tools.
5. Applying the principles of Additive Manufacturing process.

LIST OF EXPERIMENTS:
1. MANUAL PART PROGRAMMING: - CNC Machining Centre
   i) Linear Cutting.
   ii) Circular cutting.
   iii) Cutter Radius Compensation.
   iv) Canned Cycle Operations.

2. MANUAL PART PROGRAMMING: - CNC Turning Centre
   i) Straight, Taper and Radial Turning.
   ii) Thread Cutting.
   iii) Rough and Finish Turning Cycle.
   iv) Drilling and Tapping Cycle.

3. COMPUTER AIDED PART PROGRAMMING
   Generate CL Data and Post process data using CAM packages for Machining and Turning Centre.

4. STUDY OF CNC EDM or CNC EDM WIRE-CUT

5. STUDY OF ADDITIVE MANUFACTURING PROCESS: FDM or SLA or SLS or LOM

TOTAL = 60 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Apply the fundamental working principle of CNC machine tool.
2. Program G & M Code programming and simulate the CNC program.
3. Generate part programming data through CAM software.
4. Integrate CNC and unconventional machine tools.
5. Apply the principles of Additive Manufacturing process.

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OBJECTIVES:
- Teach the need for quality, its evolution, basic concepts, contribution of quality gurus, TQM framework, Barriers and Benefits of TQM.
- Explain the TQM Principles for application.
- Define the basics of Six Sigma and apply Traditional tools, New tools, Benchmarking and FMEA.
- Describe Taguchi’s Quality Loss Function, Performance Measures and apply Techniques like QFD, TPM, COQ and BPR.
- Illustrate and apply QMS and EMS in any organization.

UNIT I  INTRODUCTION  9
Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of product and service quality –Definition of TQM– Basic concepts of TQM —Gurus of TQM (Brief introduction) -- TQM Framework- Barriers to TQM –Benefits of TQM.

UNIT II  TQM PRINCIPLES  9

UNIT III  TQM TOOLS & TECHNIQUES I  9

UNIT IV  TQM TOOLS & TECHNIQUES II  9
Quality circles – Quality Function Deployment (QFD) - Taguchi quality loss function – TPM – Concepts, improvement needs – Performance measures- Cost of Quality - BPR.

UNIT V  QUALITY MANAGEMENT SYSTEM  9

TOTAL: 45 PERIODS

OUTCOMES:
CO1: Ability to apply TQM concepts in a selected enterprise.
CO2: Ability to apply TQM principles in a selected enterprise.
CO3: Ability to understand Six Sigma and apply Traditional tools, New tools, Benchmarking and FMEA.
CO4: Ability to understand Taguchi’s Quality Loss Function, Performance Measures and apply QFD, TPM, COQ and BPR.
CO5: Ability to apply QMS and EMS in any organization.
TEXT BOOK:

REFERENCES:

ME5551 DESIGN OF MACHINE ELEMENTS L T P C 3 0 0 3

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Designing machine members subjected to static and variable loads.
2. Designing shafts and couplings for various applications.
3. Analyzing bolted and welded joints for various kinds of loads.
4. Designing helical, leaf springs and flywheels for various applications.
5. Designing and selecting sliding and rolling contact bearings.

UNIT I FUNDAMENTAL CONCEPTS IN DESIGN 9

UNIT II SHAFTS AND COUPLINGS 9
Shafts and Axles - Design of solid and hollow shafts based on strength, rigidity and critical speed – Keys and splines – Rigid and flexible couplings.

UNIT III TEMPORARY AND PERMANENT JOINTS 9
Threaded fasteners - Bolted joints – Simple and eccentrically loaded bolted joints- Welded joints – Butt, Fillet and parallel transverse fillet welds – welded joints subjected to bending, torsional and eccentric loads.

UNIT IV ENERGY STORING ELEMENTS 9
Types of springs, design of helical and concentric springs–surge in springs, Design of laminated springs - Flywheels considering stresses in rims and arms for engines and presses - Solid and Rimmed flywheels

UNIT V BEARINGS 9
Sliding contact and rolling contact bearings - Hydrodynamic journal bearings, Sommerfeld Number, Raimondi & Boyd graphs, -- Selection of Rolling Contact bearings - Seals and Gaskets.

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Design machine members subjected to static and variable loads.
2. Design shafts and couplings for various applications.
3. Analyze bolted and welded joints for various kinds of loads.
4. Design helical, leaf springs and flywheels for various applications.
5. Design and select sliding and rolling contact bearings.
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ME5552 METROLOGY AND MEASUREMENTS L T P C 3 0 0 3

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. To introduce the basic terminology of measurements and the procedure for estimating measurement uncertainty.
2. To give an overview of the various linear and angular measuring instruments used in industries.
3. To provide the necessary skills needed to perform tolerance analysis in manufacturing situations and to design gauges for limit measurement during manufacturing.
4. To give an understanding of the importance of surface metrology and the role of GD&T in manufacturing.
5. To expose the science behind the advanced measurements and their applications in manufacturing industries in quality control.

UNIT I BASICS OF METROLOGY 9

UNIT II MEASUREMENT OF LINEAR, ANGULAR DIMENSIONS AND ASSEMBLY AND TRANSMISSION ELEMENTS 9

UNIT III TOLERANCE ANALYSIS
Tolerancing – Interchangeability, Selective assembly, Tolerance representation, Terminology, Limits and Fits, Problems (using tables); Design of Limit gauges, Problems. Tolerance analysis in manufacturing, Process capability, tolerance stackup, tolerance charting.

UNIT IV METROLOGY OF SURFACES
Fundamentals of GD & T- Conventional vs Geometric tolerance, Datums, Inspection of geometric deviations like straightness, flatness, roundness deviations, etc. Simple problems – Measurement of Surface finish – Functionality of surfaces, Parameters, Comparative, Stylus based and Optical Measurement techniques, Filters, Introduction to 3D surface metrology- Parameters.

UNIT V ADVANCES IN METROLOGY

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Describe the importance of measurements in engineering and the factors affecting measurements and to estimate measurement uncertainty.
2. Describe the working principle and applications of various linear and angular measuring instruments and basic concepts of measurement of assembly and transmission elements and select a measuring instrument for the given application.
3. Interpret the various tolerance symbols given in engineering drawings to choose the appropriate manufacturing process.
4. Describe the principles and methods of form and surface metrology and interpret surface metrology related information in Engineering drawings.
5. Describe the advances in measurements for quality control in manufacturing Industries.

TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Evaluating the fuel properties and arrive at proximate and ultimate analysis of fuels.
2. Understanding the different types of boilers and compute their performance.
3. Assessing the performance of an air compressor.
4. Comprehending the working principle of various refrigeration systems
5. Determining the different psychrometric properties and heat load

UNIT I FUELS AND COMBUSTION
Fuels - Types and Characteristics of Fuels - Determination of Properties of Fuels – Fuels Analysis - Proximate and Ultimate Analysis - Moisture Determination - Calorific Value - Gross & Net Calorific Values

UNIT II BOILERS
Types and comparison, Mountings and Accessories. Performance calculations, Boiler trial.

UNIT III AIR COMPRESSORS
Classification and comparison, working principle, work of compression - with and without clearance, Volumetric efficiency, Isothermal efficiency and Isentropic efficiency. Multistage air compressor with Intercooling. Working principle and comparison of Rotary compressors with reciprocating air compressors

UNIT IV REFRIGERATION SYSTEMS
Vapour compression refrigeration cycle, Effect of Superheat and Sub-cooling, Performance calculations, Working principle of air cycle, vapour absorption system, and Thermoelectric refrigeration.

UNIT V PSYCHROMETRY AND AIR-CONDITIONING

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Determine the fuel properties adopting proximate and ultimate analysis.
2. Analyze the performance of different boilers.
3. Assess the performance of air compressors under different operating conditions
4. Explain the working principles of various refrigeration systems and estimate COP.
5. Compute psychrometric properties and design suitable air conditioning systems.

TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES:
The main learning objectives of this course are to:
1. Demonstrate the calibration of simple linear measuring instruments and use of linear, angular measuring instruments, comparators, contact, and optical measurements used in manufacturing industries.
2. Demonstrate the measurement of GD&T parameters like straightness, perpendicularity, roundness, etc.
3. Demonstrate the measurement of surface finish using contact methods.
4. Demonstrate the working principles of kinematics involved in various mechanisms.
5. Demonstrate the working principles of Dynamics involved in various Experiments.

PART I  METROLOGY LABORATORY  30
List of Experiments:
6. Non-contact (Optical) measurement using Measuring microscope / Profile projector and Video measurement system.
8. Measurement of Surface finish in components manufactured using various processes (turning, milling, grinding, etc.,) using stylus based instruments.

PART II  DYNAMICS LABORATORY  30
List of Experiments:
1. Study of gear parameter.
2. Epicycle gear Train.
3. Determination of moment of inertia of flywheel and axle system.
4. Determination of mass moment of inertia of a body about its axis of symmetry.
5. Undamped free vibration of a single motor shaft system.
6. Torsional Vibration (Undamped) of single motor shaft system.
7. Dynamic analysis of cam mechanism.
8. Watts Governor.
10. Experiment of Proell Governor.
11. Experiment of motorized gyroscope.

TOTAL = 60 PERIODS
COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Select a suitable measuring instrument for measurement of linear and angular dimensions, and comparators and measure the dimensions of a given component.
2. Calibrate simple linear measuring instruments like Vernier caliper, micrometer, Vernier height gauge, etc. using gauge blocks.
3. Use advanced measuring equipment coordinate measuring machine, roundness tester, measuring microscope, surface finish measuring equipment to carryout measurements.
4. Measure the various kinematic parameters.
   Evaluate the vibration parameters of different mechanical systems.

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ME5512 THERMAL ENGINEERING LABORATORY 0 0 4 2

COURSE OBJECTIVES:
The main learning objective of this course is to provide hands on training to the students in:
1. Identifying the performance influencing parameters of various engines
2. Determining the valve and port timing for IC engines
3. Methodology to be adopted for performance evaluation of boiler and steam turbine
4. Quantifying the various performance parameters of air compressors
5. Estimating the fuel properties

PART I IC ENGINE LABORATORY 45

List of Experiments
2. Actual p-v diagrams of IC engines.
3. Performance Test on four – stroke Diesel Engine.
5. Morse Test on Multi-Cylinder Petrol Engine.
6. Retardation Test on a Diesel Engine.
7. Determination of p-θ diagram and heat release characteristics of an IC engine.
8. Determination of Flash Point and Fire Point of various fuels / lubricants
9. Performance test on a two stage Reciprocating Air compressor

PART II STEAM LABORATORY 15

List of Experiments:
1. Study of Steam Generators and Turbines.

TOTAL = 60 PERIODS
COURSE OUTCOMES: Upon completion of this course, the students will be able to:

1. Examine the performance of IC engines
2. Determine the valve overlap and scavenging periods
3. Evaluate the performance of boilers and steam turbines
4. Performance prediction of air compressors
5. Quantify the flash and fire point of any given fuel/lubricant

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ME5601 DESIGN OF TRANSMISSION SYSTEMS

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:

1. Designing flexible elements like belt, ropes and chain drives for engineering applications.
2. Designing spur and helical gear drives for power transmission.
3. Designing bevel and worm drives for power transmission.
4. Designing multi speed gear box for machine tool and automotive applications.
5. Designing clutch and brake systems for engineering applications.

UNIT I DESIGN OF FLEXIBLE ELEMENTS
Motor power capacity for various applications - Design of Flat belts and pulleys - Selection of V belts and sheaves – Selection of wire ropes and pulleys – Design of Transmission Chains and Sprocket.

UNIT II SPUR AND HELICAL GEARS
Gear materials - Design of straight tooth spur & helical gears based on speed ratios, number of teeth, Fatigue strength, Factor of safety, strength and wear considerations. Force analysis –Tooth stresses - Dynamic effects - Helical gears – Module - normal and transverse, Equivalent number of teeth – forces.

UNIT III BEVEL AND WORM GEARS

UNIT IV GEAR BOXES

UNIT V CLUTCHES AND BRAKES
Design of single and multi-plate clutches, cone clutches, internal expanding rim clutches and Electromagnetic clutches. Design of brakes: External shoe brakes - Single and Double Shoe, Internal expanding shoe brakes and Band brakes.

TOTAL = 45 PERIODS
COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Design flexible elements like belt, ropes and chain drives for engineering applications.
2. Design spur and helical gear drives for power transmission.
3. Design bevel and worm drives for power transmission.
4. Design multi speed gear box for machine tool and automotive applications.
5. Design clutch and brake systems for engineering applications.

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GE5251 ENVIRONMENTAL SCIENCES L T P C 3 0 0 3

COURSE OBJECTIVES:
- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and non-renewable resources, causes of their degradation and measures to preserve them.
- To familiarize the influence of societal use of resources on the environment and introduce the legal provisions, National and International laws and conventions for environmental protection.
- To inculcate the effect of population dynamics on human and environmental health and inform about human right, value education and role of technology in monitoring human and environmental issues.
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 – bio geographical 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 47 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
TOTAL: 45 PERIODS

COURSE OUTCOMES:
• To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
• To identify the causes, effects and environmental pollution and natural disasters and contribute to the preventive measures in the immediate society.
To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.

To recognize different forms of energy and apply them for suitable applications in for technological advancement and societal development.

To demonstrate the knowledge of societal activity on the long and short term environmental issues and abide by the legal provisions, National and International laws and conventions in professional and personal activities and to identify and analyse effect of population dynamics on human value education, consumerism and role of technology in environmental issues.

**TEXT BOOKS:**

**REFERENCES:**

**ME5651 HEAT AND MASS TRANSFER**  
*L T P C*  
3 0 0 3

**COURSE OBJECTIVES:**
The main learning objective of this course is to prepare the students for:
1. Understanding the steady and transient heat conduction.
2. Comprehending the principles of convective heat transfer.
3. Outlining the facets of heat transfer for designing a heat exchanger.
4. Inferring the fundamental concepts of radiation heat transfer.
5. Analyzing the relation between heat and mass transfer.

**UNIT I**  
**CONDUCTION**  

**UNIT II**  
**CONVECTION**  

**UNIT III**  
**PHASE CHANGE HEAT TRANSFER AND HEAT EXCHANGERS**  
UNIT IV  RADIATION

UNIT V  MASS TRANSFER

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Summarize the mechanism of heat conduction under steady and transient conditions.
2. Elucidate the principles of convective heat transfer.
3. Design a heat exchanger for any specific application.
4. Adopt the concept of radiation heat transfer in real time systems.
5. Develop solutions to problems involving combined heat and mass transfer.

TEXT BOOKS:

REFERENCES:
LIST OF EXPERIMENTS:
1. Thermal conductivity measurement of pipe insulation using lagged pipe apparatus.
2. Determination of thermal conductivity of a composite wall, insulating powder, oils and water.
3. Determination of heat transfer coefficient of air under natural convection and forced convection.
4. Heat transfer from pin-fin under natural and forced convection.
5. Determination of heat flux under pool boiling and flow boiling in various regimes.
8. Determination of Stefan – Boltzmann constant.
11. Determination of Coefficient of Performance of a vapour compression refrigeration system and Air-Conditioning system.

LIST OF EQUIPMENTS:
1. Lagged pipe apparatus.
2. Composite wall, insulating powder apparatus and liquid thermal conductivity measuring apparatus.
3. Natural convection and forced convection test setup.
4. Pin-fin under natural and forced convection test setup.
5. Pool boiling and flow boiling apparatus.
6. Film-wise and drop-wise condensation apparatus.
8. Stefan – Boltzmann constant apparatus.
10. Calibration of thermocouples / RTDs test setup.
11. Vapour compression refrigeration system and Air-Conditioning system test setup
12. Cooling tower test setup.

TOTAL = 60 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Determine the thermal conductivity of solids and liquids.
2. Compute the convective heat transfer coefficient under natural/forced mode
3. Evaluate the thermal performance of cooling tower at different flow conditions
4. Assess the performance of heat exchangers
5. Arrive at EER of refrigeration and air-conditioning systems.
COURSE OBJECTIVES: The main learning objective of this course is to provide hands on training to the students in:

1. Designing 3 Dimensional geometric model of parts, sub-assemblies, assemblies and exporting it to drawing.
2. Analyzing the force, stress, deflection in mechanical components.
3. Analyzing thermal stress and heat transfer in mechanical components.
4. Analyzing the vibration of mechanical components.
5. Analyzing the modal, harmonic, transient and spectrum concepts in mechanical components.

LIST OF EXPERIMENTS

1. **3D GEOMETRIC MODELLING**
   1. CAD Introduction – Sketcher
   5. Assembly: Constraints, Exploded Views, Interference check
   7. Exercises in Modeling and drafting of Mechanical Components
   8. Assembly using Parametric and Feature based Packages

2. **SIMULATION AND ANALYSIS**
   1. Force and Stress analysis using link elements in Trusses.
   2. Stress and deflection analysis in beams with different support conditions.
   5. Thermal stress and heat transfer analysis of plates.
   7. Vibration analysis of spring-mass systems.
   8. Modal analysis of Beams.
   9. Harmonic, transient and spectrum analysis of simple systems.

TOTAL = 60 PERIODS

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

1. Design 3 Dimensional geometric model of parts, sub-assemblies, assemblies and export it to drawing.
2. Analyze the force, stress, deflection in mechanical components.
3. Analyze thermal stress and heat transfer in mechanical components.
4. Analyze the vibration of mechanical components.
5. Analyze the modal, harmonic, transient and spectrum concepts in mechanical components.

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COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Analyzing the thermodynamic cycles used in power generation
2. Evaluating the merits of direct thermal energy conversion systems
3. Assessing the performance of fuel cells
4. Selecting the best energy storage mechanism for any given application
5. Developing a mechanism for total energy recovery from a system adopting CHCP concept

UNIT I  ENERGY CONVERSION CYCLES  9
Bell Coleman, Scuderi, Stirling, Ericsson, Lenoir, Atkinson, Stoddard and Kalina cycle – Comparison with Rankine and Brayton cycles

UNIT II DIRECT CONVERSION OF THERMAL TO ELECTRICAL ENERGY  9

UNIT III DIRECT CONVERSION OF CHEMICAL TO ELECTRICAL ENERGY  9

UNIT IV ENERGY STORAGE SYSTEMS  9

UNIT V COMBINED HEAT, COOLING AND POWER PRODUCTION (CHCP)  9
Cogeneration - types - Configuration and thermodynamic performance of steam turbine cogeneration systems – gas turbine cogeneration systems – reciprocating IC engines cogeneration systems – concept of Polygeneration

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Analyze the thermodynamic cycles used in power generation
2. Evaluate the merits of direct thermal energy conversion systems
3. Assess the performance of fuel cells
4. Identify a suitable energy storage mechanism for specific application
5. Design an effective energy recovery system adopting CHCP concept

TEXT BOOKS:

REFERENCES:
ME5751 FINITE ELEMENT ANALYSIS

**COURSE OBJECTIVES:**
The main learning objective of this course is to prepare the students for:

1. Developing mathematical models for Boundary Value Problems and their numerical solution.
2. Applying concepts of Finite Element Analysis to solve one dimensional problem.
3. Determining field variables for two dimensional scalar variable problems.
4. Determining field variables for two dimensional vector variable problems.
5. Applying the need for Isoparametric transformation and the use of numerical integration.

**UNIT I INTRODUCTION**
9

**UNIT II ONE-DIMENSIONAL PROBLEMS**
9

**UNIT III TWO DIMENSIONAL SCALAR VARIABLE PROBLEMS**
9

**UNIT IV TWO DIMENSIONAL VECTOR VARIABLE PROBLEMS**
9

**UNIT V ISOPARAMETRIC FORMULATION AND ADVANCED TOPICS**
9

**TOTAL = 45 PERIODS**

**COURSE OUTCOMES:** Upon completion of this course, the students will be able to:
1. Develop mathematical models for Boundary Value Problems and their numerical solution
2. Formulate the Finite Element methodology to solve the one dimensional problem(s).
3. Estimate field variables for two dimensional scalar variable problems
4. Determine field variables for two-dimensional vector variable problems
5. Apply the Isoparametric transformationand the use of numerical integration to engineering problems.
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ME5702 COMPUTER INTEGRATED MANUFACTURING

COURSE OBJECTIVES:
The main objectives of this course are:
1. To throw light on the implementation of CIM and Automation in Manufacturing Industries.
2. To develop competence in overcoming the predicaments related to Production Planning and Control.
3. To offer an insight into Cellular Manufacturing.
4. To provide competence in developing FMS.
5. To render knowledge in the application of Industrial Robots.

UNIT I INTRODUCTION

UNIT II PRODUCTION PLANNING & CONTROL SYSTEM AND COMPUTER AIDED PROCESS PLANNING
UNIT III GROUP TECHNOLOGY AND CELLULAR MANUFACTURING


UNIT IV FLEXIBLE MANUFACTURING SYSTEM (FMS) AND AUTOMATED GUIDED VEHICLE SYSTEM (AGVS)


UNIT V INDUSTRIAL ROBOTICS


TOTAL = 45 PERIODS

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

1. Apply the concept of CIM & Automation in Manufacturing Systems.
2. Discriminate the problems in Production Planning and Control.
3. Design Cellular Manufacturing Processes.
4. Implement FMS in conventional batch production.
5. Select and apply Robots for Industrial applications

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COURSE OBJECTIVES: The main objectives of this course are

1. To offer an overview of mechatronics and make students get acquainted with the sensors and transducers.
2. To impart knowledge about the fundamentals of microprocessor
3. To give insight into the method of interfacing
4. To provide competence on PLC and its programming
5. To render exposure in the design and development of mechatronics systems

UNIT I INTRODUCTION AND SENSORS

UNIT II 8085 MICROPROCESSOR

UNIT III PROGRAMMABLE PERIPHERAL INTERFACE

UNIT IV PROGRAMMABLE LOGIC CONTROLLER
Introduction – Architecture – Input / Output Processing – Programming with Timers, Counters and Internal relays – Data Handling – Selection of PLC.

UNIT V ACTUATORS AND MECHATRONICS SYSTEM DESIGN

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

1. Identify suitable sensors to develop mechatronics systems
2. Explain the architecture and timing diagram of microprocessor, and also interpret and develop programs.
3. Devise appropriate interfacing circuits to connect I/O devices with microprocessor
4. Implement PLC as a controller in a mechatronics system
5. Design an apt mechatronics system for a real time application

TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES:
The main objectives of this course are
1. To provide experimental insight into the applications of different sensors, signal conditioning circuits and measurement techniques.
2. To render practical experience in the design and development of Hydraulic, Pneumatic and Electric actuator circuits that is required to develop Mechatronics Systems
3. To make students comprehend and appreciate the real-time applications of PLC and Microcontroller
4. To offer hands on-training in the simulation and control of Robot.
5. To make students conversant with the application of Image Processing

LIST OF EXPERIMENTS:
2. Experiments on the application of Sensors – LDR, Optocoupler, Ultrasonic, Infrared, Hall effect and MEMS Accelerometer.
4. Modeling and Analysis of basic Hydraulic, Pneumatic, Electro-Pneumatic, Electrical and Electronic Circuits by using simulation software.
5. Actuation of double acting cylinder by using Hydraulic, Pneumatic and Electro-Pneumatic circuits.
7. PLC Automation with Timers and Counters – Cylinder Sequencing – Sorting of Objects on Conveyor Belt.
8. DC Drives – Speed and Direction Control by using Microcontroller.
9. AC Drives – Speed and Direction Control by using Microcontroller.
10. Stepper Motor – Position, Speed and Direction Control.
15. Actuation and control of Robot by using Internet of Things (IoT).

TOTAL = 60 PERIODS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Demonstrate the measurement of physical quantity such as displacement, force and temperature, and also the operation of signal conditioning circuits.
2. Devise appropriate circuits to automate and control the Hydraulic, Pneumatic, and Electric actuators.
3. Implement PLC, PID and microcontroller as a control unit in the Mechatronics System.
4. Develop a model of robot by using simulation software, and also execute real-time control over a Robot by IoT.
5. Implement image processing techniques to develop Machine/Robot vision systems.

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ME5711            PROJECT I
(DESIGN AND FABRICATION)  L  T  P  C
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COURSE OBJECTIVES:
The main learning objective of this course is to provide hands on training to the students in:

1. Discovering potential research areas in the field of Mechanical Engineering.
2. Comparing and contrast the several existing solutions for the problem identified.
3. Formulating and propose a plan for creating a solution for the research plan identified.
4. Conducting the experiments as a team and interpret the results.
5. Reporting and presenting the findings of the work conducted.

A project topic must be selected by the students in consultation with their guides. The ultimate aim of the project work is to deepen comprehension of mechanical principles by applying them to a new problem which may be the design and fabrication of a device for a specific application.

TOTAL : 90 PERIODS

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

1. Discover potential research areas in the field of Mechanical Engineering.
2. Compare and contrast the several existing solutions for the problems identified.
3. Formulate and propose a plan for creating a solution for the research plan identified.
4. Conduct the experiments as a team and interpret the results.
5. Report and present the findings of the work conducted.
COURSE OBJECTIVES:
The main learning objective of this course is to provide hands on training to the students in:
1. Discovering potential research areas in the field of Mechanical Engineering.
2. Comparing and contrast the several existing solutions for the problem identified.
3. Formulating and propose a plan for creating a solution for the research plan identified.
4. Conducting the experiments as a team and interpret the results.
5. Reporting and presenting the findings of the work conducted.

A project topic must be selected by the students in consultation with their guides. The ultimate aim of the project work is to deepen comprehension of mechanical principles by applying them to a new problem which may be the simulation, analysis, design and fabrication of mechanical systems for a specific application.

TOTAL : 240 CREDITS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Discover potential research areas in the field of Mechanical Engineering.
2. Compare and contrast the several existing solutions for the problems identified.
3. Formulate and propose a plan for creating a solution for the research plan identified.
4. Conduct the experiments as a team and interpret the results.
5. Report and present the findings of the work conducted.

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ME5071 AUTOMOBILE ENGINEERING

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Classifying the types of chassis and identify different class of automobiles
2. Outline the engine systems and their emission control.
3. Illustrating the functions of various transmission systems.
4. Imparting the working of different braking and steering systems.
5. Understanding the working of electrical and electronic components.

UNIT I INTRODUCTION TO AUTOMOBILE AND TYPES
An overview of different types of automobiles and their power sources. Specifications, Performance Parameters, Types of power delivery, Safety standards, Trends in automobile design. Two and Types, Regulations, Car body construction. Bus Body Details, General consideration relating to chassis layout. Introduction to MV Act, Pollution Norms,

UNIT II POWERTRAIN AND FUEL MANAGEMENT SYSTEMS
Reciprocating Engine systems, Hybrid systems. Pollutant emissions and their control; Catalytic converter systems, Electronic Engine Management systems for SI and CI engines. Liquid and gaseous alternate fuels - Alcohol, LPG, CNG, and Hydrogen
UNIT III CLUTCH AND TRANSMISSION SYSTEMS
Clutch system and types, Gear box and types - manual, automatic, and AMT, propeller shafting, Differential, Axles - function, and types, Wheels, Tyres - types, construction and specification, suspension system - types and functioning.

UNIT IV BRAKING AND SUSPENSION SYSTEMS
Braking system - requirements and types, Steering system - working, types and steering geometry parameters. Wheel balancing & Alignment Wind Tunnel testing, Servicing of Vehicles.

UNIT V ELECTRICAL AND ELECTRONIC SYSTEMS
Introduction to Battery, Alternator, and Starter Motor systems, working principle, and circuitry, Safety systems - seat belts, air-bag, ABS, Modern electronic features in vehicles like tyre pressure monitoring, ESP, EBD, Automatic headlamp ON, Rain sensing wipers, speed sensing auto locking, OBD. HVAC system

TOTAL = 45 Periods

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Distinguish the different types of automobiles and chassis.
2. Interpret the various types of engines and their emission control.
3. Select the appropriate transmission systems.
4. Compare the braking and steering systems.
5. Infer the functions of different electrical and electronic components.

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ME5077 MEASUREMENTS AND CONTROL

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Identify measurement parameters and analyze errors of measurements.
2. Select and apply suitable transducer for a particular measurement.
3. Identify measurement parameters and select the appropriate sensor for it.
4. Explain the working of various types of control systems of apply for specific applications.
5. Apply the principle of automatic control systems to control various parameter(s).
UNIT I  MEASUREMENTS AND ERROR ANALYSIS  9

UNIT II  INSTRUMENTS  9
Transducer, Modifying (intermediate) and Terminal stages – Mechanical and electrical transducers, preamplifiers – charge amplifiers – filters – attenuators – D’ Arsonval – CRO – Oscillographs – recorders – microprocessor based data logging, processing and output

UNIT III  PARAMETERS FOR MEASUREMENT  9

UNIT IV  CONTROL SYSTEMS  9

UNIT V  APPLICATION OF CONTROL SYSTEMS  9
Governing of speed, kinetic and process control – pressure, temperature, fluid level, flow-thrust and flight control – photo electric controls – designing of measurement and control systems for different applications

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Identify measurement parameters and analyze errors of measurements.
2. Select and apply suitable transducer for a particular measurement.
3. Identify measurement parameters and select the appropriate sensor for it.
4. Explain the working of various types of control systems of apply for specific applications.
5. Apply the principle of automatic control systems to control various parameter(s).

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ME5001  DESIGN CONCEPTS IN ENGINEERING  L T P C  3 0 0 3

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Analyzing the various design requirements and get acquainted with the processes involved in product development.
2. Applying the design processes to develop a successful product.
3. Applying scientific approaches to provide design solutions.
4. Designing solution through relate the human needs and provide a solution.
5. Applying the principles of material selection, costing and manufacturing in design.

UNIT I  DESIGN TERMINOLOGY  9
Definition-various methods and forms of design-importance of product design-static and dynamic products-various design projects-morphology of design-requirements of a good design-concurrent engineering -computer aided engineering-codes and standards-product and process cycles-bench marking.

UNITII  INTRODUCTION TO DESIGN PROCESSES  9
Basic modules in design process-scientific method and design method-Need identification, importance of problem definition-structured problem, real life problem- information gathering -customer requirements- Quality Function Deployment (QFD)- product design specifications-generation of alternative solutions- Analysis and selection-Detail design and drawings-Prototype, modeling, simulation, testing and evaluation

UNITIII  CREATIVITY IN DESIGN  9
Creativity and problem solving-vertical and lateral thinking-invention-psycho logical view, mental blocks-Creativity methods-brainstorming, synectics, force fitting methods, mind map, concept map-Theory of innovative problem solving (TRIZ) - conceptual decomposition creating design concepts.

UNITIV  HUMAN AND SOCIETAL ASPECTS IN PRODUCT DEVELOPMENT  9
Human factors in design, ergonomics, user friendly design-Aesthetics and visual aspects environmental aspects-marketing aspects-team aspects-legal aspects-presentation aspects

UNITV  MATERIAL AND PROCESSES IN DESIGN  9
Material selection for performance characteristics of materials-selection for new design substitution for existing design-economics of materials-selection methods-recycling and material selection-types of manufacturing process, process systems- Design for Manufacturability (DFM) - Design for Assembly (DFA).

TOTAL = 45 PERIODS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Articulate the various design requirements and get acquainted with the processes involved in product development.
2. Design the processes to develop a successful product.
3. Implement the scientific approaches to provide design solutions.
4. Integrate human and societal aspects in design.
5. Select materials and manufacturing processes in design.

TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Analyzing mechanical strength of the composite material
2. Developing the FRP and other composites by different manufacturing methods
3. Analyzing fiber reinforced Laminates for different combinations of plies with different orientations of the fiber.
4. Evaluating the stresses in the lamina of the laminate using different failure theories
5. Analyzing thermo-mechanical behavior and evaluate residual stresses in different types of laminates using the Classical Laminate Theory.

UNIT I INTRODUCTION TO COMPOSITE MATERIALS

UNIT II MANUFACTURING OF COMPOSITES
Manufacturing of Polymer Matrix Composites (PMCs)-handlay-up, spray technique, filament winding, Pultrusion, Resin Transfer Moulding (RTM)-, bag moulding, injection moulding, Sandwich Mould Composites (SMC) - Manufacturing of Metal Matrix Composites (MMCs) - Solid state, liquid state, vapour state processing, Manufacturing of Ceramic Matrix Composites (CMCs) –hot pressing-reaction bonding process-infiltration technique, direct oxidation- interfaces

UNIT III INTRODUCTION, LAMINA CONSTITUTIVE EQUATIONS

UNIT IV LAMINA STRENGTH ANALYSIS AND ANALYSIS OF LAMINATED FLAT PLATES
UNIT V THERMO-STRUCTURAL ANALYSIS

Fabrication stresses/Residual stresses in FRP laminated composites- Co-efficient of Thermal Expansion (C.T.E.) - Modification of Hooke’s Law. Modification of Laminate Constitutive Equations. Orthotropic Lamina C.T.E’s -Stress and Moment Resultants due cooling of the laminates during fabrication-Calculations for thermo-mechanical stresses in FRP laminates. Case studies: Implementation of CLT for evaluating residual stresses in the components made with different isotropic layers such as electronic packages etc.

TOTAL = 45 PERIODS

COURSE OUTCOMES:

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

1. Analyze mechanical strength of the composite material
2. Develop the FRP and other composites by different manufacturing methods
3. Analyze fiber reinforced Laminates for different combinations of plies with different orientations of the fiber.
4. Evaluate the stresses in the lamina of the laminate using different failure theories
5. Analyze thermo-mechanical behavior and evaluate residual stresses in different types of laminates using the Classical Laminate Theory.

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MA5353 NUMERICAL METHODS

COURSE OBJECTIVES:

- To provide the mathematical foundations of numerical techniques for solving Eigen value problems and linear system of equations.
- To apply the techniques of interpolation for equal and unequal intervals for the given data.
- To understand and to apply the techniques of numerical integration and differentiation for solving and ODE in applying day today life.
- To familiar in solving initial value problems and ODE for given initial and boundary conditions.
- To demonstrate the utility of Numerical techniques for solving Partial Differential Equations in Heat and Fluid problems.
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

COURSE 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 to the algebraic and transcendental equations.
- Apply numerical methods to obtain approximate solutions to mathematical problems using interpolation.
- 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 in solving ODE of First and Second order equations.
- Understand various numerical techniques for solving PDE, for given conditions in Heat flow and Wave problems.

TEXT BOOKS:
COURSE OBJECTIVES:
The main learning objective of this course is
1. To understand the importance of NDT in quality assurance.
2. To imbibe the basic principles of various NDT techniques, its applications, limitations, codes and standards.
3. To equip proper competencies to locate a flaw in various materials, products.
4. To apply the NDT techniques for in-situ applications.
5. To inculcate the knowledge of selecting suitable NDT technique for a given application

UNIT I INTRODUCTION & VISUAL INSPECTION METHODS
NDT versus Mechanical testing, Need for NDT, Relative merits and limitations, various physical characteristics of materials and their applications in NDT.
Visual Inspection - Unaided, Aided- Borescopes - Videoscopes, Special features in Borescopes, Selection of borescopes, Optical sensors, Microscopes & replication Microscopy Technique and applications, Holography, Case study.

UNIT II LIQUID PENETRANT TESTING & MAGNETIC PARTICLE TESTING
LPT - Principle, types, Procedures, Penetrants and their characteristics, Emulsifiers, Solvent Cleaners / Removers, Developers- properties and their forms, Equipments, Advantages and limitations, Inspection and Interpretation, Applications and case study.

UNIT III THERMOGRAPHY & EDDY CURRENT TESTING
Thermography – Introduction, Principle, Contact & Non-Contact inspection methods, Active & Passive methods, Liquid Crystal – Concept, example, advantages & limitations. Electromagnetic spectrum, infrared thermography- approaches, IR detectors, Instrumentation and methods and applications, Case study.
Eddy current Testing – Principle, properties of eddy currents, Eddy current sensing elements, probes, Instrumentation, Types of arrangement, Advantages & Limitations, Interpretation of Results & applications, Case study.

UNIT IV ULTRASONIC TESTING & ACOUSTIC EMISSION TESTING
Ultrasonic Testing- Principle, Basic Equipment, Transducers, couplants, Ultrasonic wave, Variables in UT, Transmission and Pulse-echo method, Straight beam and angle beam, A-Scan, B-Scan & C-Scan, Phased Array Ultrasound & Time of Flight Diffraction, Advantages & Limitations, Interpretation of Results & Applications, Case study.

UNIT V RADIOGRAPHY

TOTAL: 45 PERIODS

COURSE OUTCOMES:
The students will be able
• To compare the various visual inspection techniques and apply them in inspection.
• To adapt the Penetrant testing procedures while evaluating the surface defects.
To interpret the images and the results obtained from the Thermographic technique and the Eddy current testing
To analyze the results obtained in the Ultrasonic inspection and Acoustic Emission technique
To explain the techniques involved in the Radiographic testing and the various advancements in Radiography.

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ME5075 ENTREPRENEURSHIP DEVELOPMENT

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Understanding the types, characteristics of entrepreneurship and its role in economic development.
2. Appreciating of the theories of achievement motivation and the principles of entrepreneurship development program to enterprise.
3. Understanding the appropriate form of business ownership in setting up an enterprise.
4. Understanding the fundamental concepts of finance and accounting to enterprise.
5. Recognizing sickness in industry, selecting the appropriate corrective measures, and identifying the growth strategies in enterprise.

UNIT I ENTREPRENEURSHIP
UNIT II  MOTIVATION  9

UNIT III  BUSINESS  9

UNIT IV  FINANCING AND ACCOUNTING  9

UNIT V  SUPPORT TO ENTREPRENEURS  9

TOTAL  = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Explain the types, characteristics of entrepreneurship and its role in economic development.
2. Apply the theories of achievement motivation and the principles of entrepreneurship development program.
3. Select the appropriate form of business ownership in setting up an enterprise.
4. Apply the fundamental concepts of finance and accounting to enterprise.
5. Identify sickness in industry, select the appropriate corrective measures, and identify the growth strategies in enterprise.

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COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:

1. Understanding different types of refrigerant, their properties, and selecting appropriate refrigerant for a HVAC system.
2. Classifying different types of compressor and evaporator systems.
3. Determining the appropriate psychrometric processes and estimating the heat load.
4. Describing types of air-conditioning system and air distribution configurations.
5. Understanding non-conventional refrigeration systems and instrumentation / control in HVAC systems.

UNIT I INTRODUCTION, REFRIGERANTS AND THEIR ENVIRONMENTAL ISSUES 9
Applications of air-conditioning and refrigeration, energy usage in air-conditioning/buildings
Introduction of Refrigeration and Heat Pump: Carnot cycle, modification in reversed Carnot cycle, vapour compression cycle, actual vapour compression cycle.
Designation of refrigerants, Selection of refrigerants, Ozone Depletion Potential (ODP) and Global Warming (GW), Montreal and Kyoto protocols Total Equivalent Warming Index (TEWI), Azeotropic and zeotropic mixtures, alternative to existing CFC and HCFC refrigerants.

UNIT II BASIC REFRIGERATION, ADVANCED CYCLES AND THEIR COMPONENTS 9
Single and multi-compressor and multi-evaporator systems, System with flash chamber and intercooler, P-h and T-s diagrams, thermodynamic analysis, effect of inter cooling, sub-cooling and super heating, Cascade refrigeration.
Types of compressors, condensers, evaporators, expansion devices – Comparison between air-cooled and water-cooled condenser based air-conditioning plants

UNIT III AIR CONDITIONING AND HEATING / COOLING LOAD ESTIMATION 9
Introduction to thermal comfort and parameters of indoor environment quality; Psychrometric properties, Psychrometric chart; Basic process in air-conditioning: Humidification and Dehumidification processes; Introduction to evaporative cooling and cooling towers-Thermodynamic analysis.
Heating and Cooling Load Estimation: Components of cooling/heat load, Room sensible heat factor (RSHF), Grand sensible Heat factor (GSHF), Heating and cooling load estimation of a typical office / domestic building, Concept of diversity.

UNIT IV AIR CONDITIONING SYSTEM TYPES AND AIR DISTRIBUTION 9
Major system types in air-conditioning: unitary, package, central chilled water based systems; components of chilled water system, concept of primary-secondary chilled water pumping; concept of variable flow systems, components of non-chilled water based system, types and role for energy efficiency, comparison of variable refrigerant flow and constant flow systems.
Fundamentals of duct design, pressure loss and AHU calculations, types of terminal units, advanced air distribution: VAV, UFAD systems; concept of heat recovery systems

UNIT V OTHER REFRIGERATION SYSTEMS, CONTROLS AND SAFETY IN RAC 9
Introduction to Vortex tube, steam jet and thermoelectric refrigeration systems, vapor absorption, vapor adsorption systems, reversed Brayton cycle - air based refrigeration.
Introduction to Building Management System, major components and use of BMS, instrumentation requirements, concept of Direct Digital Control. Installation, commissioning, noise, vibration, electrical connections and safety in RAC systems

TOTAL = 45 PERIODS

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

1. Understand different types of refrigerant, their properties, and select appropriate refrigerant for a HVAC system.
2. Classify different types of compressor and evaporator systems.
3. Adopt appropriate psychrometric processes and arrive at the heat load for a system.
4. Describe types of air-conditioning system and air distribution configurations.
5. Understand various non-conventional refrigeration systems, and adopt suitable instrumentation / control, safety in HVAC systems.

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ME5004	TURBO MACHINERY	L T P C
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COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Understanding various turbo machines and their energy transfer mechanism.
2. Constructing velocity triangle for a centrifugal fan / blower and evaluating the performance.
3. Examining the working and performance of centrifugal compressor.
4. Understanding the working of axial flow compressor and analysing the flow losses.
5. Examining the working and performance of axial and radial flow turbines.

UNIT I WORKING PRINCIPLES

UNIT II CENTRIFUGAL FANS AND BLOWERS

UNIT III CENTRIFUGAL COMPRESSOR
Components - blade types. Velocity triangles - h-s diagram, stage work. Slip factor and Degree of Reaction. Performance characteristics and various losses. Geometry and performance calculation.

UNIT IV AXIAL FLOW COMPRESSOR
UNIT V AXIAL AND RADIAL FLOW TURBINES

Radial flow turbines: Types – Elements - Stage velocity diagrams - h-s diagram, stage work Performance coefficients and losses.

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Understand the basics of various turbo machines.
2. Analyse the performance of a centrifugal fan / blower.
3. Evaluate the performance of centrifugal compressor.
4. Determine the performance parameters and flow losses in axial flow compressor.
5. Compute the performance of axial and radial flow turbines.

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MF5652 ADDITIVE MANUFACTURING

COURSE OBJECTIVES:
- To introduce the development of Additive Manufacturing (AM), various business opportunities and applications
- To familiarize various software tools, processes and techniques to create physical objects that satisfy product development / prototyping requirements, using AM.
- To be acquainted with vat polymerization and material extrusion processes.
- To be familiar with powder bed fusion and direct energy deposition.
- To gain knowledge on applications of binder jetting, material jetting and laminated object manufacturing processes

UNIT I INTRODUCTION
UNIT II  DESIGN FOR ADDITIVE MANUFACTURING (DFAM)  

UNIT III  VAT POLYMERIZATION AND MATERIAL EXTRUSION  

UNIT IV  POWDER BED FUSION AND DIRECT ENERGY DEPOSITION  

UNIT V  OTHER ADDITIVE MANUFACTURING PROCESSES  

TOTAL: 45 PERIODS

COURSE OUTCOMES:
At the end of this course students shall be able to:
- CO1: Recognize the development of AM technology and how AM technology propagated into various businesses and developing opportunities.
- CO2: Acquire knowledge on process of transforming a concept into the final product in AM technology.
- CO3: Elaborate the vat polymerization and material extrusion processes and its applications.
- CO4: Acquire knowledge on process and applications of powder bed fusion and direct energy deposition.
- CO5: Evaluate the advantages, limitations, applications of binder jetting, material jetting and laminated object manufacturing processes.

TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES:
- To classify non-traditional machining processes and describe mechanical energy based non-traditional machining processes.
- To differentiate chemical and electro chemical energy based processes.
- To describe thermo-electric energy based processes.
- To explain nano finishing processes.
- To introduce hybrid non-traditional machining processes and differentiate hybrid non-traditional machining processes.

UNIT I INTRODUCTION AND MECHANICAL ENERGY BASED PROCESSES 9
Introduction - Need for non-traditional machining processes - Classification of non-traditional machining processes - Applications, advantages and limitations of non-traditional machining processes - Abrasive jet machining, Abrasive water jet machining, Ultrasonic machining their principles, equipment, effect of process parameters, applications, advantages and limitations.

UNIT II CHEMICAL AND ELECTRO CHEMICAL ENERGY BASED PROCESSES 9
Principles, equipments, effect of process parameters, applications, advantages and limitations of Chemical machining, Electro-chemical machining, Electro-chemical honing, Electro-chemical grinding, Electro chemical deburring.

UNIT III THERMO-ELECTRIC ENERGY BASED PROCESSES 9
Principles, equipments, effect of process parameters, applications, advantages and limitations of Electric discharge machining, Wire electric discharge machining, Laser beam machining, Plasma arc machining, Electron beam machining, Ion beam machining.

UNIT IV NANO FINISHING PROCESSES 9
Principles, equipments, effect of process parameters, applications, advantages and limitations of Abrasive flow machining – Chemo mechanical polishing, Magnetic abrasive finishing, Magnetorheological finishing, Magneto rheological abrasive flow finishing.

UNIT V HYBRID NON-TRADITIONAL MACHINING PROCESSES 9
Introduction - Various hybrid non-traditional machining processes, their working principles, equipments, effect of process parameters, applications, advantages and limitations. Selection and comparison of different non-traditional machining processes.

COURSE OUTCOMES:
At the end of this course the students shall be able to:
- CO1: Formulate different types of non-traditional machining processes and evaluate mechanical energy based non-traditional machining processes.
- CO2: Illustrate chemical and electro chemical energy based processes.
• CO3: Evaluate thermo-electric energy based processes.
• CO4: Interpret nano finishing processes.
• CO5: Analyse hybrid non-traditional machining processes and differentiate non-traditional machining processes.

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ME5073 DESIGN FOR MANUFACTURING

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Applying economic process selection principles and general design principles for manufacturability in the development and design of products for various engineering applications. Also, apply design consideration principles of casting in the design of cast products.
2. Applying design consideration principles of forming in the design of extruded, stamped, and forged products.
3. Applying design consideration principles of machining in the design of turned, drilled, milled, planed, shaped, slotted, and ground products.
4. Applying design consideration principles of welding in the design of welded products.
5. Applying design consideration principles of assembly in the design of assembled products.

UNIT I INTRODUCTION AND CASTING
Introduction - Economics of process selection - General design principles for manufacturability; Design considerations for: Sand cast – Die cast – Permanent mold cast parts.
UNIT II FORMING
Design considerations for: Metal extruded parts – Impact/Cold extruded parts – Stamped parts – Forged parts.

UNIT III MACHINING
Design considerations for: Turned parts – Drilled parts – Milled, planed, shaped and slotted parts– Ground parts.

UNIT IV WELDING

UNIT V ASSEMBLY

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Interpret the economics and design of cast components.
2. Design best manufacturing practices for forming of components
3. Develop design principles for machining.
4. Formulate design consideration in the design of welded products.
5. Apply design consideration principles of assembly in the design of assembled products.

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COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Applying the principles of generic development process; conducting customer need analysis; and setting product specification for new product design and development.
2. Generating, selecting, screening, and testing concepts for new product design and development.
3. Applying the principles of product architecture and industrial design to design and develop new products.
4. Applying the principles of DFMA and Prototyping to design and develop new product.
5. Applying the concepts of economics principles; project management practices in the development of new product.

UNIT I INTRODUCTION TO PRODUCT DEVELOPMENT, CUSTOMER NEED ANALYSIS, PRODUCT SPECIFICATION

UNIT II CONCEPT GENERATION, SELECTION, AND TESTING
Concept Generation: The Activity of Concept Generation - Concept Selection: Concept Screening; Concept Scoring – Concept Testing.

UNIT III PRODUCT ARCHITECTURE AND INDUSTRIAL DESIGN
Product Architecture: Implications of the Architecture; Establishing the Architecture; Delayed Differentiation; Platform Planning; Related System-Level Design Issues – Industrial Design: Assessing the Need for Industrial Design; Impact of Industrial Design; The Industrial Design Process; Management of the Industrial Design Process; Assessing the Quality of Industrial Design.

UNIT IV DFM AND PROTOTYPING
Design for Manufacturing: Estimate the Manufacturing Costs; Reduce the Costs of Components; Reduce the Costs of Assembly; Reduce the Costs of Supporting Production; Consider the Impact of DFMA– Prototyping: Type; Uses; Principles; Technologies; Planning for Prototypes.

UNIT V PRODUCT DEVELOPMENT ECONOMICS AND MANAGING PROJECTS
Product Development Economics: Elements of Economic Analysis; Economic Analysis Process - Managing Projects: Understanding and Representing Tasks; Baseline Project Planning; Accelerating Projects; Project Execution.

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Apply the principles of generic development process; conduct customer need analysis; and set product specification for new product design and development.
2. Generate, select, screen, and test concepts for new product design and development.
3. Apply the principles of product architecture and industrial design to design and develop new products.
4. Apply the principles of DFMA and Prototyping to design and develop new product.
5. Apply the concepts of economics principles; project management practices in the development of new product.

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**COURSE OBJECTIVES:**
The main learning objective of this course is to prepare the students for:
1. Explaining the fundamental concept and principles of industrial safety
2. Applying the principles of maintenance engineering.
3. Analyzing the wear and its reduction.
4. Evaluating faults in various tools, equipments and machines.
5. Applying periodic maintenance procedures in preventive maintenance.

**UNIT I**  
**INDUSTRIAL SAFETY**
Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

**UNIT II**  
**MAINTENANCE ENGINEERING**
Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Service life of equipment.

**UNIT III**  
**WEAR AND CORROSION AND THEIR PREVENTION**

**UNIT IV**  
**FAULT TRACING**
Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment’s like, i. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler,vi. Electrical motors, Types of faults in machine tools and their general causes.
UNITV PERIODIC AND PREVENTIVE MAINTENANCE


TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Explain the fundamental concept and principles of industrial safety
2. Apply the principles of maintenance engineering.
3. Analyze the wear and its reduction.
4. Evaluate faults in various tools, equipments and machines.
5. Apply periodic maintenance procedures in preventive maintenance.

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GE5552 ENGINEERING MANAGEMENT

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Explaining basic concepts of management; approaches to management; contributors to management studies; various forms of business organization and trade unions function in professional organizations.
2. Applying various functions of management in professional organization.
3. Applying organizational theory in professional organization.
4. Applying the principles of productivity and operations management in professional organization.
5. Applying modern concepts and marketing in management in professional organization.
UNIT I
INTRODUCTION TO MANAGEMENT

Definition and functions of Management - Approaches to the study of Management – Mintzberg’s Ten Managerial Roles – Principles of Taylor; Fayol; Weber; Parker – Forms of Organization: Sole Proprietorship; Partnership; Company (Private and Public); Cooperative – Public Sector Vs Corporate Organization – Business Environment: Economic; Social; Political; Legal – Trade Union: Definition; Functions; Pros and cons.

UNIT II
FUNCTIONS OF MANAGEMENT

Planning: Characteristics; Nature; Importance; Steps; Limitation – Organizing: Features; Process; Principles; Types – Departmentalization: Functional – Divisional (Product; Customer; Geographic) – Staffing: Systems Approach; Recruiting and Selection Process – Directing (Leading): Traits; Style; Managerial Grid (Blake-Mounton, Reddin) – Communication: Purpose; Model; Barriers – Controlling: Types; Audit (External, Internal, Merits) – Decision Making: Elements; Characteristics; Process; Classification – Controlling techniques.

UNIT III
ORGANIZATION THEORY

Human Resource Development (HRD): Goals – Organizational Conflict: Positive Aspects; Individual; Role; Interpersonal; Intra Group; Inter Group; Conflict Management – Need and Motivation Theories: Maslow’s Hierarchy of Needs Theory; Herzberg’s Motivation-Hygiene Theory; McClelland’s Needs Theory of Motivation – Change Management: Concept of Change; Lewin’s Process of Change Model; Sources of Resistance; Overcoming Resistance; Guidelines to managing Conflict.

UNIT IV
PRODUCTIVITY AND OPERATIONS MANAGEMENT

Productivity: Concept; Measurements; Affecting Factors; Methods to Improve – Operations Management Tools: (Simple problems in) Transportation Model (Balanced); Assignment Model (Hungarian); Network Model (Shortest path); Critical Path Method; Decision Trees.

UNIT V
MODERN CONCEPTS AND MARKETING MANAGEMENT

Concept, features, merits and demerits of: SWOT Analysis; Business Process Re-engineering (BPR); Supply Chain Management (SCM) – Marketing: Concept; Functions; Importance; Segmentation; Mix; Problems of Marketing in Small Enterprise; Competitive Analysis and Advantage – E-marketing.

TOTAL = 45 PERIODS

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

1. Explain basic concepts of management; approaches to management; contributors to management studies; various forms of business organization and trade unions function in professional organizations.
2. Apply various functions of management in professional organization.
3. Apply organizational theory in professional organization.
4. Apply the principles of productivity and operations management in professional organization.
5. Apply modern concepts and marketing in management in professional organization.

TEXT BOOKS:

REFERENCES:
ME5079 NEW AND RENEWABLE SOURCES OF ENERGY

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COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Analyzing the current energy scenario of India and World
2. Evaluating the solar energy at any given location and application of suitable technologies for harnessing them.
3. Quantification of wind energy and deployment of different devices for energy generation
4. Application of relevant concepts for recovering energy from biomass.
5. Employing appropriate engineering principles for tapping energy from ocean and geothermal resources.

UNIT I ENERGY SCENARIO
Indian energy scenario in various sectors – domestic, industrial, commercial, agriculture, transportation and others – Present conventional energy status – Present renewable energy status - Potential of various renewable energy sources - Global energy status - Per capita energy consumption in various countries - Future energy plans

UNIT II SOLAR ENERGY

UNIT III WIND ENERGY

UNIT IV BIO-ENERGY

UNIT V OCEAN AND GEOTHERMAL ENERGY

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Describe the current energy scenario of India and World
2. Gauge the solar energy and apply suitable technologies for harnessing them.
3. Quantify wind energy and deploy appropriate devices for energy generation
4. Recover energy from biomass adopting proper concepts.

TOTAL = 45 PERIODS
5. Employ appropriate engineering principles for tapping energy from ocean and geothermal resources.

TEXT BOOKS:

REFERENCES:

ME5006 ADVANCED INTERNAL COMBUSTION ENGINEERING

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Classifying the gasoline fuel injection systems and analyzing combustion knocking in SI engine combustion chambers.
2. Understanding Diesel fuel injection systems and CI engine combustion.
3. Explaining the mechanism of different pollutant formation and their control techniques.
4. Evaluating various alternative fuel options and utilization techniques.
5. Adopting advanced combustion modes and hybrid power train systems.

UNIT I SPARK IGNITION ENGINES

UNIT II COMPRESSION IGNITION ENGINES

UNIT III EMISSION FORMATION AND CONTROL
UNIT IV ALTERNATIVE FUELS

UNIT V ALTERNATE COMBUSTION AND POWER TRAIN SYSTEM

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Classify different gasoline fuel injection systems and analyse SI engine combustion.
2. Understand Diesel fuel injection systems and CI engine combustion mechanism.
3. Identify the sources of pollutants and adopt appropriate and control techniques.
4. Evaluate various alternative fuel options and its utilization techniques.
5. Adopt advanced combustion concepts and utilize hybrid power train systems.

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ME5007 CASTING AND WELDING PROCESSES L T P C
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COURSE OBJECTIVES:
The main learning objective of this course is:
1. To use the fundamental aspects of ferrous casting metallurgy in casting quality ferrous castings.
2. To use the fundamental aspects of non-ferrous casting metallurgy in casting quality non ferrous castings.
3. To understand the concepts involved in ferrous welding metallurgy.
4. To understand the basics of non-ferrous welding metallurgy.
   To Know the causes and remedies of various welding defects, weldability, testing of weldments, welding standards and codes.
UNIT I  FERROUS CAST ALLOYS

UNIT II  NON FERROUS CAST ALLOYS

UNIT III  PHYSICAL METALLURGY OF WELDING

UNIT IV  WELDING OF ALLOY STEELS AND NON-FERROUS METALS
Welding of stainless steels, types of stainless steels, overview of joining ferritic and martensitic types, welding of austenitic stainless steels, Sensitisation, hot cracking, sigma phase and chromium carbide formation, ways of overcoming these difficulties, welding of cast iron. Welding of non-ferrous materials: Joining of aluminium, copper, nickel and titanium alloys, problems encountered and solutions

UNIT V  DEFECTS, WELDABILITY AND STANDARDS
Defects in welded joints: Defects such as arc strike, porosity, undercut, slag entrapment and hot cracking, causes and remedies in each case. Joining of dissimilar materials, weldability and testing of weldments. Introduction to International Standards and Codes

TOTAL  = 45 PERIODS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Produce quality ferrous castings.
2. Produce quality non ferrous castings.
3. Describe the metallurgical changes in the ferrous weldments.
4. Appreciate the metallurgical changes in the alloy steels and non-ferrous weldments.
5. Identify the welding defects and provide the remedy according to the standards.

TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES:
The main learning objectives of this course are to:
1. Elucidate the steps involved in preparing a process plan for a given Product.
2. Provide an overview for cost estimation of a given product.
3. Explain the allocation of overhead costs in manufacturing.
4. Elucidate the procedure to estimate the cost of castings and forging products.
5. Explain the costs involved in machining and estimate the machining cost.

UNIT I PROCESS PLANNING

UNIT II FUNDAMENTAL OF ESTIMATING AND ELEMENTS OF COST

UNIT III OVERHEADS AND DEPRECIATION
Overheads, Allocation or Distribution of Overhead Cost, Depreciation and Methods to Calculate it, Interest on Capital, Idleness Costs, Repair and Maintenance Cost.

UNIT IV ESTIMATION OF CASTING, FORGING & WELDING COSTS
Estimation of cost for Casting processes, Welding processes and Forging processes.

UNIT V ESTIMATION OF MACHINING TIME AND COST
Estimation of Machining Time and Cost – Lathe operations, Drilling, Milling, Shaping Planing, and Grinding operations.

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Create a Process Plan for a given Product.
2. Identify Cost elements for a given Product.
3. Allocate Overhead to different departments in manufacturing a product.
5. Analyze the costs for machining a product.
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ME5083 PRODUCT LIFE CYCLE MANAGEMENT

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Explaining the history, concepts and terminology of PLM.
2. Applying the functions and features of PLM/PDM.
3. Applying different modules offered in commercial PLM/PDM tools.
4. Implementing PLM/PDM approaches for industrial applications.
5. Integrating PLM/PDM with legacy data bases, CAx& ERP systems.

UNIT I INTRODUCTION TO PLM
Introduction to PLM, Need for PLM, opportunities of PLM, Different views of PLM - Engineering Data Management (EDM), Product Data Management (PDM), Collaborative Product Definition Management (CPDM), Collaborative Product Commerce (CPC), Product Lifecycle Management (PLM). PLM/PDM Infrastructure – Network and Communications, Data Management, Heterogeneous data sources and applications.

UNIT II PLM/PDM FUNCTIONS AND FEATURES

UNIT III DETAILS OF MODULES IN A PDM/PLM SOFTWARE
Case studies based on top few commercial PLM/PDM tools – Teamcenter, Windchill, ENOVIA, Aras PLM, SAP PLM, Arena, Oracle Agile PLM and Autodesk Vault.
UNIT IV ROLE OF PLM IN INDUSTRIES
Case studies on PLM selection and implementation (like auto, aero, electronic) - other possible sectors, PLM visioning, PLM strategy, PLM feasibility study, change management for PLM, financial justification of PLM, barriers to PLM implementation, ten step approach to PLM, benefits of PLM for–business, organization, users, product or service, process performance

UNIT V BASIC ON CUSTOMISATION/INTEGRATION OF PDM/PLM SOFTWARE
PLM Customization, use of EAI technology (Middleware), Integration with legacy data base, CAD, SLM and ERP

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Explain the history, concepts and terminology of PLM
2. Apply the functions and features of PLM/PDM
3. Apply different modules offered in commercial PLM/PDM tools.
4. Implement PLM/PDM approaches for industrial applications.
5. Integrate PLM/PDM with legacy data bases, CAx& ERP systems

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ME5084 SURFACE ENGINEERING TRIBOLOGY

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Describe the fundamentals of surface features and different types of friction associated with metals and non metals
2. Analyze the different types of wear mechanism and its standard measurement.
3. Analyze the different types of corrosion and its preventive measures
4. Analyze the different types of surface properties and surface modification techniques
5. Analyze the various types of materials used in the friction and wear applications
UNITI SURFACES AND FRICTION

UNIT II WEAR
Laws of Wear - Types of Wear mechanism – wear debris analysis - Theoretical wear models - Wear of metals and nonmetals – International standards in friction and wear measurements

UNIT III CORROSION

UNIT IV SURFACE TREATMENTS

UNIT V ENGINEERING MATERIALS

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Describe the fundamentals of surface features and different types of friction associated with metals and non metals
2. Analyze the different types of wear mechanism and its standard measurement.
3. Analyze the different types of corrosion and its preventive measures
4. Analyze the different types of surface properties and surface modification techniques
5. Analyze the various types of materials used in the friction and wear applications.

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COURSE OBJECTIVES
The course aims to
- make students learn about the concept and regulation of human rights
- make students aware about the constitutional human rights

UNIT I
INTRODUCTION TO HUMAN RIGHTS

UNIT II
REGULATIONS IN HUMAN RIGHTS

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

UNIT IV
HUMAN RIGHTS-INDIAN PERSPECTIVE
Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V
IMPLEMENTATION OF HUMAN RIGHTS IN VARIOUS SCENARIO

COURSE OUTCOMES
At the end of the course the students will be able to
CO1 acquire the basic knowledge of human rights.
CO2 acquire knowledge about the regulatory bodies involved in human rights.

REFERENCES

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Classifying heat exchangers and its types.
3. Calculating the pressure drop and simulating performance of heat exchangers.
4. Designing compact heat exchangers for various applications
5. Designing condenser and cooling towers for different applications.

UNIT I
FUNDAMENTALS OF HEAT EXCHANGER
UNIT II   FLOW AND STRESS ANALYSIS  

UNIT III   DESIGN ASPECTS  

UNIT IV   COMPACT AND PLATE HEAT EXCHANGERS  
Types – merits and demerits – design of compact heat exchangers, plate heat exchangers – performance influencing parameters – limitations

UNIT V   CONDENSERS AND COOLING TOWERS  
Design of surface and evaporative condensers – cooling tower – performance characteristics

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Classify heat exchangers and its types.
2. Predict flow and stress related failure issues in heat exchangers.
3. Calculate the pressure drop and simulate performance of heat exchangers.
4. Design a compact heat exchanger.
5. Design a condenser and cooling tower for a specific application.

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COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Applying the fundamentals of CFD, and developing case specific governing equations.
2. Performing finite difference and finite volume based analysis for steady and transient diffusion problems.
3. Implementing various mathematical schemes under finite volume method for convention diffusion.
4. Solving complex problems in the field of fluid flow and heat transfer with the support of high speed computers.
5. Applying the various discretization methods, solution procedure and the concept of turbulence modeling.

UNIT I  GOVERNING EQUATIONS AND BOUNDARY CONDITIONS 9

UNIT II  FINITE DIFFERENCE AND FINITE VOLUME METHODS FOR DIFFUSION 9

UNIT III  FINITE VOLUME METHOD FOR CONVECTION DIFFUSION 9
Steady one-dimensional convection and diffusion – Central, upwind differencing schemes, properties of discretization schemes, Hybrid, Power-law, QUICK Schemes, Conservativeness, Boundedness, Transportiveness.

UNIT IV  FLOW FIELD ANALYSIS 9
Stream function and vorticity, Representation of the pressure gradient term, Staggered grid – Momentum equations, Pressure and Velocity corrections – Pressure Correction equation, SIMPLE algorithm and its variants – PISO Algorithms.

UNIT V  TURBULENCE MODELS AND MESH GENERATION 9
Turbulence models, mixing length model, Two equation (k-€) models – High and low Reynolds number models, Mesh Generation and refinement Techniques-software tools.

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Apply the fundamentals of CFD, and develop case specific governing equations.
2. Perform finite difference and finite volume based analysis for steady and transient diffusion problems.
3. Implement various mathematical schemes under finite volume method for convention diffusion.
4. Solve complex problems in the field of fluid flow and heat transfer with the support of high speed computers.
5. Apply the various discretization methods, solution procedure and the concept of turbulence modeling.

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ME5085 QUALITY AND RELIABILITY ENGINEERING

COURSE OBJECTIVES:
The main learning objective of this course is
1. To provide an overview about quality concepts and SPC tools for continuous improvement.
2. To impart knowledge on the control charts and process capability studies.
3. To give an insight on acceptance sampling plan and its parameters.
4. To inculcate the fundamentals of the reliability concepts
5. To render exposure on improving the reliability and its optimization.

UNIT I INTRODUCTION AND STATISTICAL PROCESS CONTROL
Introduction: definitions of quality, Evolution of Quality: Inspection, Quality Control, Quality assurance Customer-Orientation: Internal & External Customer Concept, Life cycle approach to quality costs- Prevention; Appraisal and Failure costs. Seven SPC tools -Histogram, Check sheets, Ishikawa diagrams, Pareto, Scatter diagrams, Control charts and flow chart.

UNIT II ONLINE QUALITY CONTROL
Control chart for attributes –control chart for non conforming– p chart and np chart – control chart for nonconformities– C and U charts, Control chart for variables – X chart, R chart andorchart -State of control and process out of control identification in charts, pattern study and process capability studies.

UNIT III OFFLINE QUALITY CONTROL
Lot by lot sampling – types – probability of acceptance in single, double, multiple sampling techniques – O.C. curves – producers Risk and consumers Risk. AQL, LTPD, AOQL concepts standard sampling plans for AQL and LTPD- uses of standard sampling plans.

UNIT IV RELIABILITY CONCEPTS
Reliability engineering - fundamentals – failure data analysis, Mean failure rate, Mortality curves concept of burn –in period, useful life and wear out phase of a system, mean time to failure, meantime between failure, hazard rate – failure density and conditional reliability-Maintainability and availability – simple problems

UNIT V RELIABILITY ESTIMATION

TOTAL = 45 PERIODS
COURSE OUTCOMES: Upon completion of this course, the students will be able to:

1. Apply the 7 QC tools in problem solving for continuous improvement.
2. Design online sampling plan for quality control using control charts and perform process capability studies.
3. Use the strategies of acceptance sampling plan to perform quality audit in the customer site.
4. Evaluate the different reliability measurements while applying the reliability concepts.
5. Select the suitable method of improving the reliability and integrate reliability concepts in new product design and development.

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IE5652 PRODUCTION AND OPERATIONS MANAGEMENT

COURSE OBJECTIVES:
- Recognize and appreciate the concept of Production and Operations Management in creating and enhancing a firm’s competitive advantages.
- Describe the concept and contribution of various constituents of Production and Operations Management (both manufacturing and service).
- Relate the interdependence of the operations function with the other key functional areas of a firm.
- Teach analytical skills and problem-solving tools to the analysis of the operations problems.
- Apply scheduling and Lean Concepts for improving System Performance.

UNIT I INTRODUCTION

UNIT II FORECASTING
Need, Determinants of Demand, Demand Patterns, Qualitative Forecasting Methods-Delphi techniques. Market Research, Nominal Group Technique. Quantitative Forecasting methods – Moving Average Methods, Exponential Smoothing Methods, Regression methods, Monitoring and Control of Forecasts, Requirements and Selection of Good forecasting methods.
UNIT III  AGGREGATE PLANNING AND MATERIAL REQUIREMENT PLANNING  9
Role of aggregate Product planning, Managerial inputs to Aggregate planning, Pure and Mixed strategies, Mathematical Models for Aggregate planning – Transportation Method, Linear programming Formulation, Linear Decision Rues, Master Production Schedule(MPS), Procedure for developing MPS, MRP -Lot sizing methods – Implementation issues, MRP – II, Introduction to ERP.

UNIT IV  CAPACITY MANAGEMENT  9

UNIT V  PRODUCTION ACTIVITY CONTROL AND LEAN MANUFACTURING  9
Objectives and Activities of Production Activity Control -JIT- Kanban- Introduction to Scheduling in different types of Production Systems. Lean Manufacturing - Principles – Activities - Tools and techniques - Case studies.

COURSE OUTCOMES:
CO1: The students will appreciate the role of Production and Operations management in enabling and enhancing a firm’s competitive advantages in the dynamic business environment.
CO2: The students will obtain sufficient knowledge and skills to forecast demand for Production and Service Systems.
CO3: The students will able to Formulate and Assess Aggregate Planning strategies and Material Requirement Plan.
CO4: The students will be able to develop analytical skills to calculate capacity requirements and developing capacity alternatives.
CO5: The students will be able to apply scheduling and Lean Concepts for improving System Performance.

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REFERENCES:
COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:

1. Applying the principles of locating and clamping in Jigs and fixtures and various components related to Press tools.
2. Designing various types of Jigs for given components and draw multiple views of the same with dimensions and parts List.
3. Designing various types of Fixtures for given components and draw multiple views of the same with dimensions and parts List.
4. Designing various parts of cutting dies and draw the standard dimensioned views.
5. Designing various parts of forming dies and draw the standard dimensioned views.

UNIT I PRINCIPLES OF JIGS, FIXTURES AND PRESS WORKING

UNIT II JIGS
Design and development of jigs for given component - Types of Jigs – Post, Turnover, Channel, latch, box, pot, angular post jigs – Indexing jigs

UNIT III FIXTURES
Design and development of fixtures for given component- General principles of milling, Lathe, boring, broaching and grinding fixtures – Assembly, Inspection and Welding fixtures – Modular fixturing systems- Quick change fixtures

UNIT IV DESIGN OF CUTTING DIES
Complete design and preparation of standard views of simple blanking, piercing, compound and progressive dies -fine Blanking dies

UNIT V DESIGN OF BENDING, FORMING, DRAWING AND MISCELLANEOUS DIES
Difference between bending forming and drawing – Blank development for above operations – Types of Bending dies – Press capacity – Spring back – Variables affecting Metal flow in drawing operations – draw die inserts – draw beads- ironing – Design and development of bending, forming, drawing, reverse redrawing and combination dies – Blank development for axisymmetric, rectangular and elliptic parts – Single and double action dies

TOTAL = 45 PERIODS

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

1. Apply the principles of locating and clamping in Jigs and fixtures and various components related to Press tools.
2. Design various types of Jigs for given components and draw multiple views of the same with dimensions and parts List.
3. Design various types of Fixtures for given components and draw multiple views of the same with dimensions and parts List.
4. Design various parts of cutting dies and draw the standard dimensioned views.
5. Design various parts of forming dies and draw the standard dimensioned views.
TEXT BOOKS:

REFERENCES:

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ME5009 MECHANICAL VIBRATIONS AND NOISE CONTROL

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Apply the fundamental concepts of vibration.
2. Apply the fundamentals of noise.
3. Describe the various sources of noise for automotive applications.
4. Determine the natural frequencies and mode shapes of the two degree freedom systems.
5. Apply the various control techniques to reduce the vibration and noise to improve the life of the components.

UNIT I BASICS OF VIBRATION
Introduction, classification of vibration: free and forced vibration, undamped and damped vibration, linear vibration, response of damped and undamped systems under harmonic force, analysis of single degree systems, torsional vibration - determination of natural frequencies and critical speed of shafts.

UNIT II BASICS OF NOISE
Introduction, amplitude, frequency, wavelength and sound pressure level, addition, subtraction and averaging decibel levels, noise dose level, legislation, measurement and analysis of noise, measurement environment, equipment, frequency analysis, tracking analysis, sound quality analysis.

UNIT III AUTOMOTIVE NOISE SOURCES

UNIT IV TWO DEGREE FREEDOM SYSTEM
Introduction-Free Vibration Of Undamped And Damped - Forced Vibration With Harmonic Excitation System –Coordinate Couplings And Principal Coordinates – Vibration absorbers

UNIT V CONTROL OF VIBRATION AND NOISE
Major sources of noise – Noise survey techniques – Measurement technique for vehicular noise – Road vehicle noise standards – Industrial noise sources – Control Strategies – Noise control at the
source and along the path – use of acoustic barriers – Noise control at the receiver – vibration isolation methods

TOTAL = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Apply the fundamental concepts of vibration.
2. Apply the fundamentals of noise.
3. Describe the various sources of noise for automotive applications.
4. Determine the natural frequencies and mode shapes of the two degree freedom systems.
5. Apply the various control techniques to reduce the vibration and noise to improve the life of the components

TEXT BOOKS:

REFERENCES:

GE5071 DISASTER MANAGEMENT

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COURSE 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 and
- 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
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 Processess 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

COURSE 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, Scenarious in the Indian context, Disaster damage assessment and management.

TEXTBOOKS:

REFERENCES
1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Applying the core values toward the ethical behavior of an engineer.
2. Applying the ethical and moral principles in engineering experimentation.
3. Applying the ethical and moral principles in engineering for safety.
4. Applying standard codes of moral conduct toward the ethical behavior of an engineer.
5. Applying ethical and moral principles for engineers as managers, consultants, expert witness. Resolving global issues of ethics concerning weapon development and multinational companies.

UNIT I  ENGINEERING ETHICS  9

UNIT II  ENGINEERING AS SOCIAL EXPERIMENTATION  9
Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics– Codes of Ethics – Industrial Standards – A Balanced Outlook on Law – The Challenger Case Study

UNIT III  ENGINEERING FOR SAFETY  9

UNIT IV  ENGINEER’S RESPONSIBILITIES AND RIGHTS  9

UNIT V  GLOBAL ISSUES  9

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Apply the core values toward the ethical behavior of an engineer.
2. Apply the ethical and moral principles in engineering experimentation.
3. Apply the ethical and moral principles in engineering for safety.
4. Apply standard codes of moral conduct toward the ethical behavior of an engineer.
5. Apply ethical and moral principles for engineers as managers, consultants, expert witness. Resolve global issues of ethics concerning weapon development and multinational companies.

TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:

1. Quantifying the energy demand and energy supply scenario of the nation and explaining the need for energy auditing for becoming environmentally benign
2. Analyzing factors behind energy billing and applying the concept of demand-side management for lowering energy costs
3. Computing the stoichiometric air requirement for any given fuel and quantifying the energy losses associated with thermal utilities of industries
4. Diagnosing the causes for under-performance of various electrical utilities and suggesting remedies for improving their efficiency
5. Applying CUSUM and other financial evaluation techniques to estimating the accruable energy savings/money benefits for any energy efficiency project

UNIT I  INTRODUCTION

UNIT II  ELECTRICAL SUPPLY SYSTEMS
Electricity Tariff structures – Typical Billing - Demand Side Management - HT and LT supply - Power Factor – Energy conservation in Transformers – Harmonics

UNIT III  ENERGY CONSERVATION IN MAJOR THERMAL UTILITIES
Stoichiometry - Combustion principles.

UNIT IV  ENERGY CONSERVATION IN MAJOR ELECTRICAL UTILITIES
Energy conservation in : Motors - Pumps – Fans – Blowers - Compressed Air Systems - Refrigeration and Air Conditioning Systems - Illumination systems

UNIT V  ENERGY MONITORING, TARGETING, LABELLING AND ECONOMICS

TOTAL  = 45 PERIODS

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

1. Quantify the energy demand and energy supply scenario of the nation and appreciate the need for energy auditing for becoming environmentally benign
2. Analyze factors behind energy billing and apply the concept of demand-side management for lowering energy costs
3. Compute the stoichiometric air requirement for any given fuel and quantify the energy losses associated with thermal utilities of industries.
4. Diagnose the causes for under performance of various electrical utilities and suggest remedies for improving their efficiency.
5. Apply CUSUM and other financial evaluation techniques to estimate the accruable energy savings/monetary benefits for any energy efficiency project.

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ME5011 ENERGY EFFICIENT BUILDINGS DESIGN L T P C 3 0 0 3

COURSE OBJECTIVES: The main learning objective of this course is to prepare the students for:

1. Comparing the conventional vis-à-vis energy efficient buildings and developing proficiency in energy conservation building codes.
2. Designing an energy efficient landscape system.
3. Examining different solutions for HVAC in buildings.
5. Adopting integration of renewable energy in buildings.

UNIT I INTRODUCTION

UNIT II LANDSCAPE AND BUILDING ENVELOPES
Energy efficient landscape design – Micro climates – various methods – Shading, water bodies – Building envelope: Building materials, Envelope heat loss and heat gain and its evaluation, paints, insulation, Design methods and tools.
UNIT III  HEATING, VENTILATION AND AIR CONDITIONING  9
Natural Ventilation, Passive cooling and heating: Thermal mass effects – Application of wind, water and earth for cooling, evaporative cooling, radiant cooling – Hybrid methods – energy conservation measures, thermal storage integration in buildings

UNIT IV  HEAT TRANSMISSION IN BUILDINGS  9
Surface co-efficient: air cavity, internal and external surfaces, overall thermal transmittance, wall and windows; heat transfer due to ventilation / infiltration, internal heat transfer; solar temperature; decrement factor; phase lag. Design of day lighting; estimation of building loads: steady state method, network method, numerical method, correlations; computer packages for carrying out thermal design of buildings and predicting performance. Thermal load estimation: Heat balance method. Degree day method for seasonal energy consumption.

UNIT V  BUILDING COOLING AND RENEWABLE ENERGY IN BUILDINGS  9
Passive cooling concepts, Application of wind, water and earth cooling; shading, paints and cavity walls for cooling; roof radiation traps, Earth air tunnel. Solar sorption cooling and Solarvapour compression cooling for buildings – Solar water heating systems in buildings – Small wind turbines, standalone PV, Hybrid systems for residential buildings with economics. TOTAL  = 45 PERIODS

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

1. Compare conventional vis-à-vis energy efficient buildings and versatile with energy conservation building codes.
2. Design an energy efficient landscape system.
3. Examine different solutions for HVAC in buildings
4. Analyze the heat transmission in buildings.
5. Adopt integration of renewable energy in buildings.

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OBJECTIVES:
- Explain the basics of Lean and Six Sigma.
- Teach the need and the process of integrating Lean and Six Sigma.
- Summarize to identify and select the resources required for LSS Projects and selection of projects including Team building.
- Teach the DMAIC process and study the various tools for undertaking LSS projects.
- Illustrate to institutionalize the LSS efforts.

UNIT I  INTRODUCTION TO LEAN AND SIX SIGMA
Introduction to Lean- Definition, Purpose, Features of Lean ; Top seven wastes, Need for Lean management, The philosophy of lean management, Creating a lean enterprise, Elements of Lean, Lean principles, the lean metric, Hidden time traps. Introduction to quality, Definition of six sigma, origin of six sigma, Six sigma concept and Critical success factors for six sigma.

UNIT II  INTEGRATION OF LEAN AND SIX SIGMA
Evolution of lean six sigma, the synergy of Lean and six sigma, Definition of lean six sigma, the principles of lean six sigma, Scope for lean six sigma, Features of lean six sigma. The laws of lean six sigma, Key elements of LSS, the LSS model and the benefits of lean six sigma. Initiation - Top management commitment – Infrastructure and deployment planning, Process focus, organizational structures, Measures – Rewards and recognition, Infrastructure tools, structure of transforming event and Launch preparation.

UNIT III  PROJECT SELECTION AND TEAM BUILDING
Resource and project selection, Selection of Black belts, Training of Black belts and Champions, Identification of potential projects, top down (Balanced score card) and Bottom up approach – Methods of selecting projects – Benefit/Effort graph, Process mapping, value stream mapping, Predicting and improving team performance, Nine team roles and Team leadership.

UNIT IV  THE DMAIC PROCESS AND TOOLS
The DMAIC process – Toll gate reviews; The DMAIC tools; Define tools – Project definition form, SIPOC diagram; Measure tools – Process mapping, Lead time/cycle time, Cause and Effect matrix, Idea – generating and organizing tools – Brainstorming, Nominal group technique and Multi-voting; Data collection and accuracy tools- Check sheet, Gauge R&R; Understanding and eliminating variation- run charts; Analyze tools - Scatter plots, ANOVA, Regression analysis, Time trap analysis; Improve tools – Mistake proofing, Set up time reduction (SMED) and the pull system; Control tools – statistical process control.

UNIT V  INSTITUTIONALIZING AND DESIGN FOR LSS
Institutionalizing lean six sigma – improving design velocity, creating cycle time base line, valuing projects, gating the projects, reducing product line complexity, Design for lean six sigma, QFD, Theory of Inventive Problem solving (TRIZ), Robust design; Case study presentations.

TOTAL: 45 PERIODS

COURSE OUTCOMES
CO1: The students will be able to understand what is Lean and Six sigma and their importance in the globalized competitive world.
CO2: The students will be able to understand the importance of integrating Lean and Six sigma and also the process of their integration.
CO3: The students will be able to plan the Resources required to undertake the LSS projects and also acquire how to select the suitable projects and the teams.
CO4: The students will be able apply DMAIC methodology to execute LSS projects and in this regard they will be acquainted with various LSS tools.
CO5: The students will be able to understand the process of institutionalizing the LSS effort and also understand the Design for LSS.
COURSE OBJECTIVES: The main learning objective of this course is:

1. To explain the concepts of industrial robots with respect to its classification, specifications and coordinate systems. Reviewing the need and application of robots in different engineering fields.
2. To exemplifying the different types of robot drive systems as well as robot end effectors.
3. To apply the different sensors and image processing techniques in robotics to improve the ability of robots.
4. To Develop robotic programs for different tasks and analyzing the kinematics motions of robot.
5. To Implementing robots in various industrial sectors and interpolating the economic analysis of robots.

UNIT I  FUNDAMENTALS OF ROBOT

UNIT II  ROBOT DRIVE SYSTEMS AND END EFFECTORS
Pneumatic Drives-Hydraulic Drives-Mechanical Drives-Electrical Drives-D.C. Servo Motors, Stepper Motors, A.C. Servo Motors-Salient Features, Applications and Comparison of all these Drives, End Effectors-Grippers-Mechanical Grippers, Pneumatic and Hydraulic- Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT III  SENSORS AND MACHINE VISION
UNIT IV ROBOT KINEMATICS AND ROBOT PROGRAMMING  9
Forward Kinematics, Inverse Kinematics and Difference; Forward Kinematics and Reverse Kinematics of manipulators with Two, Three Degrees of Freedom (in 2 Dimension), Four Degrees of freedom (in 3 Dimension) Jacobians, Velocity and Forces-Manipulator Dynamics, Trajectory Generator, Expert system, Manipulator Mechanism Design-Derivations and problems. Lead through Programming, Robot programming Languages-VAL Programming-Motion Commands, Sensor Commands, End Effector commands and simple Programs.

UNIT V IMPLEMENTATION AND ROBOT ECONOMICS  9
RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TOTAL  = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Explain the concepts of industrial robots with respect to its classification, specifications and coordinate systems. Review the need and application of robots in different engineering fields.
2. Exemplify the different types of robot drive systems as well as robot end effectors.
3. Apply the different sensors and image processing techniques in robotics to improve the ability of robots.
4. Develop robotic programs for different tasks and analyze the kinematics motions of robot.
5. Implement robots in various industrial sectors and interpolate the economic analysis of robots.

TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Applying concepts of Finite Element Analysis to solve production processes
2. Applying concepts of Finite Element Analysis to solve fluid mechanics and heat transfer problems
3. Applying concept of Finite Element Analysis to solve problems involving geometric and material non linearity
4. Creating solution techniques to solve dynamic problems
5. Investigating error norms, convergence rates and refinement.

UNIT I ANALYSIS OF PRODUCTION PROCESSES 9
Governing Equations of production processes- Application to bulk forming, sheet metal forming, casting, metal cutting, welding.

UNIT II FLUID MECHANICS AND HEAT TRANSFER 9

UNIT III NON-LINEAR ANALYSIS 9
Introduction to Non-linear problems- some solution techniques-computational procedure-simple material nonlinearity-Plasticity and viscoplasticity, stress stiffening, contact interfaces- problems of gaps and contact - geometric non-linearity- modeling considerations - Impact analysis.

UNIT IV DYNAMIC PROBLEM 9

UNIT V ERROR ESTIMATES AND ADAPTIVE REFINEMENT 9
Error norms and Convergence rates – h-refinement with adaptivity – Adaptive refinement.

TOTAL = 45 PERIODS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Apply concepts of Finite Element Analysis to solve production processes
2. Apply concepts of Finite Element Analysis to solve fluid mechanics and heat transfer problems
3. Apply concept of Finite Element Analysis to solve problems involving geometric and material non linearity
4. Create solution techniques to solve dynamic problems
5. Investigate error norms, convergence rates and refinement.

TEXT BOOKS:

REFERENCES:
ME5014  METAL FORMING TECHNOLOGY  L T P C  3 0 0 3

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Explaining the stress-strain concepts of materials during plastic deformation.
2. Applying the theory of plasticity and its application for analyzing various metal forming Processes.
3. Applying the principle of forging and rolling for load calculation and its applications.
5. Explaining the various sheet metal forming methods and its applications.

UNIT I  STRESS - STRAIN TENSOR  9
State of stress, components of stress, symmetry of stress tensor, principle stresses, stress deviator, Von Mises, Tresca Yield criteria, comparison of yield criteria, Octahedral shear stress and shear strain, Slip, twinning, Forming load calculations, Strain Rate Tensor

UNIT II  FUNDAMENTALS OF METAL FORMING  9

UNIT III  FORGING AND ROLLING  9
Forging-Hot, Cold and Warm Forging – types of presses and hammers. Classification, Open die forging and Closed die forging, die design, forging in plane strain, calculation of forging loads, use of software for analysis - forging defects – causes and remedies, residual stresses in forging. Rolling: Classification of rolling processes, types of rolling mills, hot and cold rolling, rolling of bars and shapes, and geometrical relationship in rolling, analysis of rolling load, torque and power, rolling mill control, rolling defects- causes and remedies.

UNIT IV  EXTRUSION AND DRAWING  9
Direct and indirect extrusion, variables affecting extrusion, deformation pattern, equipment’s, port – hole extrusion die, hydrostatic extrusion, defects and remedies, simple analysis of extrusion ,tube extrusion and production of seamless pipe and tube. Drawing of road, wires and tubes.

UNIT V  SHEET METAL FORMING AND OTHER PROCESSES  9

TOTAL  = 45 PERIODS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Explain the stress-strain concepts of materials during plastic deformation.
2. Apply the theory of plasticity and its application for analyzing various metal forming Processes.
3. Apply the principle of forging and rolling for load calculation and its applications.
4. Apply the principle of extrusion and drawing for load calculations and its applications.
5. Explain the various sheet metal forming methods and its applications.
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ME5076 MARKETING MANAGEMENT L T P C 3 0 0 3

COURSE OBJECTIVES: The main learning objective of this course is to prepare the students for:
1. Understanding the basic concepts in marketing.
2. Appreciating the various buying behaviour methods.
3. Studying the various product pricing concepts.
4. Scrutinizing the various marketing planning principles and its strategies.
5. Relating the trends of advertising, sales promotion methods.

UNIT I CONCEPTS IN MARKETING

UNIT II BUYING BEHAVIOUR AND MARKET SEGMENTATION
Cultural, Demographic factors, Motives, Types, Buying Decisions, Segmentation factors, Demographic, Psycho graphic and Geographic Segmentation, Process, Patterns. Services marketing and Industrial marketing.

UNIT III PRODUCT, PRICE AND MARKETING RESEARCH

UNIT IV MARKETING PLANNING AND STRATEGY FORMULATION

UNIT V ADVERTISING, SALES PROMOTION AND DISTRIBUTION

TOTAL = 45 PERIODS
COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Explain the basic concepts in marketing.
2. Explain the various buying behaviour methods.
3. Analyze the various product pricing concepts.
4. Analyze the various marketing planning principles and its strategies.
5. Describe the trends of advertising, sales promotion methods.

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ME5015 GAS DYNAMICS AND SPACE PROPULSION

COURSE OBJECTIVES: The main learning objective of this course is to prepare the students for:
1. Understanding the compressible flow concepts and the use of gas tables.
2. Analyzing the compressible flow behavior in constant area ducts with friction and heat transfer.
3. Analyzing the formation of shock waves and its effect on flow parameters.
4. Understanding the working of different jet engines and their performance parameters.
5. Classifying types of rocket engines, propellants and their performance parameters.

UNIT I BASIC CONCEPTS AND ISENTROPIC FLOWS

UNIT II COMPRESSIBLE FLOW THROUGH DUCTS
Flows through constant area ducts with heat transfer (Rayleigh flow) and Friction (Fanno flow) – variation of flow properties. Choking. Isothermal flow with friction. Use of Gas tables.

UNIT III NORMAL AND OBLIQUE SHOCKS

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UNIT IV JET PROPULSION
Theory of jet propulsion – thrust equation – Performance parameters - thrust, power and efficiency. Operation, cycle analysis and performance of ram jet, turbojet, turbofan, turbo prop and pulse jet engines.

UNIT V SPACE PROPULSION

TOTAL = 45 PERIODS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Understand the compressible flow concepts and the use of gas tables.
2. Evaluate the compressible flow behavior in constant area ducts with friction and heat transfer.
3. Analyze the development of shock waves and its effects.
4. Understand types of jet engines and their performance parameters.
5. Classify types of rocket engines, propellants and their performance parameters.

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ME5016 SOLAR ENERGY TECHNOLOGY

COURSE OBJECTIVES: The main learning objective of this course is to prepare the students for:
1. Understanding the basics of solar radiation and types of solar collectors.
2. Outlining the working of solar thermal systems and their applications.
3. Inferring the fundamentals of solar PV systems and performance evaluation.
5. Understanding the basics of solar passive architecture and its performance.

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UNIT I  SOLAR RADIATION AND COLLECTORS
Solar angles – Sun path diagrams – Radiation - extraterrestrial characteristics - measurement and estimation on horizontal and tilted surfaces - flat plate collector thermal analysis - testing methods - evacuated tubular collectors - concentrator collectors – classification - design and performance parameters - tracking systems - compound parabolic concentrators - parabolic trough concentrators - concentrators with point focus - Heliostats – performance of the collectors

UNIT II  SOLAR THERMAL TECHNOLOGIES

UNIT III  SOLAR PV FUNDAMENTALS

UNIT IV  SPV SYSTEM DESIGN AND APPLICATIONS
Solar cell array system analysis and performance prediction- Shadow analysis: reliability - solar cell array design concepts - PV system design - design process and optimization - detailed array design - storage autonomy - voltage regulation - maximum tracking - centralized and decentralized SPV systems - standalone - hybrid and grid connected system - System installation - operation and maintenances - field experience - PV market analysis and economics of SPV systems

UNIT V  SOLAR PASSIVE ARCHITECTURE
Thermal comfort - bioclimatic classification – passive heating concepts: direct heat gain - indirect heat gain - isolated gain and sunspaces - passive cooling concepts: evaporative cooling - Radiative cooling- application of wind, water and earth for cooling; shading - paints and cavity walls for cooling – roof radiation traps - earth air-tunnel – energy efficient landscape design - thermal comfort

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Infer the basics of solar radiation and types of solar collectors
2. Examine the performance of various solar thermal systems and their applications
3. Compare the various solar PV cell materials and their conversion efficiencies
4. Estimate and analyse various Solar PV systems design and their economic analysis
5. Evaluate different solar passive building techniques and their performance.

TEXT BOOKS:

REFERENCES:
ME5080 PRECISION MANUFACTURING

COURSE OBJECTIVES: The main learning objective of this course are to:

1. Introduce the need and basic terminology of precision engineering.
2. Give an overview of the various commonly used precision machining techniques.
3. Explain the design aspects of machines used in precision manufacturing.
4. Give an understanding of the various errors involved in precision manufacturing.
5. Expose the science behind the commonly used techniques for measurements of precision components.

UNIT I PRECISION ENGINEERING
Introduction to Precision Engineering, Need for precision manufacturing, Taniguchi diagram, Four Classes of Achievable Machining Accuracy – Normal, Precision, High-precision, Ultra-precision Processes and Nanotechnology.

UNIT II PRECISION MACHINING

UNIT III MACHINE DESIGN FOR PRECISION MANUFACTURING

UNIT IV MECHANICAL AND THERMAL ERRORS
Sources of error, Principles of measurement, Errors due to machine elements, bearings, spindles, Kinematic design, Structural compliance. Vibration, Thermal errors – background, thermal effects, Environmental control of precision machinery. Error mapping and error budgets.

UNIT V MEASUREMENT AND CHARACTERISATION

TOTAL = 45 PERIODS

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

1. Explain the need, significance and progress of precision manufacturing and the different levels of manufacturing.
2. Explain the principle and working of different methods of precision machining.
3. Explain the special construction requirements of precision machine tools.
4. Explain the errors involved in precision machine tools and calculate the error budgets for a given situation.
5. Select a suitable measurement solution to measure and characterize precision machined features.

TEXT BOOKS:
1. Jain, V.K., Introduction to micromachining, Narosa publishers, 2018

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ME5078 MEMS AND MICROSYSTEMS

COURSE OBJECTIVES: The main learning objective of this course are:
1. To throw light on the fundamental concepts of MEMS.
2. To inculcate knowledge about micromanufacturing techniques
3. To provide expertise on Electrostatic and thermal based MEMS
4. To make students get acquainted with the piezo- resistive/electric and magnetic based MEMS.
5. To enlighten on Microfluidics and applications of MEMS.

UNIT I BASIC ENGINEERING FOR MEMS

UNIT II MICROMANUFACTURING TECHNIQUES
Photolithography, Ion Implantation, Diffusion, Oxidation, Chemical Vapour Deposition, Physical Vapour Deposition-Sputtering, Deposition by Epitaxy, Etching, Bulk Micromanufacturing, Micromachining Processes, LIGA Process, Microsystem Assembly and Testing.

UNIT III ELECTROSTATIC AND THERMAL BASED MEMS

UNIT IV PIEZO-RESISTIVE / ELECTRIC AND MAGNETIC BASED MEMS
Introduction to Piezoresistive & Piezoelectric effects, Piezoresistive & Piezoelectric materials, Stress Analysis of Mechanical Elements, Applications of Piezoresistive & Piezoelectric Sensors and

UNIT V MICROFLUIDICS AND APPLICATIONS OF MEMS
Microfluidics - Fluid Mechanics Concepts, Design and Fabrication of Channels, Valves, Pumps, Case Studies - Accelerometer, Gyros, RF MEMS and MOEMS.

TOTAL = 45 PERIODS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Select suitable material for MEMS and Microsystems, and explain the scaling laws involved in miniaturization.
2. Explain the various micro-manufacturing processes.
3. Apply the working principle of electrostatic and thermal based MEMS sensors and actuators in the design of MEMS devices.
4. Apply the working principle of piezo-resistive, piezo-electric and magnetic effect in the design of MEMS devices.
5. Design the elements of Micro-fluidic systems, and select suitable MEMS devices for Industrial applications.

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ME5017 MACHINE VISION L T P C 3 0 0 3

COURSE OBJECTIVES:
The main learning objectives of this course are:
1. To provide the concepts of Physics behind Digital Image Processing.
2. To give insight into the Methods of Image Acquisition.
3. To impart knowledge on different techniques involved in image Processing.
4. To provide competence on different image analysis techniques
5. To render exposure in Machine Vision Applications.

UNIT I INTRODUCTION

UNIT II IMAGE ACQUISITION 9

UNIT III IMAGE PROCESSING 9

UNIT IV IMAGE ANALYSIS 9

UNIT V MACHINE VISION APPLICATIONS 9

TOTAL = 45 PERIODS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Explain the concepts of Physics behind Digital Image Processing.
2. Illustrate the Methods of Image Acquisition.
3. Discuss various image processing techniques.
4. Discuss various image analysis techniques.
5. Implement Machine Vision in various Applications.

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COURSE OBJECTIVES: The main learning objective of this course is

1. To provide an insight to the fundamentals of linear programming problems.
2. To inculcate the methodology of formulation and solution to Transportation and assignment problems.
3. To enlighten the principles of the inventory management.
4. To outline the basics of the queuing theory, Simulation and its application.
5. To expose the essentials of project management and Replacement problems

UNIT I LINEAR PROGRAMMING PROBLEMS 9
OR-Definition - Phases - models, LP problem formulation – Graphical solution, GLPP, Standard and Canonical forms of LPP- simplex methods- Big M, Two phase methods, Alternate optimal solutions, Duality in LP.

UNIT II TRANSPORTATION 9
Transportation problems- Basic feasible solution, Optimal solution By MODI method, Balanced and Unbalanced TP, Degeneracy, Production problems. Assignment problems – Hungarian method Traveling salesman problems - Sequencing models- Johnson algorithm, n job 2 machines,n job 3 machines and n job m machines.

UNIT III INVENTORY CONTROL 9
Types of inventory- Inventory cost - EOQ - Deterministic inventory problems – Purchase and Production models with and without shortages-EOQ with price breaks - Stochastic inventory problems - Multi product problems - Systems of inventory control (P and Q Systems)-Determination of buffer stock and re-order levels -Selective inventory control techniques (ABC,VED, SDE, etc.)

UNIT IV QUEUING THEORY 9
Queuing system - Characteristics - symbols - Poisson process and exponential distribution –Single server queuing models - Multiserver queuing models, Simulation Monte Carlo technique- Inventory& Queuing problems.

UNIT V PROJECT MANAGEMENT AND REPLACEMENT MODELS 9
Project management: Network logic – Ford-Fulkerson's rule - AON diagram - CPM and PERT techniques, Critical path and float calculations Replacement models -types of failures – Gradual failures-replacement of items: Efficiency deteriorates with time, sudden failures- individual and group replacement policies.

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

1. Select the constraints on the availability of resources, develop a model and render an optimal solution during the given circumstances.
2. Appraise the challenges in the transportation and production problems and furnish a rational solution to maximize the benefits.
3. Plan the purchase/ manufacturing policies, manage the spares/ stocks and meet the customer demands..
4. Analyze the queue discipline and explore the avenues for better customer service.
5. Investigate the nature of the project/ failure and offer methodical assistance towards decision making.

TEXT BOOKS:

REFERENCES:

IE5077 SYSTEMS ENGINEERING

COURSE OBJECTIVES:
- Illustrate the life cycle phases and framework for systems engineering.
- Describe about systems engineering process.
- Apply ergonomic and system dynamic models for evaluation of alternatives.
- Create knowledge on Reliability, Markov and Time series models for analysis of alternatives.
- Describe about decision assessment methods in systems engineering.

UNIT I INTRODUCTION
Definitions of Systems Engineering, Systems Engineering Knowledge, Life cycles, Life-cycle phases, logical steps of systems engineering, Frame works for systems engineering.

UNIT II SYSTEMS ENGINEERING PROCESSES
Formulation of issues with a case study, Value system design, Functional analysis, Business Process Reengineering, Quality function deployment, System synthesis, Approaches for generation of alternatives.

UNIT III ANALYSIS OF ALTERNATIVES - I
Cross-impact analysis, Structural modeling tools, System Dynamics models with case studies, Economic models: present value analysis – NPV, Benefits and costs over time, ROI, IRR; Work and Cost breakdown structure.
UNIT IV 
ANALYSIS OF ALTERNATIVES – II 
Reliability, Availability, Maintainability, and Supportability models; Stochastic networks and Markov models, Queuing network optimization, Time series and Regression models, Evaluation of large scale models

UNIT V 
DECISION ASSESSMENT 
Decision assessment types, Five types of decision assessment efforts, Utility theory, Group decision making and Voting approaches, Social welfare function; Systems Engineering methods for Systems Engineering Management

TOTAL: 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will
CO1: Be able to recognize life cycle phases in systems engineering.
CO2: Apply steps in systems engineering process for large scale problems.
CO3: Able to develop system dynamic models for analyzing alternatives.
CO4: Gain ability to evaluate alternatives in large scale problems.
CO5: Be able Attain confidence in assessment and arrive decisions for complex problems.

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REFERENCES:

AD5091 CONSTITUTION OF INDIA

COURSE OBJECTIVES:
- Teach history and philosophy of Indian Constitution.
- Describe the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- Summarize powers and functions of Indian government.
- Explain emergency rule.
- Explain structure and functions of local administration.

UNIT I INTRODUCTION
History of Making of the Indian Constitution-Drafting Committee- (Composition & Working) - Philosophy of the Indian Constitution-Preamble-Salient Features

UNIT II CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES
COURSE OUTCOMES:
CO1: Able to understand history and philosophy of Indian Constitution.
CO2: Able to understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
CO3: Able to understand powers and functions of Indian government.
CO4: Able to understand emergency rule.
CO5: Able to understand structure and functions of local administration.

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TEXT BOOKS:
4. The Constitution of India (Bare Act), Government Publication, 1950
Values and self-development – Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non-moral valuation, Standards and principles, Value judgements

UNIT II IMPORTANCE OF VALUES
Importance of cultivation of values, Sense of duty, Devotion, Self-reliance, Confidence, Concentration, Truthfulness, Cleanliness. Honesty, Humanity, Power of faith, National Unity, Patriotism, Love for nature, Discipline

UNIT III INFLUENCE OF VALUE EDUCATION
Personality and Behaviour development - Soul and Scientific attitude. Positive Thinking, Integrity and discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger, Dignity of labour, Universal brotherhood and religious tolerance, True friendship Happiness Vs suffering, love for truth.

UNIT IV REINCARNATION THROUGH VALUE EDUCATION

UNIT V VALUE EDUCATION IN SOCIAL EMPOWERMENT
Equality, Non violence, Humility, Role of Women, All religions and same message, Mind your Mind, Self-control, Honesty, Studying effectively

TOTAL: 45 PERIODS

COURSE OUTCOMES:
CO1 Gain knowledge of self-development
CO2 Learn the importance of Human values
CO3 Develop the overall personality through value education
CO4 Overcome the self destructive habits with value education
CO5 Interpret social empowerment with value education

REFERENCES:

AD5093 PEDAGOGY STUDIES

COURSE OBJECTIVES:
- Understand the methodology of pedagogy.
- Compare pedagogical practices used by teachers in formal and informal classrooms in developing countries.
- Infer how can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.
- Illustrate the factors necessary for professional development.
- Identify the Research gaps in pedagogy.

UNIT I INTRODUCTION AND METHODOLOGY:
Aims and rationale, Policy background, Conceptual framework and terminology - Theories of learning, Curriculum, Teacher education - Conceptual framework, Research questions - Overview of methodology and Searching.

UNIT II  THEMATIC OVERVIEW  9
Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries - Curriculum, Teacher education.

UNIT III  EVIDENCE ON THE EFFECTIVENESS OF PEDAGOGICAL PRACTICES  9
Methodology for the in depth stage: quality assessment of included studies - How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? - Theory of change - Strength and nature of the body of evidence for effective pedagogical practices - Pedagogic theory and pedagogical approaches - Teachers’ attitudes and beliefs and Pedagogic strategies.

UNIT IV  PROFESSIONAL DEVELOPMENT  9
Professional development: alignment with classroom practices and follow up support - Peer support - Support from the head teacher and the community - Curriculum and assessment - Barriers to learning: limited resources and large class sizes

UNIT V  RESEARCH GAPS AND FUTURE DIRECTIONS  9
Research design – Contexts – Pedagogy - Teacher education - Curriculum and assessment - Dissemination and research impact.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

- Understand the methodology of pedagogy.
- Understand Pedagogical practices used by teachers in formal and informal classrooms in developing countries.
- Find how can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.
- Know the factors necessary for professional development.
- Identify the Research gaps in pedagogy.

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COURSE OBJECTIVES:
- Develop healthy mind in a healthy body thus improving social health also improve efficiency
- Invent Do’s and Don’t’s in life through Yam
- Categorize Do’s and Don’t’s in life through Niyam
- Develop a healthy mind and body through Yog Asans
- Invent breathing techniques through Pranayam

UNIT I INTRODUCTION TO YOGA
Definitions of Eight parts of yoga. (Ashtanga)

UNIT II YAM
Do`s and Don’t`s in life.
Shaucha, santosh, tapa, swadhyay, iswarpranidhan

UNIT III NIYAM
Do’s and Don’t’s in life.
Ahinsa, satya, astheya, bramhacharya and aparigraha

UNIT IV ASAN
Various yoga poses and their benefits for mind & body

UNIT V PRANAYAM
Regularization of breathing techniques and its effects-Types of pranayam

TOTAL: 45 PERIODS

COURSE OUTCOMES:
CO1 – Develop healthy mind in a healthy body thus improving social health also improve efficiency
CO2 – Learn Do’s and Don’t’s in life through Yam
CO3 – Learn Do’s and Don’t’s in life through Niyam
CO4 – Develop a healthy mind and body through Yog Asans
CO5 – Learn breathing techniques through Pranayam

REFERENCES:
1. “Rajayoga or conquering the Internal Nature” by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata
2. ‘Yogic Asanas for Group Training-Part-I”: Janardan Swami Yogabhyasi Mandal, Nagpur

AD5095 PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

COURSE OBJECTIVES:
- Develop basic personality skills holistically
- Develop deep personality skills holistically to achieve happy goals
- Rewrite the responsibilities
- Reframe a person with stable mind, pleasing personality and determination
• Discover wisdom in students

UNIT I  NEETISATAKAM-HOLISTIC DEVELOPMENT OF PERSONALITY - I  9
Verses- 19,20,21,22 (wisdom) - Verses- 29,31,32 (pride & heroism) – Verses- 26,28,63,65 (virtue)

UNIT II  NEETISATAKAM-HOLISTIC DEVELOPMENT OF PERSONALITY - II  9
Verses- 52,53,59 (don'ts) - Verses- 71,73,75,78 (do's)

UNIT III  APPROACH TO DAY TO DAY WORK AND DUTIES  9
Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48 - Chapter 3-Verses 13, 21, 27, 35 Chapter 6-
Verses 5,13,17,23, 35 - Chapter 18-Verses 45, 46, 48

UNIT IV  STATEMENTS OF BASIC KNOWLEDGE – I  9
Statements of basic knowledge - Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 Chapter 12 -
Verses 13, 14, 15, 16,17, 18

UNIT V  PERSONALITY OF ROLE MODEL - SHRIMAD BHAGWADGEETA  9
Chapter2-Verses 17, Chapter 3-Verses 36,37,42 - Chapter 4-Verses 18, 38,39 Chapter18 – Verses
37,38,63

TOTAL: 45 PERIODS

COURSE OUTCOMES:
CO1: To develop basic personality skills holistically
CO2: To develop deep personality skills holistically to achieve happy goals
CO3: To rewrite the responsibilities
CO4: To reframe a person with stable mind, pleasing personality and determination
CO5: To awaken wisdom in students

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REFERENCES:
1. Gopinath,Rashtriya Sanskrit Sansthanam P, Bhartrihari’s ThreeSatakam , Niti-sringar-vairagya,
   New Delhi,2010
2. Swami Swarupananda , Srimad Bhagavad Gita, Advaita Ashram,Publication Department,
   Kolkata,2016

AD5097  ESSENCE OF INDIAN KNOWLEDGE TRADITION  L T P C
3  0  0  0

COURSE OBJECTIVES
The course will introduce the students to
• get a knowledge about Indian Culture
• Know Indian Languages and Literature religion and philosophy and the fine arts in India
• Explore the Science and Scientists of Ancient, Medieval and Modern India
• Understand education systems in India

UNIT I  INTRODUCTION TO CULTURE  9
Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in
human literature, Indian Culture, Ancient India, Medieval India, Modern India.
UNIT II INDIAN LANGUAGES AND LITERATURE
Indian Languages and Literature – I: Languages and Literature of South India, – Indian Languages and Literature – II: Northern Indian Languages & Literature

UNIT III RELIGION AND PHILOSOPHY
Major religions practiced in India and Understanding their Philosophy – religious movements in Modern India (Selected movements only)

UNIT IV FINE ARTS IN INDIA (ART, TECHNOLOGY & ENGINEERING)
Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India

UNIT V EDUCATION SYSTEM IN INDIA
Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

TOTAL: 45 PERIODS

COURSE OUTCOMES
After successful completion of the course the students will be able to

- Understand philosophy of Indian culture.
- Distinguish the Indian languages and literature.
- Learn the philosophy of ancient, medieval and modern India.
- Acquire the information about the fine arts in India.
- Know the contribution of scientists of different eras.
- Understand education systems in India

REFERENCES:
5. Satya Prakash, “Founders of Sciences in Ancient India”, Vijay Kumar Publisher, 1989

AD5098 SANGA TAMIL LITERATURE APPRECIATION L T P C
3 0 0 0

COURSE OBJECTIVES:
The main learning objective of this course is to make the students an appreciation for:
1. Introduction to Sanga Tamil Literature.
2. ‘Agathina’ and ‘Purathina’ in Sanga Tamil Literature.
3. ‘Attruppadai’ in Sanga Tamil Literature.
4. ‘Puranaanuru’ in Sanga Tamil Literature.
5. ‘Pathitrupaththu’ in Sanga Tamil Literature.

UNIT I SANGA TAMIL LITERATURE AN INTRODUCTION
Introduction to Tamil Sangam – History of Tamil Three Sangams – Introduction to Tamil Sangam Literature – Special Branches in Tamil Sangam Literature - Tamil Sangam Literature’s Grammar - Tamil Sangam Literature’s parables.
UNIT II ‘AGATHINAI’ AND ‘PURATHINAI’

UNIT III ‘ATTRUPPADAI’.

UNIT IV ‘PURANAANURU’
Puranaanuru on Good Administration, Ruler and Subjects – Emotion & its Effect in Puranaanuru.

UNIT V ‘PATHITRUPATHTHU’
Pathitrupaththu in ‘Ettuthogai’ – Pathitrupaththu’s Parables – Tamil dynasty: Valor, Administration, Charity in Pathitrupaththu - Message to Society from Pathitrupaththu.

TOTAL (L: 45) = 45 PERIODS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:
1. Appreciate and apply the messages in Sanga Tamil Literature in their life.
2. Differentiate ‘Agathinai’ and ‘Purathinai’ in their personal and societal life.
3. Appreciate and apply the messages in ‘Attruppadai’ in their personal and societal life.
4. Appreciate and apply the messages in ‘Puranaanuru’ in their personal and societal life.
5. Appreciate and apply the messages in ‘Pathitrupaththu’ in their personal and societal life.

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HSMC– ELECTIVES – HUMANITIES I (ODD SEMESTER)

HU5171 LANGUAGE AND COMMUNICATION LT P C 3 0 0 3

COURSE DESCRIPTION
This course offers an introduction to language and communication. The primary goal of this course is to familiarize students with key ideas related to communication using language as well as non verbal means. Ideas related to the use of language and the underlying power structures are also examined. The course also examines the role of media in communication and in the dissemination of ideas as well as opinions.

Objectives
✓ To familiarize students with the concept of communication using linguistic and non linguistic resources.
✓ To help students ask critical questions regarding facts and opinions.
✓ To provide students with the material to discuss issues such as language and power structures.
✓ To help students think critically about false propaganda and fake news.

Learning Outcomes
➢ Students will be able to use linguistic and non linguistic resources of language in an integrated manner for communication.
➢ Students will be able to analyse communication in terms of facts and opinions.
➢ Students will be able to discuss, analyse and argue about issues related to language and power.

UNIT I LINGUISTIC AND NON-LINGUISTIC RESOURCE OF COMMUNICATION: 9
a) Writing and Speech
b) Distinction between language structure and language use, form and function, acceptability and grammaticality
c) Gestures and Body language, pictures and symbols, cultural appropriacy
d) Communicative Competency, context and situation, combination of linguistic and non-linguistic elements of communication

UNIT II STRUCTURE OF WRITING/CONVERSATION: 9
a) Language skills and the communication cycle; speaking and listening, writing and reading
b) Initiating and closing conversations, intervention, turn taking
c) Writing for target reader, rhetorical devices and strategies
d) Coherence and Cohesion in speech and writing

UNIT III POWER STRUCTURE AND LANGUAGE USE: 9
a) Gender and language use
b) Politeness expressions and their use
c) Ethical dimensions of language use
d) Language rights as part of human rights

UNIT IV MEDIA COMMUNICATION: 9
a) Print media, electronic media, social media  
b) Power of media  
c) Manufacturing of opinion, fake news and hidden agendas

UNIT V  PERSUASIVE COMMUNICATION AND MISCOMMUNICATION:  
a) Fundamentals of persuasive communication  
b) Persuasive strategies  
c) Communication barriers  

TOTAL : 45 PERIODS

TEXT BOOKS:  

HU5172  VALUES AND ETHICS  
L T P C  
3 0 0 3

OBJECTIVES:  
- Teach definition and classification of values.  
- Explain Purusartha.  
- Describe Sarvodaya idea.  
- Summarize sustenance of life.  
- Conclude views of hierarchy of values.

UNIT I  DEFINITION AND CLASSIFICATION OF VALUES  
Extrinsic values- Universal and Situational values- Physical- Environmental-Sensuous- Economic-Social-Aesthetic-Moral and Religious values

UNIT II  CONCEPTS RELATED TO VALUES  
Purusartha-Virtue- Right- duty- justice- Equality- Love and Good

UNIT III  IDEOLOGY OF SARVODAYA  
Egoism- Altruism and universalism- The Ideal of Sarvodaya and Vasudhaiva Kutumbakam

UNIT IV  SUSTENANCE OF LIFE  
The Problem of Sustenance of value in the process of Social, Political and Technological Changes

UNIT V  VIEWS ON HIERARCHY OF VALUES  
The Problem of hierarchy of values and their choice, The views of Pt. Madan Mohan Malviya and Mahatma Gandhi

TOTAL: 45 PERIODS

OUTCOMES:  
CO1: Able to understand definition and classification of values.  
CO2: Able to understand purusartha.  
CO3: Able to understand sarvodaya idea.  
CO4: Able to understand sustenance of life.  
CO5: Able to understand views of hierarchy of values.
TEXT BOOKS:
2. Little, William: An Introduction of Ethics (Allied Publisher, Indian Reprint 1955)

HU5173  HUMAN RELATIONS AT WORK  L T P C
3  0  0  3

OBJECTIVES:
- Illustrate human relations at work and its relationship with self.
- Explain the importance of interacting with people at work to develop teamwork.
- Infer the importance of physical health in maintaining human relations at work.
- Describe the importance of staying psychologically healthy.
- Identify the essential qualities for progressing in career.

UNIT I  UNDERSTANDING AND MANAGING YOURSELF  9
Human Relations and You: Self-Esteem and Self-Confidence; Self-Motivation and Goal Setting; Emotional Intelligence, Attitudes, and Happiness; Values and Ethics and Problem Solving and Creativity.

UNIT II  DEALING EFFECTIVELY WITH PEOPLE  9
Communication in the Workplace; Specialized Tactics for Getting Along with Others in the Workplace; Managing Conflict; Becoming an Effective Leader; Motivating Others and Developing Teamwork; Diversity and Cross-Cultural Competence.

UNIT III  STAYING PHYSICALLY HEALTHY  9
Yoga, Pranayam and Exercise: Aerobic and anaerobic.

UNIT IV  STAYING PSYCHOLOGICALLY HEALTHY  9
Managing Stress and Personal Problems, Meditation.

UNIT V  DEVELOPING CAREER THrust  9

TOTAL: 45 PERIODS

OUTCOMES:
Students will be able to
C01: Understand the importance of self-management.
C02: Know how to deal with people to develop teamwork.
C03: Know the importance of staying healthy.
C04: Know how to manage stress and personal problems.
C05: Develop the personal qualities essential for career growth.
TEXT BOOK:

REFERENCES:

HU5174 PSYCHOLOGICAL PROCESSES L T P C
3 0 0 3

COURSE DESCRIPTION
Psychological Processes course is designed for students to be aware of the basic principles of psychology for the better understanding of people’s psyche and behaviour around them. This course enables learners to use the optimal use of different forms of thinking skills and thereby results in effective communication in diverse situations. Every unit of the syllabus highlights the psychological process of people, the most powerful and constructive use of perceptions.

OBJECTIVES
The major objectives of this course is
- To develop students’ awareness on psychology, learning behavior and usage of perception effectively.
- To learn to use the various kinds of thinking in a formal context.
- To critically evaluate content and comprehend the message on the bases of perception, personality and intelligence.

UNIT I INTRODUCTION

UNIT II SENSORY & PERCEPTUAL PROCESSES
Some general properties of Senses: Visual system – the eye, colour vision – Auditory system – Hearing, listening, Sounds - Other senses - Selective attention; physiological correlates of attention; Internal influences on perception learning – set - motivation & emotion - cognitive styles; External influences on perception figure and ground separation – movement – organization – illusion; Internal- external interactions: Constancy - Depth Perception- Binocular & Monocular Perception; Perceptual defense & Perceptual vigilance; Sensory deprivation -Sensory bombardment; ESP - Social Perception.

UNIT III COGNITION & AFFECT

UNIT IV THINKING, PROBLEM-SOLVING & DECISION MAKING

UNIT V PERSONALITY & INTELLIGENCE
Psychological phenomena & Attributes of humans - cognition, motivation, and behavior - thoughts, feelings, perceptions, and actions – personality dimensions, traits, patterns - Specialized knowledge, performance accomplishments, automaticity or ease of functioning, skilled performance under challenge - generative flexibility, and speed of learning or behavior change.

REFERENCES

HU5175 EDUCATION, TECHNOLOGY AND SOCIETY L T P C
3 0 0 3

COURSE DESCRIPTION
This course introduces students to multidisciplinary studies in Education, Technology and Society. Students will get an understanding of the relationship between education, technology and society. They will also learn about the long lasting impact of good education in a technologically advanced society.

COURSE OBJECTIVES:
The course aims
- To help learners understand the basics of different types of technology utilised in the field of education
- To make them realize the impact of education in society
- To make them evolve as responsible citizens in a technologically advanced society

LEARNING OUTCOMES
By the end of the course, learners will be able to
- Understand the various apps of technology apps and use them to access, generate and present information effectively.
- Apply technology based resources and other media formats equitably, ethically and legally.
- Integrate their technical education for betterment of society as well as their personal life.

UNIT I INDIAN EDUCATION SYSTEM
Gurukul to ICT education – Teacher as facilitator – Macaulay’s Minutes – English medium vs Regional medium – Importance of Education in Modern India - Challenges in Education

UNIT II LEARNING THEORIES

UNIT III TECHNOLOGICAL ADVANCEMENTS
Web tools – Social media in education – elearning – MOOCs – Mobile assisted learning – Learning Apps – Blended learning - Self-directed learning

UNIT IV EDUCATIONAL TECHNOLOGY
Technological implications on Education – Teaching, Learning & Testing with Technology - Advantages and drawbacks – Critical analysis on the use of technology
UNIT V ETHICAL IMPLICATIONS
Plagiarism – Online Copyright issues – Ethical and value implications of education and technology on individual and society.

TOTAL:45 PERIODS

TEACHING METHODS
Teaching modes include guest lectures, discussion groups, presentations, visual media, and a practicum style of learning.

EVALUATION
As this is a course is not a content based course, it focuses more on the ethical use of technology in education and society, and so, evaluation can be based on assignments and discussions. So there is no need for an end semester examination. Internals marks can be taken for the total marks.

INTERNAL (100 % WEIGHTAGE)
(a) Written Test (40 marks)
(b) Assignment: Write a real time report of the technology use in any school / college (15 marks)
(c) Presentation: Students choose any one of the technological tools and present its relevance to education and society (15 marks)
(d) Group discussion: Students discuss in groups on case studies relating to various challenges in education and technology use in society (20 marks)
(e) Blog entry: Making weekly blog posts in Class Blog on the topics related to the course posted by the instructor and commenting on others’ posts. (10 marks)

REFERENCES
1) Education and Social order by Bertrand Russel
2) Theories of learning by Bower and Hilgard
3) Technology and Society by Jan L Harrington

HU5176 PHILOSOPHY

OBJECTIVES
- To create a new understanding by teaching philosophy through a comparison of Indian and Western traditions.
- To Fosters critical thinking and imagination by dealing with inter-related concepts in literature and science.
- To bridge the gap between the sciences and humanities through introspective analyses.
- To nurture an understanding of the self and elucidates ways to progress towards a higher understanding of one’s self and others.

UNIT I KNOWLEDGE

UNIT II ORIGIN
Origin of Universe And Creation – ‘Nasidiya Sukta’ in Relation With Big Bang Theory. Greek Concept of Chaos. The Concept of Space – Space as the Final Goal – Udgitha. Relationship
UNIT III  WORD

UNIT IV  KNOWLEDGE AS POWER/OPPRESSION

UNIT V  SELF KNOWLEDGE/BRAHMAN

TOTAL : 45 PERIODS

OUTCOMES:
On completion of the course, the students will be able to:
1. Think sceptically, ask questions and to arrive at deductions.
2. Connect and relate different branches of thought.
3. Comprehends the relation between language, thought and action.
4. Arrive at a better understanding of self and others and forms a new outlook.

REFERENCES:
7. Bacon, Francis: Power as Knowledge

HU5177 APPLICATIONS OF PSYCHOLOGY IN EVERYDAY LIFE

UNIT I  INTRODUCTION
Nature and fields.

UNIT II  PSYCHOLOGY IN INDUSTRIES AND ORGANIZATIONS
Job analysis; fatigue and accidents; consumer behavior.

UNIT III  PSYCHOLOGY AND MENTAL HEALTH
Abnormality, symptoms and causes psychological disorders

UNIT IV  PSYCHOLOGY AND COUNSELING
Need of Counseling, Counselor and the Counseele, Counseling Process, Areas of Counseling.
UNIT V  PSYCHOLOGY AND SOCIAL BEHAVIOUR

Group, group dynamics, teambuilding, Prejudice and stereotypes; Effective Communication, conflict and negotiation.

TOTAL: 45 PERIODS

TEXTBOOKS
HSMC – ELECTIVES – HUMANITIES II (EVEN SEMESTER)

HU5271 GENDER, CULTURE AND DEVELOPMENT L T P C 3 0 0 3

COURSE DESCRIPTION
This course offers an introduction to Gender Studies that asks critical questions about the meanings of sex and gender in Indian society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary drawing from Indian literature and media studies, to examine cultural assumptions about sex, gender, and sexuality. This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with class, caste and other social identities. This course also seeks to build an understanding of the concepts of gender, gender-based violence, sexuality, and rights and their impact on development through a number of discussions, exercises and reflective activities.

Objectives
✓ To familiarize students with the concepts of sex and gender through literary and media texts.
✓ To help students ask critical questions regarding gender roles in society.
✓ To provide students with the material to discuss gender issues such as gender based discrimination, violence and development.
✓ To help students think critically about gender based problems and solutions.

Learning Outcomes
➢ Students will be able to critically read literary and media texts and understand the underlying gender perspectives in them.
➢ Students will be able to analyse current social events in the light of gender perspectives.
➢ Students will be able to discuss, analyse and argue about issues related to gender and their impact on society, culture and development.

UNIT I: Introduction to Gender
• Definition of Gender
• Basic Gender Concepts and Terminology
• Exploring Attitudes towards Gender
• Social Construction of Gender

Texts:
1. Sukhu and Dukhu (Amar Chitra Katha)
2. The Cat who Became a Queen (Folk tale, J. Hinton Knowles, Folk-Tales of Kashmir. London: Kegan Paul, Trench, Trübner, and Company, 1893, pp. 8-10.)

UNIT II: Gender Roles and Relations
• Types of Gender Roles
• Gender Roles and Relationships Matrix
• Gender-based Division and Valuation of Labour

Texts:
1. Muniyakka (Short Story, Lakshmi Kannan, Nandanvan and Other Stories, Hyderabad: Orient Blackswan, 2011)

UNIT III: Gender Development Issues
• Identifying Gender Issues
• Gender Sensitive Language
• Gender, Governance and Sustainable Development
• Gender and Human Rights
• Gender and Mainstreaming
UNIT IV: Gender-based Violence
- The concept of violence
- Types of Gender-based violence
- The relationship between gender, development and violence
- Gender-based violence from a human rights perspective

Texts:
1. Lights Out (Play, Manjula Padmanabhan)
2. Lights Out (Video of play enacted)

UNIT V: Gender and Culture
- Gender and Film
- Gender, Media and Advertisement

Texts:
1. Mahanagar (Movie: Satyajit Ray)
2. Beti Bachao Beti Padhao Advertisements

READINGS: Relevant additional texts for readings will be announced in the class. Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments.

ASSESSMENT AND GRADING:
Discussion & Classroom Participation: 20%
Project/Assignment: 30%
End Term Exam: 50%

HU5272 ETHICS AND HOLISTIC LIFE

OBJECTIVES:
- To emphasize the meaning and nature of ethics, human values and holistic life for leading a good, successful and happy life through continuous examination of thoughts and conduct in day to day life.
- To understand the status and responsible role of individual in abatement of value crisis in contemporary world in order to develop a civilized and human society. Understanding the process of ethical decision making through critical assessment of incidents/cases of ethical dilemmas in personal, professional and social life.
- To view the place of Ethics and Human Values in the development of individual and society through identification and cross examination of life values and world view of his/her role models in society.

UNIT I  HUMAN LIFE, ITS AIM AND SIGNIFICANCE
The concept of a successful life, happy life and a meaningful life, Ethical and decision making capability and its development: Meaning of Ethical dilemma, sharing real life experiences.

UNIT II  CREATIVE AND LEADERSHIP ABILITY AND THEIR DEVELOPMENT
Intellectual, Emotional, Creative, Ethico - spiritual development, Aesthetic sense, Self-dependency, Activeness, Development of positive attitude.

UNIT III  HARMONY IN PERSONAL AND SOCIAL LIFE:
Concept of personal and group Ethics; Balance between - rights and duties-welfare of self and welfare of all, Creating a value based work culture in hostel, classroom and other places in the campus and society.
UNIT IV  CHARACTER, RIGHTEOUSNESS AND VIRTUES FOR A MEANINGFUL LIFE
Egolessness, Humility, Righteousness, Purity, Truthfulness, Integrity, Self-restraint, Self-control, Sense of responsibility, Empathy, Love, Compassion, Maitri / Comradeship, Cooperation, Tolerance.

UNIT V  DILEMMA BETWEEN MATERIALISTIC DEVELOPMENT AND HUMAN WELFARE

TOTAL: 45 PERIODS

OUTCOMES:
On completion of the course, the students will be able to:
1. Enable students to understand the concept of contemporary ethics at different levels: Individual, local and Global and enable them to cross examine the ethical and social consequences of the decisions of their life-view and world view.
2. Develop the ability of students to create a balance between their individual freedom and social responsibilities and enable them to identify the personal, professional and social values and integrate them in their personality after cross examination.
3. Enable students to cross examine their earlier decisions taken in life and understand the meaning of ethical dilemma to overcome the ethical dilemmas and engage in critical reflection.
4. Develop positive habits of thought and conduct and work cohesively with fellow beings who have variety of strengths, experiences, shortcomings and challenges, hence to enable them to handle diverse type of personalities.
5. Enable students to develop a method for making ethically sound decisions for themselves, within hostels, classrooms, university campus and society.

HU5273  LAW AND ENGINEERING  L T P C
3 0 0 3

UNIT I  THE LEGAL SYSTEM: SOURCES OF LAW AND THE COURT STRUCTURE
Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law- Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers. (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court) Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration.

UNIT II  LAWS
Basic principles of contract law, sale of goods law, laws relating to industrial pollution, accident, environmental protection, health and safety at work, patent law, constitutional law: the supreme law of the land, Information technology law and cyber crimes.

UNIT III  BUSINESS ORGANISATIONS
Sole traders (Business has no separate identity from you, all business property belongs to you). Partnerships: Types of Partnerships - Limited Liability Partnership, General Partnership, Limited Partnerships. Companies: The nature of companies, Classification of companies, Formation of companies, Features of a public company, Carrying on business, Directors– Their Powers and Responsibilities/Liabilities.

UNIT IV  LAW AND SOCIETY
Interdisciplinary nature of law, legal ideologies/philosophy/ schools of jurisprudence.

UNIT V  CASE STUDIES
Important legal disputes and judicial litigations

TOTAL: 45 PERIODS
COURSE DESCRIPTION
This is an intensive course designed to promote comprehensive understanding and insights into the nature of cinema and other related forms and practices. Movies, though at times are used more as escapism, they are also a true art form and expressive tool used by writers, directors and actors. This course will explore the aesthetics of cinema, the concepts behind storytelling and various other elements of a film. It will also explore the impact of movies in our society and in our lives. It also encourages students to use films as a medium to analyse visual texts and read underlying messages.

OBJECTIVES:
- To help learners understand the various movie genres and its types.
- To understand various elements that contributes to film making.
- To make them realize the impact of film in society.
- To analyse the visual media and interpret the underlying messages.

UNIT I            THE COMPONENTS OF FILMS  9

UNIT II            EVOLUTION OF FILM  9

UNIT III            FILMS ACROSS THE WORLD  9

UNIT IV            INDIAN FILMS  9

UNIT V            INTERPRETING FILMS  9
Film Criticism & Appreciation – Censorship in Movies – Cultural Representation in Movies – Television – New Media & Online Media – Films Beyond Entertainment.

TOTAL: 45 PERIODS

OUTCOMES
On completion of the course, the students will be able to:
- Recognize types of films, their impact on society and their roles in our lives.
- Have an understanding of the concepts of storytelling, Mise en Scene, and other elements of film making.
- Interpret the underlying messages in the movies.

Teaching Methods
- Each unit consists of reading materials, learning activities videos, websites. Students are expected to watch movies sometimes in class and at times at home and discuss in class.

Evaluation
- As this is course is critical appreciation course on films, there is no written end semester examination. The course is more on learning how to critically analyse a movie and appreciate its finer elements. Therefore evaluation can be based on assignments and discussions. Internals marks can be taken for the total marks.

Internal (100 % weightage)
- Assignment 1: Write a movie review with critical analysis (20 marks).
- Assignment 2 : Write a script for a scene taken from a short story / novella (20 marks).
- Presentation: Students choose any one topic related to films and present it to the audience. (25 marks)
• Group discussion: Students discuss in groups on the various aspects of movies and its impact on society. (25 marks)
• Blog entry: Making weekly blog posts in Class Blog on the topics related to the course posted by the instructor and commenting on others’ posts. (10 marks)

REFERENCES
1. A Biographical Dictionary of Film by David Thomson, Secker & Warburg, 1975
2. Signs and Meaning in the Cinema by Peter Wollen, Secker & Warburg, 1969
3. The World Viewed by Stanley Cavell 1971
4. Film Style and Technology: History and Analysis by Barry Salt, Starword, 1983

HU5275 FUNDAMENTALS OF LANGUAGE AND LINGUISTICS L T P C
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OBJECTIVES
• To broadly introduce students to the formal and theoretical aspects of linguistics.
• To enable learners to understand the various practical applications of language and recent findings in the field of applied linguistics.

CONTENTS:
UNIT I LANGUAGE AND LINGUISTICS: AN OVERVIEW 9

UNIT II MORPHOLOGY- WORDS OF LANGUAGE 9

UNIT III SYNTAX- THE SENTENCE PATTERNS OF LANGUAGE AND SEMANTICS-THE MEANING OF LANGUAGE 9
-Pragmatics– Speech Acts

UNIT IV PHONETICS – THE SOUNDS OF LANGUAGE 9

UNIT V APPLIED LINGUISTICS - THE PRACTICAL APPLICATIONS OF LANGUAGE 9
Language learning and teaching (ELT)- lexicography-translation studies-computational linguistics-neurolinguistics (speech pathology and language disorders)- forensic linguistics – sociolinguistics.

TOTAL : 45 PERIODS

Teaching Methods :
Lectures, discussion.

Evaluation Internal and External:
Internal: 2 written tests + assignments, seminars, project (50+15+15+20).
External: A 3 hour written exam (50 marks)

REFERENCES :
OBJECTIVES
- To internalize the importance of language by understanding its role in the transformation of man.
- To look at language, literature and culture as locus of identity and change.
- To extract meaning from existing literatures and cultures.
- To identify meanings in modern life by reconnecting with lost cultures.

UNIT I INTRODUCTION
Why study literature? Tracing the origin – pictures. Tokens as precursors of writing. Movement from three dimensions to two dimensions- Pictography. From visual to oral -Logography. Reading out literature to young children- Edmund J Farrell.

UNIT II READING CULTURE
Reading culture through language, signs and consumables- Roland Barthes. Culture through poems- Nissim Ezekiel's 'The night of the Scorpion'. 'Nothing’s Changed'- Tatamkhulu Afrika- Apartheid. Ruskin Bond- ‘Night train at Deoli’- How real life is different from movies.

UNIT III IDENTIFYING MEANING
Searching and locating meaning through literature. Looking for order in a chaotic world. The Myth of Sisyphus (Albert Camus) and Adi Shankar’s ‘Jagat Mithya’- the world as an illusion. The Indian version as ‘meaningless meaning’.

UNIT IV POST MODERNISM
‘If on a winter’s night a traveler’- Italo Calvino. The book about the reader- the experience of reading as reading. Metafiction. Selfie Culture. Visual Culture as purpose of modern life.

UNIT V RETURNING TO PICTURES

Reading list
1. Bond, Ruskin: ‘Night train at Deoli’
2. Ezekiel, Nissim: ‘The Night of the Scorpion’
3. Afrika,Tatamkhulu: ‘Nothing’s Changed’
4. Barthes, Roland: Mythologies
5. Shankarakcharya: Viveka Chudamani
6. Camus, Albert- The Myth of Sisyphus
7. Calvino, Italo: If on a winter’s night a traveler

OUTCOMES
- Can identify the connections among language, literature and culture.
- Is able to relate between seemingly different aspects of life.
- Understands the fractions in modern life and can assimilate meanings.