ANNA UNIVERSITY OF TECHNOLOGY MADURAI
MADURAI-625002

CURRICULUM AND SYLLABI

UNDER REGULATION 2010 FOR ALL AFFILIATED INSTITUTIONS

(Common to all B.E / B.Tech Degree Programme except B.E. – Marine Engineering)

SEMESTER I

(To be followed from the Academic year 2010 – 2011 onwards)

<table>
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<tr>
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PRACTICAL

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TOTAL    18  5  9  26
### B.E. – MARINE ENGINEERING

#### SEMESTER I

(To be followed from the Academic year 2010 – 2011 onwards)

<table>
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<tr>
<th>SUBJECT CODE</th>
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(Common to all B.E / B.Tech Degree Programme  
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**SEMESTER II**

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*Common to all BE/ B.Tech Programmes*
# B.E. MARINE ENGINEERING
## SEMESTER – II

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* The Syllabus is common as of other B.E / B.Tech Programmes.

** This course and syllabi are prescribed as per the directions of the Director General of Shipping, Govt. of India
LIST OF BRANCHES UNDER VARIOUS FACULTIES

NON-CIRCUIT BRANCHES

I  Faculty of Civil Engineering
   1. B.E. Civil Engineering

II  Faculty of Mechanical Engineering
   1. B.E. Aeronautical Engineering
   2. B.E. Automobile Engineering
   3. B.E. Mechanical Engineering
   4. B.E. Production Engineering
   5. B.E. Mechatronics Engineering
   6. B.E. Marine Engineering

III  Faculty of Technology
   1. B.Tech. Chemical Engineering
   2. B.Tech. Biotechnology
   3. B.Tech. Textile Technology
   4. B.Tech. Textile Technology (Fashion Technology)

CIRCUIT BRANCHES

I  Faculty of Electrical Engineering
   1. B.E. Electrical and Electronics Engineering
   2. B.E. Electronics and Instrumentation Engineering
   3. B.E. Instrumentation and Control Engineering

II  Faculty of Information and Communication Engineering
   1. B.E. Computer Science and Engineering
   2. B.E. Electronics and Communication Engineering
   3. B.Tech. Information Technology
   4. B.E. Bio Medical Engineering
   5. B.E. Medical Electronics
UNIT I
LANGUAGE FOCUS
General and Technical Vocabulary - changing from one form to another – Nouns – Compound nouns – Adjectives - Comparative adjectives – Adverbs – Prefix Suffix – Tenses (simple present – present continuous) – British and American Vocabulary

UNIT II
LANGUAGE FOCUS
Subject – Verb agreement – Past / Past Perfect / Past continuous – Future Tense – Perfect Tenses – Active passive – Impersonal passive – Active-Passive voice - Gerund and infinitives, cause and effect, purpose and function – ‘If’ conditionals – Error correction – Linking devices (comparison, contrast, additive and sequential relation)

UNIT III
READING
Skimming – Scanning for specific information – Inference – Context based meaning – Statistical interpretation – Graphic forms bar charts / flow charts – Tabular Column

UNIT IV
WRITING

UNIT V (Not for Examination)
SPEAKING AND LISTENING
1. Listening and Understanding British and American accent
2. Listening to news – Understand and Present(Problems) Critical analysis – Implications
3. Speaking
   a) Self Introduction
   b) Presenting arguments
   c) Commenting on any issue
   d) Persuasive speaking
   e) Presenting a common problem and suggesting a solution
   f) Presenting a particular problem to the higher officials and suggesting suitable solutions
   g) asking for solution
   h) asking for clarification
TEXT BOOKS:

1. Dept. of Humanities and Social Sciences Anna University, Chennai:
   English For Engineers and Technologists (Vol I & II combined edition)
   Orient Longmans Rept.2008
2. Dr. M. Balasubramanian & Dr. G. Anbalagan: Perform In English
   Anuradha Pub, Kumbakonam

REFERENCES:

   Foundation books: Cambridge House,
   4381/4 Ansari Road, Daryanganj,
   New Delhi – 2

2. M. Ashraf Rizvi: Effective Technical Communication,
   Tata Mcgraw Hill, Rep: 2007
UNIT I
MATRICES


12

UNIT II
THREE DIMENSIONAL GEOMETRY


12

UNIT III
DIFFERENTIAL CALCULUS

Curvature - Cartesian and Parametric Co-ordinates – Centre and radius of curvature – Circle of curvature – Envelopes - Evolutes – Evolute as envelop of normals.

12

UNIT IV
FUNCTIONS OF SEVERAL VARIABLES


12

UNIT V
ORDINARY DIFFERENTIAL EQUATIONS (ODE)

Solution of second and higher order linear ODE with constant coefficients – Simultaneous first order linear equations with constant coefficients – Linear equations of second order with variable coefficients - Cauchy’s and Legendre’s linear equations – Method of variation of parameters.

12
TEXT BOOKS:

REFERENCES:
UNIT – I
ULTRASONICS

UNIT – II
LASERS

UNIT – III
FIBRE OPTICS
Principle and propagation of light in optical fibers – Numerical aperture and Acceptance angle – Classification of optical fibers (Material, refractive Index, Mode) – Production – Double crucible technique – Optical fiber losses – Attenuation, Dispersion and Bending losses – Fiber optics communication systems (Block Diagram) – Applications – Sensors ((Temp, Displacement, Pressure).

UNIT – IV
QUANTUM PHYSICS:
Black body radiation – Plank’s theory (deviation) Deduction of Wein’s displacement law and Rayleigh – Jean’s law from Plank’s theory – Compton effect – Theory and experimental verification – Schrodinger’s wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in one dimensional box – Extension to 3 dimension electrons in metals (qualitative) – degeneracy.

UNIT – V
CRYSTAL PHYSICS
Lattice – Unit cell – Bravais Lattices – Lattice planes – Miller indices – Inter planar distance d in a cubic lattice – Calculation of number of atoms per unit cell, Atomic radius, Co-ordination number and Packing factor for SC, BCC, FCC and HCP structures – NaCl, ZnS, Diamond and graphite structures.
TEXT BOOKS:


REFERENCES:


UNIT – I
WATER TECHNOLOGY


UNIT – II
POLYMERS AND COMPOSITES


UNIT – III
SURFACE CHEMISTRY


UNIT – IV
NON CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES


UNIT – V
ENGINEERING MATERIALS

Refractories – Classification- (acidic, basic and neutral) – Properties (refractoriness, refractoriness under load, porosity, dimensional stability, thermal spalling) – manufacture of alumina, magnesite and Zirconia bricks – Abrasives – Natural abrasives – (Quartz, corundum, emery, garnet, diamond) – Artificial abrasives (silicon carbide, boron carbide) – Lubricants- Mechanism of lubrication – Liquid lubricants – Properties (Viscosity, viscosity index, flash and fire points, cloud and pour points, oilness , aniline number) – solid lubricants (graphite & molybdenum disulphide).
TEXT BOOKS:


REFERENCES:

AIM: To develop Graphic skills in students.

UNIT-0 (NOT FOR EXAMINATION)

Importance of Engineering Graphics – use of drawing instruments. BIS Conventions, specifications, layout of drawings, Lettering and dimensioning

UNIT-I
PLANE CURVES AND INTRODUCTION TO ORTHOGRAPHIC PROJECTION

Curves used in Engineering Practices

Construction of Ellipse, parabola and hyperbola by eccentricity method only. Construction of CYCLOID, INVOLUTE OF SQUARE AND CIRCLE only. Drawing normal and tangent to the above curves.

INTRODUCTION TO ORTHOGRAPHIC PROJECTION

Principle of 1st angle and 3rd angle projection. Projection of points situated in all the four quadrants. Problems involving projection of points, projection of two points situated in different quadrants.

UNIT-II
PROJECTION OF STRAIGHT LINES AND PLANES [FIRST ANGLE]

Projection of straight lines, situated in first quadrant only, inclined to both horizontal and vertical planes – LOCATION OF TRACES ONLY. Determination of true length and true inclinations of straight lines from the projections (not involving traces)

Projection of plane surfaces like rectangle, square, pentagon, hexagon, circle- surfaces inclined to one reference plane.

UNIT-III
PROJECTION OF SOLIDS AND SECTION OF SOLIDS

Projections of prism, pyramid, cone and cylinder, axis inclined to one plane by change of position method.

Section of above solids in simple vertical position (axis perpendicular to HP alone) by planes either inclined to HP or VP alone- True shape of section.

UNIT-IV
DEVELOPMENT OF SURFACES AND ISOMETRIC PROJECTION

Development of lateral surfaces of vertical prism, cylinder pyramid, and cone truncated by surfaces of inclined to HP alone. Development of surfaces of vertical cylinder and prism with cylindrical cut outs perpendicular to the axis.

Isometric projection of solids like prism, pyramid, cylinder and cone; combination of any two; truncation when solid is in simple vertical position, by a cutting plane inclined to HP.
UNIT-V
FREE HAND SKETCHING AND PERSPECTIVE PROJECTION

Free Hand sketching of front view, top view and a suitable side view of simple components from their isometric views
Normal perspective of prism, pyramid, cylinder & cone in vertical position by visual ray method only.

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. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. Whenever the total number of candidates in a college exceeds 150, the University Examination in that college will be conducted in two sessions (FN and AN on the same day) for 50 percent of student (approx) at a time.
UNIT-1
DIGITAL CONCEPTS AND NUMBER SYSTEMS

Number System – Decimal, Binary, Octal, Hexadecimal and BCD numbers- Binary Arithmetic – Number system conversion – Machine codes such as ASC11, EBCDIC and Unicode.

UNIT II
HARDWARE, SOFTWARE AND NETWORKING


UNIT III
PROBLEM SOLVING

Problem Solving through computers – Problem solving methodologies – Top Down, Bottom up approaches at conceptual level- Algorithm – FlowChart – Pseudocode – Solving simple problems and algorithm developments – procedure oriented and structured programming concepts

UNIT-IV
FUNDAMENTALS OF C PROGRAMMING

Introduction to C – History of C – Advantages, applications and demerits of C – Character set, Identifier keyword, datatypes, variables, constants, tokens – Operators and expression, Simple input and output Operators and expression, Simple input and output functions – Control structures, Arrays – one dimensional and two dimensional arrays.

UNIT-V
FUNCTION, POINTERS, STRUCTURES AND FILE

Functions – Userdefined and Library functions – Pointers – Array of Pointers, Pointer to array, Function returning pointer, Pointer to function, Pointer to Pointer, Structure and union, High level file Operations.
TEXT BOOKS:


REFERENCES:

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<th>Concepts</th>
<th>Suggested Exercises</th>
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<td><strong>UNIT I</strong></td>
<td>Practical Exercises may be given in the application packages to acquire skills in word processing. Spread sheet and Power point.</td>
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<tr>
<td>Packages</td>
<td>2. To create an advertisement in word.</td>
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<tr>
<td>Word</td>
<td>3. To illustrate the concept of mail merging, importing images, tables in Word</td>
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<td>5. Chart-Line, XY Bar and Pie.</td>
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<td>6. Formula- formula editor.</td>
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<td>Spreadsheet</td>
<td>7. Spread sheet- inclusion of object, Picture and graphics, protecting the document and sheet.</td>
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<td>8. To create a spread sheet to analyze the marks of the students of a class and also to create appropriate charts.</td>
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<td>9. Sorting and Import/Export features.</td>
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<tr>
<td>Power point</td>
<td>10. To create the presentation for the department with power point using animation. Design Templates and Effective Presentation.</td>
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Unit II
C Programming Basics

The following Programs to be Practiced

Data Types, Expression, Evaluation
1. Operators & Expressions

Condition Statements, Operators
2. Control Structures.

And Expressions
3. Arrays

IO Formatting
4. Functions

Decision Making
5. Pointers

Looping
6. Pointers and Functions
7. Structures and Union
8. Files

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS

Hardware
LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
Printers – 3 Nos.

Software
OS – Windows / UNIX Clone
Application Package – Office suite
Compiler – C
OBJECTIVES
To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE

Buildings:
(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:
(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
(b) Study of pipe connections requirements for pumps and turbines.
(c) Preparation of plumbing line sketches for water supply and sewage works.
(d) Hands-on-exercise:
Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:
(a) Study of the joints in roofs, doors, windows and furniture.
(b) Hands-on-exercise:
Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE

Welding:
(a) Preparation of arc welding of butt joints, lap joints and tee joints.
(b) Gas welding practice

Basic Machining:
(a) Simple Turning and Taper turning
(b) Drilling Practice
Sheet Metal Work:
(a) Forming & Bending:
(b) Model making – Trays, funnels, etc.
(c) Different type of joints.

Machine assembly practice:
(a) Study of centrifugal pump
(b) Study of air conditioner

Demonstration on:
(a) Smithy operations, upsetting, swaging, setting down and bending.
Example – Exercise – Production of hexagonal headed bolt.
(b) Foundry operations like mould preparation for gear and step cone pulley.
(c) Fitting – Exercises – Preparation of square fitting and vee – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE
1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
5. Measurement of energy using single phase energy meter.

IV ELECTRONICS ENGINEERING PRACTICE
1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
2. Study of logic gates AND, OR, EOR and NOT.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.
SEMESTER EXAMINATION PATTERN

The Laboratory examination is to be conducted for Group A & Group B, allotting 90 minutes for each group, with a break of 15 minutes. Both the examinations are to be taken together in sequence, either in the FN session or in the AN session. The maximum marks for Group A and Group B lab examinations will be 50 each, totaling 100 for the Lab course. The candidates shall answer either I or II under Group A and either III or IV under Group B, based on lots.

Engineering Practices Laboratory

List of equipment and components (For a Batch of 30 Students)

CIVIL

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. 15 Sets.
2. Carpentry vice (fitted to work bench) 15 Nos.
4. Models of industrial trusses, door joints, furniture joints 5 each
5. Power Tools: (a) Rotary Hammer 2 Nos (b) Demolition Hammer 2 Nos (c) Circular Saw 2 Nos (d) Planer 2 Nos (e) Hand Drilling Machine 2 Nos (f) Jigsaw 2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders 5 Nos.
2. Welding booth with exhaust facility 5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc. 5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit. 2 Nos.
5. Centre lathe 2 Nos.
6. Hearth furnace, anvil and smithy tools 2 Sets.
7. Moulding table, foundry tools 2 Sets.
8. Power Tool: Angle Grinder 2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner One each.
ELECTRICAL

1. Assorted electrical components for house wiring 15 Sets
2. Electrical measuring instruments 10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp 1 each
4. Megger (250V/500V) 1 No.
5. Power Tools: (a) Range Finder 2 Nos
   (b) Digital Live-wire detector 2 Nos

ELECTRONICS

1. Soldering guns 10 Nos.
2. Assorted electronic components for making circuits 50 Nos.
3. Small PCBs 10 Nos.
5. Study purpose items: Telephone, FM radio, low-voltage power supply
1. Air Wedge – Thickness of a Wire
3. Lee’s Disc – Determination of Thermal Conductivity of Bad Conductor.
4. a) Particle Size Determination using Diode Laser
   b) Determination of Acceptance Angle in an Optical Fiber.
5. PN Junction Diode Characteristics.

**LIST OF EXPERIMENTS**

1. Estimation of Hardness of Water by EDTA Method.
2. Estimation of Copper in brass by EDTA Method.
3. Determination of DO in water by Winkler’s Method.
5. Estimation of alkalinity of Water sample.
6. Determination of Molecular Weight and Degree of Polymerization using Viscometry.

A minimum of FIVE experiments shall be offered.
Laboratory classes on alternate weeks for physics and chemistry.
The lab examination will be held in the second semester.
AIM:
To impart Sound knowledge of Boiler Chemistry and Boiler Water Treatment including basics of nano chemistry

OBJECTIVES

On Completion of the course the Students are expected to
1. Have a thorough knowledge of Boiler Chemistry and Feed Water Treatment methods.
2. Have a knowledge of various Water Hardness analysis procedures
3. Have a basic concept on Nano chemistry

1. WATER TECHNOLOGY
Water and its impurities – Impurities in water – fresh water, sea water, distilled water impurities. Purpose of water treatment in boilers, scale formation and prevention.

2. BOILER CHEMISTRY
Boiler corrosion – fretting, pitting corrosion, corrosion fatigue, atoms and ions, electro chemical corrosion, hydrogen and hydroxyl ions, types and causes of corrosion and its control; chemical and mechanical deareation, methods of chemical deareation, de-zincification, stress corrosion,

3. BOILER WATER TREATMENT
Lime and Soda treatment, pH treatment, salinometer, use of litmus paper, test for partial, total alkalinity, chloride, sulphite, phosphate test, caustic soda treatment, condensate lime treatment. De-salination of water, reverse osmosis and electro dialysis, priming, foaming and control, effects of salts and gases in feed water

4. WATER HARDNESS ANALYSIS
Hardness, units of hardness, estimation of hardness by EDTA method, treatment for hardness, total dissolved solids, dissolved oxygen test, use of coagulants, typical test valves for smoke and water tube boilers.

5. ENERGY SOURCES AND NANOCEMISTRY
Introduction - Properties (Electrical, Mechanical and vibration) – carbon nano tubes - Applications in fuel cells, catalysis and use of gold nanoparticles - batteries – secondary batteries - alkaline batteries – lead acid, Ni – Cd and Li batteries, principles and applications of solar cells, fuels cells - Hydrogen and methanol.
TEXT BOOKS:


REFERENCES:

2. Water Treatment by J.D. Skelly Imarest Publication, London.
AIM:
To impart Sound knowledge of Basic Marine Engineering with the special emphasis on Energy resources and Marine Power Plant.

OBJECTIVES
On Completion of the course the Students are expected to
1. Have studied the renewable and Non-Renewable Energy Sources
2. Have a good knowledge of working principle of 2 Stroke and 4 Stroke Marine IC Engines
3. Have sound knowledge of Marine Refrigeration and Air-Conditioning Plant
4. Have a Knowledge of Metal Forming and Joining Processes and various Power Transmission methods

1. ENERGY RESOURCES AND POWER GENERATION
Renewable and Non-renewable resources – thermal, hydel, solar, wind, tidal, geothermal and nuclear – Indian energy scenario.
Power Plants - Steam, gas turbine, diesel, nuclear and hydel power plants – Layout, major components and working, Choice of the type of plant, Combined cycles, cogeneration, Importance of Energy storage, Environmental constraints of power generation using fossil fuels and nuclear energy.
Steam generators - Classification, working or Cochran, Babcock Wilcox, Lamont and Benson boilers, Principles and features of modern high pressure boiler – tower type boilers. (A separate study of boiler mountings and accessories are beyond the scope of this course).

2. MARINE I.C. ENGINES

3. REFRIGERATION & AIR CONDITIONING
Refrigeration – application and types, Vapour compression refrigeration system – working principles and features, working fluids.
Air conditioning – requirement of conditioned air, summer and winter air conditioning, layout of a typical window air conditioner, Thermoelectric cooling.
4. **METAL FORMING, METAL JOINING PROCESSES**

Metal forming – Principles of forging – mechanical power hammers – Hot and Cold forging processes – rolling, drawing and extrusion, Metal joining processes – flexible and permanent, Principles of welding – Fundamentals of arc welding, gas welding and gas cutting, Brazing and Soldering

5. **POWER TRANSMISSION**

Brief introduction to belt and rope drives. Simple and compound gear trains. Machine Tool Engineering - Main Components and functions of lathe, drilling, shaping, planning and milling machines. Introduction to CAD, CAM, CIM and ROBOT.

**TEXT BOOKS:**


**REFERENCES:**

SEMMETER II

10177TE201 TECHNICAL ENGLISH- II

L T P C
3 1 0 4

AIM:
To encourage students to actively involve in participative learning of English and to help them acquire Communication Skills.

OBJECTIVES:
1. To help students develop listening skills for academic and professional purposes.
2. To help students acquire the ability to speak effectively in English in real-life situations.
3. To inculcate reading habit and to develop effective reading skills.
4. To help students improve their active and passive vocabulary.
5. To familiarize students with different rhetorical functions of scientific English.
6. To enable students write letters and reports effectively in formal and business situations.

UNIT :I LANGUAGE FOCUS

Phrasal verbs & idioms

UNIT :II LANGUAGE FOCUS

Relative clauses – Imperative – Infinitive structures – Question Pattern – Wh- Aux-Verbs
(Yes/No Questions) Contrasted time structures – Adverbial clauses of time, place and manner – intensifiers – Basic pattern of sentences.

UNIT :III READING


UNIT: IV WRITING

Unit V (Not for Examination)

**Listening to Lectures/ Seminar/Workshop –**

1. Write a brief summary of the listened matter
2. British council recording

**Speaking**

1. Oral presentation on any topic (5 Minutes)
2. Group discussion
3. Accepting other’s views /ideas
4. Arguing against the others views
5. Interrupting others’ when they speak (techniques/ )
6. Pronunciation /stress/intonation-
7. Addressing the higher officials, collagues, subordinates – on any issue

**TEXT BOOKS :**


**REFERENCES:**

UNIT I LAPLACE TRANSFORM

Transform of elementary functions – Basic properties – Transform of derivatives and integrals – Initial and Final value theorems – Inverse Laplace transform - Convolution theorem - Solution of ODE with constant coefficients using Laplace transform - Transform of periodic functions – Solution of Integral equations.

UNIT II VECTOR CALCULUS


UNIT III ANALYTIC FUNCTIONS

Necessary and Sufficient conditions (without proof) - Cauchy –Riemann equations – Properties of analytic functions - Harmonic conjugate – Construction of analytic functions – Conformal mapping : w = z+ a, az , 1/z , z^2 and bilinear transformation.

UNIT V MULTIPLE INTEGRALS

Double integration – Cartesian and polar coordinates – Change of order of integration – Area as a double integral – Change of variables between Cartesian and polar coordinates –Triple integration –Volume as triple integral.

UNIT IV COMPLEX INTEGRATION

Problems solving using Cauchy’s integral theorem and integral formula – Taylor’s and Laurent’s expansions – Residues – Cauchy’s Residue theorem – contour integration over unit circle – semi circular contours with no pole on real axis.

TOTAL: 60

TEXT BOOKS:


REFERENCES:

UNIT I CONDUCTING MATERIALS

UNIT II SEMICONDUCTING MATERIALS

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS

UNIT IV DIELECTRIC MATERIALS
Dielectric constant – polarization in dielectrics – Different types of polarization (Derivation for polarizability ) - Clausius – Mosotti equation – dielectric loss – dielectric breakdown – Applications – Ferro electricity and applications.

UNIT V MODERN ENGINEERING MATERIALS
Metallic glasses- preparation, properties and applications- Shape memory alloys (SMA)- Characteristics - applications, Advantages and Disadvantages of SMA .
Carbon nanotubes: structure – properties - applications.

TOTAL: 45

TEXT BOOKS:
2. “Introduction to Nanotechnology”, Charles P. Poole and Frank J. Owen, Wiley India (2007) (for Unit V)
REFERENCES:

UNIT I ELECTROCHEMISTRY


UNIT II CORROSION AND CORROSION CONTROL


UNIT III FUELS AND COMBUSTION


UNIT IV PHASE RULE AND ALLOYS


UNIT V ANALYTICAL TECHNIQUES

Beer-Lambert’s law (problem) – UV-visible spectroscopy and IR spectroscopy – principles – instrumentation (problem & block diagram only) – estimation of sodium by flame photometry - atomic absorption spectroscopy- principle – instrumentation (block diagram only) -estimation of nickel by AAS.

TOTAL: 45
TEXT BOOKS:


REFERENCES:

UNIT I  BASICS & STATICS OF PARTICLES


UNIT II  EQUILIBRIUM OF RIGID BODIES


UNIT III  PROPERTIES OF SURFACES AND SOLIDS


UNIT IV  DYNAMICS OF PARTICLES


UNIT V  FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS

Frictional force – Laws of Coulomb’s friction – Simple contact friction – rolling resistance Belt friction.
Translation and rotation of rigid bodies – Velocity and acceleration – General Plane motion.

TOTAL: 60
TEXT BOOK:


REFERENCES:

UNIT I  BASIC CIRCUIT ANALYSIS  12
Ohm’s law, Kirchoff’s laws – DC and AC circuits – Resistors in series and parallel circuits – Mesh current and node voltage method of analysis for DC and AC circuits (AC circuits at elementary level only)

UNIT II  NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS 12
Network reduction: Voltage and current division, Source Transformation – Star, delta conversion – Thevenin’s Theorem and Norton’s Theorem- Superposition Theorem – Maximum power transfer Theorem.

UNIT III  RESONANCE AND COUPLED CIRCUITS 12

UNIT IV  TRANSIENT RESPONSE OF DC AND AC CIRCUITS. 12
Transient response of RL, RC, and RLC circuits using Laplace Transform for DC input and AC sinusoidal inputs only.

UNIT V  ANALYSIS OF THREE PHASE CIRCUITS 12
Three phase balanced and unbalanced voltage sources – analysis of three phase 3 wire and 4 wire circuits with star and delta connected loads, balanced and unbalanced phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

TOTAL: 60

TEXT BOOKS:

REFERENCES:
UNIT – I  CIRCUIT ANALYSIS TECHNIQUES  12


UNIT II  TRANSIENT RESPONSE AND RESONANCE IN RLC CIRCUITS  12


UNIT III  SEMICONDUCTOR DIODES  12

Intrinsic and Extrinsic semiconductors – Theory of PN junction diode – Energy band structure – current equation (Basic operation) space charge and diffusion capacitance – Effect of Temperature and breakdown mechanism – Zener diode and its characteristics.

UNIT IV  TRANSISTORS  12

Principle of operation of PNP and NPN Transistors – CE, CB, CC configuration – and comparison of their characteristics – Biasing – Break down in Transistors – Operation and comparison of N channel and P channel JFET drain characteristic equation. MOSFET – Enhancement and Depletion Types – structure and operation – Comparison of BJT with MOSFET – thermal effect on MOSFET.

UNIT V  SPECIAL SEMICONDUCTOR DEVICES (QUALITATIVE TREATEMENT ONLY)  12

Tunnel diodes – PIN Diode – Varactor diodes – SCR characteristics and Two Transistor equivalent model – UJT – Diac and Triac – Laser, CCD, Photodiode, Photo transistor, Photo conductive and Photo Voltaic cells – LED, LCD.

TOTAL: 60
TEXT BOOKS:


REFERENCES:

UNIT I: ELECTRICAL CIRCUITS AND MEASUREMENTS

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters).
Dynamometer type Watt meters and Energy meters.

UNIT II: ELECTRICAL MACHINES


UNIT III: SEMICONDUCTOR DEVICES AND APPLICATIONS


UNIT IV DIGITAL ELECTRONICS


UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING

Communication System: Radio, TV, Fax, Microwave, Satellite and Optical Fiber (Block Diagram Approach only).

TOTAL: 60

TEXT BOOKS:


REFERENCES:

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS 12

UNIT II BUILDING COMPONENTS AND STRUCTURES 12
Foundations: Types, Bearing capacity – Requirement of good foundations

UNIT III POWER PLANT ENGINEERING 12
Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear power Plants – Merits and Demerits – Pumps and turbines – working principle of Reciprocating pumps (single acting and double acting) – Centrifugal Pump

UNIT IV IC ENGINES 12
Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as power plant

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEMS 12

TOTAL: 60
TEXT BOOKS:


REFERENCES:

LIST OF EXPERIMENTS

1. Determination of Young’s modulus of the material – non uniform bending.
2. Determination of Band Gap of a semiconductor material.
3. Determination of specific resistance of a given coil of wire – Carey Foster Bridge.
5. Spectrometer dispersive power of a prism.
6. Determination of Young’s modulus of the material – uniform bending.

- A minimum of FIVE experiments shall be offered.
- Laboratory classes on alternate weeks for Physics and Chemistry.
- The lab examinations will be held only in the second semester.

CHEMISTRY LABORATORY – II

LIST OF EXPERIMENTS

1. Conduct metric titration (Simple acid base)
2. Conduct metric titration (Mixture of weak and strong acids)
3. Conduct metric titration using \( \text{BaCl}_2 \) vs \( \text{Na}_2 \text{SO}_4 \)
4. Potentiometric Titration (\( \text{Fe}^{2+} / \text{KMnO}_4 \) or \( \text{K}_2\text{Cr}_2\text{O}_7 \))
5. PH titration (acid & base)
6. Determination of water of crystallization of a crystalline salt (Copper sulphate)
7. Estimation of Ferric iron by spectrophotometry.

- A minimum of FIVE experiments shall be offered.
- Laboratory classes on alternate weeks for Physics and Chemistry.
- The lab examinations will be held only in the second semester.
Basic Commands in UNIX

Working with files
- Files and File types
- Sorting the contents of a file
- Counting the number of words in a file

Working with Directories

UNIX Editor

Pipes

Simple Filters

Command line parameters with simple UNIX commands

Shell Programming Fundamentals
- Shell Variables
- Conditional Statements
- Testing and Loops
- Simple shell Programs
- Grep and Sed commands
- Awk filter
- Security commands

UNIX C
- Simple C programs to simulate the basic UNIX commands (Fork, Signal)
- File handling

HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS

Hardware

1 UNIX Clone Server
33 Nodes (thin client or PCs)
Printer – 3 Nos

Software

OS-UNIX clone (33 user license or License free Linux)
Compiler- C
List of Exercises using software capable of Drafting and Modeling

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures
2. Drawing of a Title Block with necessary text and projection symbol
3. Drawing of curves like parabola, spiral, involute using B-spline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple Stool, Objects with hole and curves)
6. Drawing of a plan of residential building (Two bed rooms, Kitchen, hall, etc.)
7. Drawing of a simple steel truss
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc.
9. Drawing isometric projection of simple objects
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.

List of Equipments for a batch of 30 students:
- Pentium IV Computer or better hardware, with suitable graphics facility - 30 No.
- Licensed software for Drafting and Modeling – 30 Licenses
- Laser Printer or Plotter to print / plot drawings - 2 No.
LIST OF EXPERIMENTS

1. Verification of Ohm’s laws and Kirchoff’s laws
2. Verification of Thevenin’s and Norton’s DTheorem
3. Verification of Superposition Theorem
4. Verification of maximum power transfer theorem
5. Verification of reciprocity theorem
6. Measurements of self inductance of a coil
7. Verification of mesh and nodal analysis
8. Transient response of RL and RC circuits for DC inputs
9. Frequency response of series and parallel resonance circuits
10. Frequency response of single tuned coupled circuits
11. Measurement of inductance and Capacitance phase angle using LCR Meter
12. Measurement of Magnitude & Frequency for different wave forms (Since, Square & Triangular waveforms)
1. Verification of KVL and KCL
2. Verification of Thevenin and Norton Theorems
3. Verification of Superposition Theorem.
4. Verification of Maximum Power Transfer and Reciprocity Theorems
5. Frequency Response of Series and Parallel Resonance Circuits
6. Characteristics of PN and Zener Diode
7. Characteristics of CE Configuration
8. Characteristics of CB Configuration
9. Characteristics of UJT and SCR
10. Characteristics of JFET and MOSFET
11. Characteristics of Diac and Triac
12. Characteristics of Photodiode and Phototransistor
AIM

To impart knowledge to the students about Marine Engineering Thermodynamics.

OBJECTIVES

At the end of the study of this topic the students should have the knowledge on basic Thermodynamics and solve the problems on First and Second Law of Thermodynamics and Gas power cycles. Also should have the knowledge on fuel used in IC Engines and Combustion of Fuels.

UNIT I BASIC CONCEPTS AND FIRST LAW OF THERMODYNAMICS  12

Thermodynamic systems, concepts of continuum, thermodynamic properties, equilibrium, processes, cycle, work, heat, temperature, Zeroth law of thermodynamics. First law of thermodynamics – applications to closed and open systems, internal energy, specific heats, enthalpy, – applications to steady and unsteady flow conditions.

UNIT II BASIC CONCEPTS OF SECOND LAW OF THERMODYNAMICS  12

Thermodynamic systems, Second law of thermodynamics Statements, Reversibility, causes of irreversibility, Carnot cycle, reversed Carnot cycle, heat engines, refrigerators, and heat pumps. Clausius inequality, entropy, principles of increase in entropy, Carnot theorem, available energy, availability.

UNIT III FLUID CYCLES  12

Thermodynamic properties of pure substances, property diagram, PVT surface of water and other substances, calculation of properties, first law and second law analysis using tables and charts.

UNIT IV GAS POWER CYCLES  12


UNIT V THERMODYNAMIC RELATIONS AND COMBUSTION OF FUELS  12

Exact differentials, T-D diagrams, Maxwell relations, Clasius Claperon Equations, Joule-Thomson coefficients. Heat value of fuels, Combustion equations, Theoretical and excess air, Air fuel ratio and Exhaust gas analysis

TOTAL: 60
TEXT BOOKS


REFERENCES

AIM:
To impart knowledge on the Fitting methods of Metal joining Process

OBJECTIVES:
On Completion of the Course The Students are expected to have the Knowledge of Metal Cutting and Joining Process Tools and equipments used in Smithy, Carpentry, Fitting, Foundry, Welding and Sheet Metal.

LIST OF EXPERIMENTS:

SHEET METAL

Fabrication of tray, cone etc. with sheet metal.

WELDING

Arc Welding of butt joint, Lap joint, Tee fillet etc. Demonstration of gas welding.

FITTING

Practice in chipping, filing, drilling – Making Vee, square and dove tail joints.

TOTAL: 60

REFERENCES: