UG11P3101	**BASIC ELECTRICAL AND ELECTRONICS LABORATORY**	**54 HRS**

ELECTRICAL LABORATORY   27 Hrs

1. Determination of equivalent resistance of the resistors when they are connected in Series, Parallel

   and Series-parallel combinations.

2. Characteristics of Fluorescent lamps.

3. Characteristics of Tungsten filament lamps.
4. Verification of Thevenin's theorem.
5. Verification of Norton's theorems.
6. Verification of Maximum power transfer theorem.
7. Verification of Superposition theorem.
8. Study of R-L-C Series circuit.
9. Study of R-L-C parallel circuit.

10. Measurement of power in a three phase circuit by two wattmeter method.
11. Measurement of energy (single and 3 phase) using suitable energy meter.

12. Measurement of the insulation resistance of an electrical machine and continuity test by the Megger.

13. Measurement of various parameters with multimeter, Tong-tester, Tachometer.

14. Use of Line tester and test lamp.

ELECTRONICS LABORATORY   27 Hrs

1. To understand the operation & measurement with the help of voltmeter, Ammeter, CRO, Multimeter, Clamp meter.
2. Determination of V-I characteristics of a p-n junction diode.

3. Determination of V-I characteristics of a Zener diode.
4. Determination of V-I characteristics of LED.
5. To study charging & discharging action of a Capacitor.
6. To study full wave & half wave rectification circuit with L, C, Pie filter, L-C filter & without filter.
7. To determine band gap of a semiconductor using hot water bath.
8. Determination of V-I characteristics of a high current p-n junction diode.
9. Realisation of Basic & Universal Logic gates.
10. To determine the characteristics of a thermistor.
11. To determine of input /output characteristics of a Transistor CE amplifier.
12. To study the clipping & clamping circuit using diode.

SEMESTER – I

UG11P3102	WORKSHOP PRACTICALS – I	108 HRS

Awareness of Safety Equipments in working

Familiarization:

1. Personal Safety and safe working practices.
2. Common hand tools.
3. Measuring tools, precision tools.

Fitting Shop: Bench Work

1. To make a square block from a round bar.

   (OR)

   To make a hexagon block from a round bar.

2. To make a Male-Female square fitting from 10 millimeter, thick plate.
3. To make a V-fitting from a 10 millimeter, thick plate.

Black Smithy Shop:

1. Drawing down from round rod and bending to 90^0.
2. To make a square head on a round rod (square head pin).
3. Bending 90^0 from a round rod.
4. To make a flat chisel of Hexagonal stem from a round rod.
5. Tempering process of tools.

Machine Shop:

1. Familiarization of Lathe, Lathe machine tools.
2. Familiarization of Drilling machine and relevant tools.

Carpentry Shop:

1. Make a wooden box with dovetail joint.
2. Make a wooden plug for condenser tube.
3. Make a cement box for a leaking water pipe.

Miscellaneous:

Two jobs that a student may be given as a project. Jobs to relate to onboard systems within the above mentioned fields.

UG11P3103	**COMMUNICATIVE ENGLISH LABORATORY**	**36 HRS**

Development of Skills in Oral Communication:

- Phonology: Pronunciation, Word Stress, Intonation, Sentence Stress
- Presentation Skills: Content Structuring, Preparation & Planning, Welcome Note, Vote of Thanks.
- Facing Interview: Attitude, Etiquette, Body Language and Diction.
- Sea speak : External Communication & Internal Communication on Board Ship
- Group Discussions & Extempore Speeches

Maritime Correspondence:

- Sentence structure, process of writing i.e. to identify, organize and list the points/ideas related to a given topic in a proper logical sequence and writes a rough draft and final draft.
- Letter Writing: Types, Parts, Styles.
- Maritime Correspondence: Repatriation Letter, Requisition Letter, Promotion Letter, Letter of Indemnity, Grievance Letter
- Email Writing
- Notice, Agenda and Minutes

Report Writing (Maritime Correspondence):

- Precis Writing
- Structure of a technical report, description of factual details as observed.
- Maritime Correspondence: Damage Report, Incident Report
- Accident Report.

Standard Marine Communication Phrases:

- Importance of Standard Marine Communication Phrases: Procedure, Spelling, Message Markers, Responses, Distress/Urgency/ Safety Signals, Corrections, Readiness, Repetition, Numbers, Positions, Bearings, Courses, Distances, Speed, Times, Geographical Names, Ambiguous Words, Omission of "may", "might", "should" and "could. Use and understand the IMO Standard Marine Communication Phrases (SMCP)

Selected tests to be conducted to test skill in comprehension and speech.

REFERENCE BOOKS:

1. IMO Standard Marine Communication Phrases (SMCP) London : International Maritime Organisation
2. Sea speak Training Manual, Essential English for International Maritime Use: Pergamon Press UK
3. Blakey, T.N. English for Maritime Studies, Prentice - Hall International, London
4. English Grammar and Composition : Wren & Martin

UG 11T3101	ENGLISH	54 HRS

OBJECTIVE: To build proficiency in writing, reading and speaking in English language.

Unit - I: Prose   10 Hrs

1. Google Guys (Extract) – Richard L Brandt
2. Happiness 101 – Geeta Padmanabhan
3. Structured Procrastination – John Perry
4. The Refugee – K.A. Abbas
5. The Lion and the Lamb – Leonard Clarke

Unit - II: Poetry   10 Hrs

1. The Blind Pedlar – Osbert Sitwell
2. An Old Woman – Arun Kolatkar
3. No Sentence – Anjum Hassan
4. The Solitary Reaper – William Wordsworth
5. Gift – Alice Walker

Unit - III: Short Stories   10 Hrs

1. A Garden So Rich – Christie Craig
2. The Umbrella Man – Roald Dahl
3. The Bird – Amar Jalil
4. The Fortune Teller – Karel Capek
5. The Postmaster – Rabindranath Tagore

Unit - IV: Drama   12 Hrs

1. A Boy Who Stopped Smiling – Ramu Ramanathan
2. While the Auto Waits – O' Henry
3. The Cell phone Epidemic – Claudia I. Haas

4. The Death Trap – 'Saki' (H.H. Munro)

5. The Dear Departed: A Comedy in One-Act – Stanley Houghton

Unit - V: Communicative Grammar   12 Hrs

1. Seeking and Giving Information

2. Being Informal

3. Expressing Ability, Possibility Etc.

TEXT BOOKS:

1. CHANDRALEKHA RAO et al., (2016), *Spring Part One*, Emerald Publishers, Chennai.

2. USHA SAIKUMAR et al., (2017), *Panorama*, Emerald Publishers, Chennai.

REFERENCE BOOKS:

1. BHASKARAN NAIR et al., (2016), *Reflections*, Cambridge University, New Delhi.

Websites

1. http://www.learnenglish.de/

SEMESTER – I

UG11T3102	MATHEMATICS-1	72 HRS

OBJECTIVE: The course is aimed at developing basic mathematical skills that are imperative for effective understanding of Engineering subjects. The topics introduced will serve as a basic tool for specialised studies in Engineering fields.

Applications of derivatives - Curvature, Asymptotes.   4 Hrs

Successive Differentiation-Higher order derivates, n^{th} order derivatives, Standard results, n^{th} order derivates of rational functions and partial fractions, n^{th} order derivative of the product of powers of sines and cosines. Leibnitz' Theorem, Maclaurin's Theorem and std. Expansions.

8 Hrs

Functions of Several Variables-Limit, Continuity, Partial derivatives and their geometrical significance, Higher order partial derivatives, Homogeneous functions, Euler's theorem, Maxima, Minima and Saddle points, Constrained maxima or minima, Lagrange multipliers, exact differentials. Curve tracing of cartesian and polar curves.   12 Hrs

Calculus of Variations-The Brachistochrome problem, Euler-Lagrange development, applications of Euler's equation, Several dependent variables, Applications to discrete mechanics, Isoperimetric problem.   8 Hrs

Properties of Definite Integrals, Fundamental theorem of integral calculus, applications of integrals to lengths of plane curve, volume and surface of revolution, Centre of gravity, Moment of inertia, Integration as limit of a sum, Beta function and gamma function, Multiple integrals, Differentiation under integral sign. Work done by variable forces mean values, RMS value of sin nx 1 cos nx, Pappus and Guldinus theorem and its applications. Applications - Area volume, mass, centre of gravity of wire, lamina and solid.   10 Hrs

Vector algebra, Scalar and vector products, Orthonormal triad, Scalar triple products, Linear dependence of vectors, Other repeated products, Identity of Lagrange, Reciprocal systems.

6 Hrs

Vector calculus, Vector functions of one variable and their derivatives, curves, arc length, tangent, curvature and torsion, Gradient of a scalar field, Divergence of a vector field, Curl of a vector field, Directional derivatives.   8 Hrs

Matrices and Determinants, Matrix algebra, Sub matrices, Rank of a matrix, Systems of n linear equations in n unknowns, Inverse of a matrix, Hermitian and Skew-Hermitian matrices, Unitary, Orthogonal and normal matrices, Eigen values and Eigen vectors, Eigen values of Hermitian, Skew-Hermitian and Unitary matrices, Bilinear, Quadric, Hermitian and Skew-Hermitian forms, Real life applications.   6 Hrs

Review of pre requisites of complex numbers, De-Moivre's theorem, Complex variables, Limit, derivative, Analytic functions, Cauchy Rieman equations, Cauchy's integral theorem, Cauchy's integral formula, Derivatives of an analytic functions.

4 Hrs

Linear Programming: Graphical Method, General Linear programming problems, Canonical and standard form of LPP, simplex method, Two phase method. Duality concept, dual simplex method, transportation problems, Assignment problems.

6 Hrs

REFERENCE BOOKS:

1. GREWAL, B. S. Higher Engineering Mathematics, Khanna Publishers, Delhi

2. Bali, N.P. and Narayana Iyengar, N.CH.S., Engineering Mathematics, Laxmi Publications Pvt. Ltd, New Delhi
3. Venkataraman M.K., Engineering Mathematics, Vol-I & II, The National Publishing Company, Chennai
4. K.A. Stroud, Engineering Mathematics.

SEMESTER - I

UG11T3103	BASIC THERMODYNAMICS	54 HRS

OBJECTIVE: To impart Basic Thermodynamics knowledge to the students. At the end of the course, the student should be able to understand and further study of Applied Thermodynamics effectively.

Thermodynamics Definitions : Thermodynamics and Energy, Application Areas of Thermodynamics; State and Equilibrium, Properties of State – Extensive, Intensive; Forms of Energy – Internal Energy, Heat, Work, Mechanical Energy, Point Function, Path Function ; Systems - Boundary, control volume, control mass, isolated systems; First Law of Thermodynamics and its application to various Processes, Energy Balance, Energy Change of a System, Mechanisms of Energy Transfer; Steady-Flow Energy Equation; Non-Flow Energy Equation; Basic Problems. Various thermodynamic processes P-V Diagram for Work Transfer in

Reversible Processes; Steady Flow Process and Non-flow Process; Energy Conversion Efficiencies

<div align="right">8 Hrs</div>

Properties of Pure Substances and Gases: Pure Substance, Phase-Change Processes of Pure Substances, Property Diagrams for Phase-Change Processes, Property Tables – Enthalpy, Saturated, Superheated and Sub cooled (Compressed Liquid); Use of Steam Tables and Steam Charts, Characteristic Equation of State for a Perfect Gas; Equation of State for Real Gas; Compressibility Factor, Real gas equations. Related problems

[Gibbs Phase Rule, Joules Law, Vanderwaal's equation, Virial equation, Adiabatic mixing]

<div align="right">12 Hrs</div>

Energy Analysis of Systems: Energy Analysis of Closed Systems, Energy Balance for Closed Systems, Specific Heats, Internal Energy, Enthalpy, and Specific Heats of Ideal Gases, Internal Energy, Enthalpy, and Specific Heat of Solids and Liquids; Mass and Energy Analysis of Control Volumes, Conservation of Mass, Flow Work and the Energy of a Flowing Fluid, Energy Analysis of Steady-Flow Systems and Energy Analysis of Unsteady-Flow Processes.

<div align="right">12 Hrs</div>

The Second Law of Thermodynamics : Introduction to the Second Law of Thermodynamics, Thermal Energy Reservoirs, Heat Engines, Refrigerators and Heat Pumps, Perpetual-Motion Machines, Reversible and Irreversible Processes, The Carnot Cycle and principles, The Thermodynamic Temperature Scale, The Carnot Heat Engine, Refrigerator and Heat pump; Entropy - The Increase of Entropy Principle, Entropy Change of Pure Substances, Isentropic Processes, Property Diagrams Involving Entropy, Entropy Change of Liquids and Solids, Entropy Change of Ideal Gases, Reversible Steady-Flow Work, Entropy Balance

<div align="right">12 Hrs</div>

Exergy : A Measure of Work Potential, Reversible Work and Irreversibility, Second-Law Efficiency, Exergy Change of a System, Exergy Transfer by Heat, Work and Mass, The Decrease of Exergy Principle and Exergy Destruction, Exergy Balance: Closed Systems, Exergy Balance: Control Volumes

<div align="right">10 Hrs</div>

REFERENCE BOOKS:

1. Applied Thermodynamics for Engineering Technologists - T.D.Eastop & A.McConkey
2. Basic Engineering Thermodynamics – Joel Rayner
3. Thermodynamics : An Engineering Approach – Yunus A Cengel and M A Boles
4. Fundamentals of Engineering Thermodynamics – MJ Moran, HN Shapiro, DD Boettner & MB Bailey
5. Heat and Thermodynamics – M W Zemansky and R H Dittman
6. Fundamentals of Thermodynamics – Claus Borgnakke and Richard E. Sonntag
7. Engineering Thermodynamics – PK Nag
8. Thermodynamics for Engineers (Schaum Series) – M Potter and C W Somerton

SEMESTER – I

UG11T3104	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**	**72 HRS**

OBJECTIVE: The course is aimed at developing the basic electrical and electronics engineering knowledge that are imperative for effective understanding of electrical machines and electronics.

ELECTRIC CIRCUITS:

Circuit Concepts: Electrical Quantities, Lumped-Circuit Elements, Ohm's Law, Kirchhoff's Laws, Voltage and Current sources, Voltage and Current divider principles, Analogy between Electrical and Other Non-electric Physical Systems, Effect of temperature on resistance.   3 Hrs

Circuit Analysis Techniques: Thévenin and Norton Equivalent Circuits, Node-Voltage and Mesh-Current Analyses, Superposition and Linearity, Maximum power transfer theorem. Star–Delta (Y-D) Transformation.   4 Hrs

Electrostatics and DC Transients Analysis: Transients and steady state response of series and parallel R-L, R-C, R-L-C circuits. Coulomb's law of electrostatics, Electric field and potential, Energy stored in inductor and capacitor, Charging and discharging characteristics of capacitor. Practical Application: Battery (Lead acid) construction and it's working. Maintenance, charging

and sulphasion in cells. Generation of static electricity, arrangement for continuous discharge of static charges to avoid explosion on tankers. 10 Hrs

Single-Phase AC Circuits: Generation of Sinusoidal (AC) Voltage Waveform, Average value, Root Mean Square (RMS) value, Form factor, Peak factor, Representation of sinusoidal signal by a phasor and solution of current (phasor concept) in series and parallels R-L, R-C, R-L-C circuits. Power consumed and Power factor, Complex Power, Volt-Amperes (VA) and Reactive Power. 8 Hrs

Resonance in AC Circuits: Resonance in series and parallel (R-L, R-C, R-L-C) circuits. 2 Hrs

Three-Phase AC Circuits: Three-phase voltages and phase sequence for Star and Delta Connections, Relation between the Phase and Line voltages and currents for Star and Delta Connections, Balanced and unbalanced three-phase loads (Star & Delta), Measurement of Power by wattmeter. 5 Hrs

Magnetic Circuits: Different laws for calculating magnetic field i.e. Biot-Savart law, Ampere's circuital law, Reluctance & Permeance, Leakage flux and fringing, B-H Characteristics, Different zones of B-H characteristic, Analysis of Series magnetic circuit, Analysis of Series-parallel magnetic circuit, Eddy Current & Hysteresis Losses, Faraday's laws of electromagnetic Induction, Self inductance, mutual inductance and coefficient of coupling. Energy stored in a magnetic field. 10 Hrs

Electrical Instruments and Measurements: Basic requirements of a measuring instrument- deflection, control and damping devices, moving coil, moving iron, dynamometer and thermocouple type of ammeter, voltmeter and wattmeter-their construction and other details, extension of scales of a meter. Energy meter, Frequency meter, Megger, Potentiometer, Galvanometer, Multimeter. 8 Hrs

A.C Bridge: Measurement of resistance, inductance and capacitance by Bridge Method (Maxwell-Wien Bridge, Schering Bridge and Kelvin Double Bridge). Application of localization of cable faults. 4 Hrs

Fundamentals of Electrical Installation: Distribution of electrical energy, system of wiring and installation, Earthing of installation, testing of electrical installation.   2 Hrs

<u>ELECTRONICS:</u>

Semi Conductors: Types of Semi Conductors, Electrical characteristics, Diffusion and Drift, Mobility, Varistors, Thermistors and Non Linear Resistors.   4 Hrs

Semi Conductor Diodes: Characteristics of diodes, Diode as a rectifier, Diode clamper and voltage doubler, Zener diodes, tunnel Diodes, Rectifiers & Filters, LEDs, seven-segment display.

                                                                                                                        4 Hrs

Transistors: The junction transistor and its characteristics, transistor as a switch, Transistor as an amplifier, stabilized biased circuits, self biased and potentiometer biased.   6Hrs

Regulated Power Supplies: series regulators and shunt regulators   2 Hrs

REFERENCE BOOKS:

1. Electrical Engineering by Edward Huges
2. Basic Electrical Engineering by Mittal and Mittal.
3. Electrical Engineering & Electronics by J. B. Gupta.
4. Basic Electrical & Electronics Engineering by S. K. Bhattacharya.
5. A text Book of Electro technology, volume 1, Basic Electrical Engineering, by B. L. Theraja and A. K. Theraja.
6. A text Book of Electro technology, volume 4, Electronic Devices and Circuits, by B. L. Theraja and A. K. Theraja
7. Basic Electronics, Volume 1 – 7, Harry Mileaf.

UG11T3105	ENGINEERING MECHANICS-I	54 HRS

OBJECTIVE: To impart a sound knowledge on the principles of Engineering Mechanics.

Vector Statics: Scalars and Vectors. Moments and couples, Couple moment – couple moment as a free vector, addition & subtraction of couple, Equilibrium and resultant of co-planar, concurrent and non-concurrent forces (analytical & graphical method), Lamis Theorem, Frame-works. Free body diagrams. Trusses, Method of section, joint to joint method and Bow's notations.

6 Hrs

Non-Coplanar Forces : Three rectangular components of vectors. Equilibrium and resultant of vectors in space.   4 Hrs

Virtual Work and Machines : Principle of virtual work. Ideal machines. Law of machines. Reversibility and irreversibility of lifting machines and its application to different types of lifting machines.

6 Hrs

Centroids: Centroids of lines, Centroids of areas, Centroids of volumes, Centroids of masses, Centre of gravity, Composite figures, Pappus Theorem   6 Hrs

Moment of Inertia : Moment of inertia of area. Transfer formula. Product of inertia and its transfer formula. Maximum and minimum moment of inertia. Mass moment of inertia and its transfer formula. Radius of gyration.

10 Hrs

Rectilinear Motion : Differential equation. Constant force, Force as function of time and displacement. D' Alambert's principle of dynamic equilibrium. Linear momentum.

8 Hrs

Curvilinear Motion : Differential equation. Normal and tangential acceleration. Projectile, D'Alembert's principle. Angular momentum.

6 Hrs

Motion of Rigid Bodies : Rotation about fixed axis. Rotation under constant moment. Periodic motion, Work, power and energy.

8 Hrs

REFERENCE BOOKS:

1. Rajasekaran, S. Sankara Subramanian. G. "Fundamentals of Engineering Mechanics", Vikas Publishing House Pvt. Ltd

2. Irving-H. Shames, "Engineering Mechanics – Statics and Dynamics" Pearson Education Asia Pvt. Ltd.
3. Hibbler R.C. "Engineering Mechanics", Vol-I Statics, Vol-II, Dynamics, Pearson Education Asia Pvt. Ltd
4. Elementary Mechanics of Machines – J. Hannah & R.C. Stephens

SEMESTER - I

UG11T3106	**WORKSHOP TECHNOLOGY**	**54 HRS**

OBJECTIVE : To impart knowledge to the students about, Common Workshop Tools, Measuring Techniques, Machining & Fusion Processes & Overhauling of various types of valves.

Common Workshop Tools : Description and usage of different types of Callipers, Straight edges, Try squares, Vices, Hammers, Chisels, Scrapers, Files, Drills, Reamers, Taps, V-Blocks, Face plate, Marking blocks, Carpentry tools, Pattern maker's tools, Smithy tools and Moulding tools. Application of hand tools such as chisel, file and saw.   6 Hrs

Metal Cutting Machines: Operation and inspection of the important types of metal cutting machines including Centre lathes, Capstan & Turret lathes, Automatic lathes, Drilling and Boring machines, Shaping, Slotting & Planing machines & Milling machine.

8 Hrs

Machine Process and Machine Tools: The geometry of cutting processes, Chip formation, Cutting forces, Stresses and power, Friction of chip on tool. Generation and dissipation of heat in cutting. Standard nomenclature for cutting tools. Cutting speeds and feeds, estimation of machining time. The fundamental cutting process, geometrical control of the cutting edge. Turning, screw cutting and taper turning processes on Centre lathe. Shears and punches. Principles of jigs and fixtures . I S Standards.   7 Hrs

Abrasive Process: Grinding, honing and lapping by hand and machines.   4 Hrs

Measuring Instruments and Inspection : Description and use of steel rule, Vernier's scale, Micro-meter (Inside & Outside), Dial gauge, Depth gauge, Thread gauge, Feeler gauge, Telescopic Feeler gauge, Bridge gauge, Wire gauge, Trammel gauge, Poker gauge, Taper gauge, Snap gauge, Plug gauge, Surface roughness analyzer, Optical methods of measurement (Auto-collimator).

7 Hrs

Welding : Welding Equipment & Applications, Electric welding (A.C & D.C.) spot welding. Gas welding. Different welding method (carbon arc, metal arc, GMA, TIG, Plasma, Submerged arc etc) & Electrodes, Welded joint edge preparation, Soldering & Brazing process and fluxes used. Defects in welding and steps taken. Welding inspection, Safety measures in welding.
Safe working practices – Personal protection equipment.
10 Hrs

Fitting and Overhauling : Types of packing and jointing materials and their uses, Construction details of various types of valves and cocks, Globe valves (return / non return), Gate valves, Butterfly valves, Reducing valves for steam and air. Bedding of bearings, Marking of engine parts for fitting, machining operations fitting of keys, cotters, Pipe work.

<div align="right">8 Hrs</div>

Safety Measures : Risk Assessment, Safe working practice, Sources of danger and methods of protection. Types of guards and safety devices. Personal Protection Equipment, Factory Act Regulation.

<div align="right">4 Hrs</div>

REFERENCE BOOKS :

1. Workshop Technology I & II – Hazra Choudhury.
2. Workshop Technology – R.S.Khurmi.
3. Workshop Technology – W.A.J. Chapman (Vol I & II)
4. H.M.T Production Technology – TATA McGraw Hill

<div align="center">**SEMESTER - I**</div>

UG11T3107	GEOMETRICAL DRAWING	72 HRS

OBJECTIVE: *To impart the knowledge to the students about good draughtsmanship curves used in engineering practise, and projection of solids.*

Introduction to Technical Drawing:

Draughtsman ship, lettering, dimensioning, types of lines and correct use of drawing instruments, Construction of geometrical figures specially showing joining of straight lines and curves.

<div align="right">18 Hrs</div>

Curves used in Engineering Practice:

Conic sections construction of ellipse, parabola and hyperbola by various methods. Drawing of spirals, involutes, cycloids, epi and hypocycloids, helixes. Detailed drawings of helical springs of round and rectangular sections Square thread formation in proper helical form.

<div align="right">18 Hrs</div>

Development of Surfaces and Curves of Intersections:

Developing the surface of prisms. Pyramids and cones and drawing the curves of intersection of cylinders to cylinders, cylinders to cones, and other solids.

18 Hrs

Projection of Points and Lines

Ortho Graphic Projections of Solids:

Axis perpendicular to a plane, axis parallel to both planes, axis parallel to one plane and inclined to the other, axis inclined to both planes.

18 Hrs

REFERENCE BOOKS:

1. M. B. Shah and B.C. Rana, " Engineering Drawing ", Pearson Education
2. N.D. Bhatt, "Engineering Drawing" Charotar Publishing House