SEMESTER-II

UG11P3201	APPLIED MECHANICS LABORATORY	54 HRS

1. To determine the magnitude and nature of forces acting on the different members of (a) Wall Crank (b) Shear Leg Apparatus (c) Derrick Crane.

2. To determine the reactions of a Loaded Beam.
   (a) Bell crank lever (b) Simply supported beam

3.
   (i) To determine the co-efficient of friction between leather and metal in an inclined plane.
   (ii) To prove in a frictionless simple machine that Mechanical Advantage is the same as the Velocity Ratio.

4. To find out the Mechanical Advantage, Velocity Ratio, Theoretical Effort, Efficiency, Friction, the Equation giving the relation between Load and Actual Efforts, and draw graphs with load as base for
   (i) Efficiency,
   (ii) Actual Effort,
   (iii) Mechanical Advantage
   (iv) Friction for the following machines:
   (a) Screw Jack;
   (b) Worm and Worm Wheel;
   (c) Compound Wheel and Axle;
   (d) Single Purchase Crab
   (e) Double Purchase Crab.

5. To verify that the efficiency of a square thread is greater than that of V-thread.

6. To verify that-E1 x E2 = E3

   Where-

   E1 = Efficiency of Simple Screw Jack;

E2 = Efficiency of Worm Wheel; and

E3 = Efficiency of Combined Screw Jack and Worm Wheel.

7. To determine the Moment of Inertia and Radius of Gyration of a Fly Wheel.

8. To find the co-efficient of friction both for flat belt and V-Belt with Belt friction apparatus and hence find the slip.

9. Centrifugal clutch to demonstrate the process of Power parameters of the Hartnell Governor.
   (i) Rotating masses
   (ii) Spring Rate
   (iii) Initial Spring Compression.

Note the effects of varying the mass of the centre sleeve of the Porter Governor and Compare the same with that of Proell Governor.

10. To determine the characteristic curves of sleeve position against speed of rotation in case of :
    (i) Hartnell Governor
    (ii) Porter Governor and
    (iii) Proell Governor

11. To determine the moment of inertia of different bodies by the Trifilar suspension by experiment and by calculation.

SEMESTER-II

UG11P3202	WORKSHOP PRACTICALS – II	108 HRS

Machine Shop (Lathe Work):

Prepare a Job piece which consists of following operations:

1. Straight Turning.
2. A Step Pulley.
3. Straight turning, under-cut with taper & threads.
4. Stepping down with knurling operation.
5. Taper turning and inside boring.
6. Making of hexagonal end with under-cut taper turning and thread cutting.

Welding Shop:

1. Welding edge preparation.
2. Practice for welding run.
3. Lap Welding.
4. Single and Double V Butt welding.
5. T-welding (both sides).
6. Vertical welding.

General Overhauling Work:

1. Dismantling, refitting and studying of various valves including return-type and non-return-type valves.
2. Overhauling of a Globe Valve.
3. Overhauling of a Butterfly valve.
4. Dismantling, refitting and studying the operation of a Sluice Valve.
5. Cutting of joints and packing for various uses.
6. Use of stud extractor and bearing puller.
7. Use of hand power tools (portables).

Miscellaneous Work:

Two projects related to modern onboard systems under above mentioned workshops.

SEMESTER – II

UG11P3203	COMPUTER LABORATORY	36 HRS

a) Word Processing

1. Document creation, Text manipulation with Scientific notations.
2. Table Creation, Table formatting and Conversion.
3. Mail merge and Letter preparation.
4. Drawing – Flow chart

b) Preparation of Spread Sheet

1. Chart – Line, XY, Bar and Pie.
2. Formula – Formula editor.
3. Spread sheet – inclusion of object, Picture and graphics, protecting the document and sheet.
4. Sorting and Import/Export Features

c) Simple C - Programming

1. Data Types, Expression Evaluation, Condition Statements.
2. Arrays
3. Structures and Unions
4. Functions, Pointer.

SEMESTER-II

UG11T3201	SEAMANSHIP, ELEMENTARY NAVIGATION AND SURVIVAL AT SEA	54 HRS

OBJECTIVE*: To make the students familiar with the duties of a seaman, various types of ropes and knots, knowledge of Bridge equipments and about Life Saving Appliances.*

Seamen and their Duties: Ship's Departments, General ship knowledge, lay out and nautical terms like Poop-Deck, Forecastle, Bridge, Monkey island etc, Bridge equipment arrangement. 4 Hrs

Navigational Lights and Signals: Navigation lights, Colours, Location and visibility. Look out, Precautions in Bad weather, Flags used on ships, Flag etiquette, Morse and Semaphore signalling, Sound signals. 5 Hrs

Rope Knots and Moorings: Types of knots. Practice of knot formation, Materials of ropes, Strength, Care and maintenance, use of mooring line, heaving line, Rat guards, Canvas and its use. 4 Hrs

Anchors: Different type of anchor. Their use, Dropping and Weighing anchor, Cable stopper. 3 Hrs

Navigation: General knowledge of principal Stars. Sextant, Navigation Compasses, Echo Sounder, Log and uses, barometer and weather classification, G.M.T. and Zonal time, wireless Navigational Instruments, radar satellite-Navigation. 6 Hrs

Life Boats and Life Rafts: Construction, equipment carried, carrying capacity. Davits and their operation, Launching of Life rafts (Inflatable type). Embarkation into lifeboat and Life raft. Survival pack, Stowage and securing arrangement. Rescue boat, immersion suit, Thermal Protective Aid. 8 Hrs

Abandon Ship: Manning of lifeboat and life raft. Muster list, Radio and Alarm signals, Distress signal (S.O.S.). Distress Calls time and Radio frequency. Pyro-techniques. 3 Hrs

Survival at Sea: Survival difficulties and factors, equipment available, Duties of crew members, Initial action on boarding, Maintaining the craft. 3 Hrs

Introduction of MARPOL: Convention and its annexes, Regulatory Control towards environmental pollution at sea. Familiarisation with SOLAS, STCW convention, ISPS code and other maritime codes & conventions. Ill effects of cargo on human and environment.

8 Hrs

Practical: Knots, bends and hitches, Ropes splice, Donning of Life jackets, Life boat drills. Lowering & hoisting of Life boats (model). 8 Hrs

Rescue: Method of Helicopter rescue, evacuation 2 Hrs

REFERENCE BOOKS:

1. Seamanship : J. Dinger
2. Survival in Life Boat : : Capt Puri
3. SOLAS : IMO
4. MARPOL : IMO
5. International light, shape & sound signals : W. Moore
6. Electronic navigation aids : G. Sonnenberg
7. Search and Rescue Manual : I.M.O. Publication
8. Mariner's Hand Book : H.M.S.O.

SEMESTER-II

UG11T3202	MATHEMATICS II	54 HRS

OBJECTIVE: *The course is aimed to understand higher mathematics useful in solving engineering problems*

Fourier Series and Integrals, Periodic Functions, Fourier Series and Euler's Formulae, Fourier Series for Even & Odd Functions and Functions having arbitrary period; Half-range Expansions. Applications of Fourier Series-Rectangular Pulse; Half-wave Rectifier. Fourier Integral, Orthogonal Functions, Gibbs Phenomenon.

10 Hrs

Ordinary Differential Equations of First Order, Basic Concepts, Geometrical Considerations; Isoclines, Formation of Differential Equations, Separable Equation; Equations Reducible to Separable Forms; Exact Differential Equations; Integrating Factors; Linear First Order Differential Equations; Variation of Parameters; Picard's Iteration Method; Families of Curves; Orthogonal Trajectories; Applications to Electrical Circuits. Cauchy's Homogeneous Linear Differential Equation and Legendre's Equation Applications to deflection of beams, struts and columns.

10 Hrs

Ordinary Differential Equation of n^{th} order; Solution of Homogeneous and Non-homogeneous Equations, Method of Undetermined Co-efficient. System of Ordinary Differential Equations,

Phase Plane, Critical Points, Stability. Differential Equation with Variable Co-efficient.

4 Hrs

Laplace Transform, Inverse Transform, Linearity, Laplace Transforms of Derivatives & Integrals; Transformation of Ordinary Differential Equation. Applications, shifting on the 's' and 't' axes; Convolutions, Partial Fractions

10 Hrs

Probability and Statistics; Concept of Probability; Random Experiments, Sample Space, Events; Axioms of Probability; Some important Theorems on Probability; Mutually exclusive events; Conditional Probability; Theorems on Conditional Probability; Independent Events; Bayes' Theorem; Problems and Application on Combinatorial Analysis; Probability using Combinatorial Analysis.

8 Hrs

Random Variables and Probability Distributions; Discrete and Continuous Probability Distributions; Joint Probability Distributions; Independent Random Variables; Conditional Distributions.

4 Hrs

Mathematical Expectations; Theorems on Mathematical Expectations; Variance and Standard Deviation; Standardized Random Variable; Moment Generating Functions; Characteristic Functions; Variance for Joint Distributions, Co-variance; Correlation Co-efficient; Conditional Expectation; Variance & Moment; Chebyshev's Inequality; Law of large numbers; Percentiles; Special Probability Distributions-Binomial, Poisson; Normal and their Properties; Multinomial Distribution;

8 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 – II

UG11T3203	APPLIED THERMODYNAMICS - I	72 HRS

OBJECTIVE: *To impart Applied Thermodynamics knowledge to the students. At the end of the course, the student should get complete knowledge of Gas and Vapour power cycles.*

Ideal Gas Cycles : Gas power cycles – basic considerations, Carnot cycle and its importance, air standard assumptions. Constant Volume cycle, constant pressure cycle, Diesel cycle, Dual combustion cycle, Otto cycle. Reciprocating engines overview – 2 Stroke and 4 Stroke cycle, criteria of performance, compression ratio and thermal efficiency; Indicator diagrams, indicated power, brake power, Friction power, Mechanical Efficiency, Specific Fuel Consumption and applied problems

12 Hrs

Vapour Power Cycles : The Carnot Vapour Cycle, Rankine Cycle, Deviation of Actual Vapor Power Cycles from Idealized Ones, Increasing efficiency of a Rankine cycle, Ideal Reheat Rankine Cycle, Ideal Regenerative Rankine Cycle for open and closed feed systems, Cogeneration, Combined Gas–Vapour Power Cycles and Binary vapour cycle.

16 Hrs

Gas Mixtures : Composition of a Gas Mixture, P-V-T Behaviour of Gas Mixtures: Ideal and Real Gases, Properties of Gas Mixtures: Ideal and Real Gases, Ideal Gas Mixtures and Ideal Solutions, Reversible Mixing Processes, problems on adiabatic mixing.
Dalton's law of partial pressure

16 Hrs

Reciprocating Compressors : Ideal cycle for compressors, Work transfer in single stage compressor, Mass and Volume flow, free air delivery, effect of clearance and volumetric efficiency in single stage compressors, multi-stage compression with clearance and without clearance. Conditions for minimum work input, effect of inter cooling. Types of compressors – Tandem, Inline reciprocating, Rotary positive displacement types, compressed air motors and applied problems.

18 Hrs

Axial Flow Compressors: Principle of Centrifugal Compression and pressure rise in centrifugal compressor, change in angular momentum, pre-whirl and pre-whirl vanes, Mach number at inlet to a centrifugal compressor, slip and slip factor, multi-stage centrifugal compressor.

10 Hrs

REFERENCE BOOKS:

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

SEMESTER-II

UG11T3204	STRENGTH OF MATERIALS-I	72 HRS

OBJECTIVE: *To impart knowledge about stress and strain, Shearing Force and Bending Moment, Thin Walled Shells deflection of Beams design of shafts and thick cylinder in the field of strength of materials.*

Simple Stresses and Strains: Concept of Stress and Strain and their relationship in deformable solids. Normal, shear and hydrostatic stresses and the corresponding strains. Poisson's Ratio and complementary shear stress. Relationship between three elastic constants. Uni-axial loading and deformations; Thermal Stress; Axial Stresses in composite materials.

10 Hrs

Strain Energy in Simple Stresses: Concept of Strain Energy; Strain Energy due to normal and Shear Stresses; Strain Energy due to impact loads; Resilience.

8 Hrs

Shearing Force and Bending Moment: Sign Convention, Relation between Intensity of Loading, Shearing Force and Bending Moment. Graphical construction of Bending Moment & Shear Force diagrams.

10 Hrs

Thin Walled Shells: Stresses and Strains in thin Walled Shells subjected to internal pressure; Stresses and Strains in submersibles. Strengthening of Thin Walled Shells by wire or tape winding. Effect of temperature; Volumetric strain on capacity.

10 Hrs

Welded Joints: Strength of Welded Joints. Torsion effect on welded joint.

6 Hrs

Bending Stress : Pure Bending, Second moment of area, Stresses due to bending. Position of Neutral axis, Radius of Curvature, Combined bending and direct stress. Short Column with eccentric loading. Composite beams. Bending beyond the limit of proportionality.

10 Hrs

Shear and Torsion : Shear Stress and Shear Strain. Twisting of solid and hollow shafts, Stiffness and Strength. Power and Torque relation. Shafts with linear and compound shafts, Partial hollow shafts, Calculation for Coupling bolts, Torsion applied to closed coil springs, springs with axial load, Calculations for mean diameter Of springs, wire diameter & number of coils. Strain Energy in torsion. Plastic yielding of materials in Torsion.

18 Hrs

REFERENC BOOKS :

1. Strength of Materials — G. H. Ryder
2. Strength of Materials — Stephen Timoshenko
3. Strength of Materials — R. K. Rajput
4. Strength of Materials — R. C. Stephens

SEMESTER - II

UG11T3205	COMPUTER SCIENCE	54 HRS

OBJECTIVE: *To provide an awareness to Computing and Programming*

Introduction to Computers

Basic computer organization and architecture, Number systems.

4 Hrs

Computer Software

Computer Software: Types of Software, Software Development Steps, Basic Internet Technology, Computer networking 11 Hrs

Problem Solving and Office Automation Planning the Computer Program: Purpose, Algorithm, Flow Charts, Pseudo code

8 Hrs

Introduction to ANSI C

Overview of ANSI C, Constants, Variables and Data Types, Operators and Expressions, Managing Input and Output operators, Decision Making: Branching and Looping.

20 Hrs

Functions and Pointers

Handling of Character Strings, User defined Functions, Definitions, Declarations, Call by reference, Call by value, Structures and Unions, Pointers, Arrays, Preprocessor.

11 Hrs

REFERENCE BOOKS:

1 Yashwant Kanetkar, "Let Us C"
2 E. Balagurusamy, "Computing Fundamentals and C Programming", Tata McGraw-Hill Publishing Company Limited.
3 Ashok. N. Kamthane, "Computer Programming", Pearson Education (India)
4 Behrouz A. Forouzan and Richard F. Gilberg, "A Structured Programming Approach Using C", Brooks – Cole Thomson Learning Publications.

5 Pradip Dey, Manas Ghoush, "Programming in C", Oxford University Press.
6 Byron Gottfried, "Programming with C", TMH Publications.
7 Stephen G. Kochan, "Programming in C", Pearson Education India.
8 Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson Education Inc.
9 S. Thamarai Selvi and R. Murugan, "C for All", Anuradha Publishers.

SEMESTER - II

UG11T3206	ENGINEERING MECHANICS-II	54 HRS

OBJECTIVE*: To enable the student to correlate the principles of friction, dynamics of rotation with application oriented studies.*

Friction: Static and Kinetic Friction - Laws of Friction; Effort required to pull a body up or down an inclined plane. Friction in Square and V-threaded screws, friction in pivots and collars; Conical bearings and thrust bearings plates. Cone clutches and Centrifugal clutches.

8 Hrs

Dynamics of Rotation : Dynamics of rotating particle and rotating bodies, velocity and acceleration in terms of path variables, cylindrical co-ordinates forces acting on a body having known motion; Torque equation; Work done by application of torque; Kinetic energy of rotation.

Total Kinetic energy of a rolling wheel.

8 Hrs

Periodic Motion : Simple Harmonic motion; Application of S.H.M. to masses and springs. Simple Pendulum and Compound Pendulum. Centrifugal Force and its application to conical pendulum, Unloaded Governor, Curved tracks and machine parts, stress in thin rim due to centrifugal action.

10 Hrs

Drives and Brake: Belt and Rope drives; Open and Cross Belt drive; Belt dimensions; Ratio of belt tension; Modification for V-groove pulleys; Power of Belt drives and maximum power transmitted. Effect of Centrifugal tension; Creep in Belts; Different types of band brakes and block brakes. Dynamometers and their working principles; Absorption Dynamometer Band & Rope Brake Dynamometer, Hydraulic Dynamometer.

18 Hrs

Governors: Function of Governor; Comparison between a Governor and a fly wheel; Various types of Governors; Centrifugal and Inertia types of Governors, Sensitiveness; Stability and Hunting of Governors; Governor effort and Power, Consideration of friction in Governors.

10 Hrs

REFERENCE BOOKS:

1. Applied Mechanics — J. Hannah & M.J. Hillier
2. A text book of Engineering Mechanics — R.S. Khurmi
3. Engineering Mechanics — H. L. Langhaar & A. P. Boresi
4. Applied Mechanics — I B Prasad

SEMESTER-II

UG11T3207	ENGINEERING AND MACHINE DRAWING	72 HRS

OBJECTIVE: *To impart training to students regarding how to draw and to read drawings of various machine components.*

Orthographic Projections: Orthographic Projection in 1st & 3rd angle projections of simple machine components from given isometric drawings; Drawing of third view from the given two views in Orthographic projections. Details of sectioning: Sectioning of components at the central axis; Part sectioning, Off-centre sectioning and Off-set sectioning; Simple assembly drawings with sectional views. 20 Hrs

Pictorial Projections: Isometric and oblique projections. Use of isometric scale. Isometric drawing of simple solids like prisms, Pyramids, cylinders and cones. Sectional views of simple machine components in isometric. 12 Hrs

Projection of Ports: Projection of Port and Openings in hollow cylinders. Parallel cut & radial cut ports; Rectangular & tapered ports in right cylinders; Tapered ports in tapered cylinders; Example of diesel cylinder liners; Steam piston valve liner and blow down cock.

20 Hrs

Thread Formation, Nuts, Bolts and Studs: V-threads and square thread details; Metric & BSP threads; General conventions for drawing of threads in engineering drawings; Standard bolts, studs, nuts & tapped holes; Special bolts & screws e.g. tapped bolts, collar bolts and studs, pinching screws, cheese headed and round headed screws; Various types of locking arrangements of nuts.
20 Hrs

REFERENCE BOOKS:

1. M. B. Shah and B.C. Rana, "Engineering Drawing ", Pearson Education.
2. N.D. Bhatt, "Engineering Drawing" Charotar Publishing House.
3. H. G. Beck, "Reed's, Engineering Drawing for Marine Engineers – Volume II".
4. H. Barr & J.G. Holburn "MacGIBBON'S Pictorial Drawing Book for Marine Engineers"