3.1 THERMODYNAMICS

L T P 4 - 2

(06 hrs)

RATIONALE

A diploma holder in this course is supposed to maintain steam generators, turbines, compressors and other power plant equipment. Therefore, it is essential to impart him basic concepts of thermodynamics, steam generators, steam turbines, compressors and about IC engines.

DETAILED CONTENTS

1. Fundamental Concepts

Thermodynamic state and system, boundary, surrounding, universe, thermodynamic systems – closed, open, isolated, adiabatic, homogeneous and heterogeneous, macroscopic and microscopic, properties of system – intensive and extensive, thermodynamic equilibrium, quasi – static process, reversible and irreversible processes, Zeroth law of thermodynamics, definition of properties like pressure, volume, temperature, enthalpy, internal energy.

2. Laws of Perfect Gases (05 hrs)

Definition of gases, explanation of perfect gas laws – Boyle's law, Charle's law, Avagadro's law, Regnault's law, universal gas constant, Characteristic gas constants, derivation, specific heat at constant pressure, specific heat at constant volume of gas, derivation of an expression for specific heats with characteristics, simple problems on gas equation

3. Thermodynamic Processes on Gases (08 hrs)

Types of thermodynamic processes – isochoric, isobaric, isothermal, hyperbolic, isentropic, polytropic and throttling processes, equations representing the processes, derivation of work done, change in internal energy, change in entropy, rate of heat transfer for the above processes

4. Laws of Thermodynamics (12 hrs)

Laws of conservation of energy, first law of thermodynamics (Joule's experiment), application of first law of thermodynamics to non-flow systems – constant volume, constant pressure, adiabatic and polytropic processes, steady flow energy equation, application of steady flow energy to equation, turbines, pump, boilers, compressors, nozzles, evaporators, limitations, heat source and heat sinks, statement of second laws of thermodynamics: Kelvin Planck's statement, Classius statement, equivalence of

statements, Perpetual motion machine of first kind, second kind, Carnot engine, introduction of third law of thermodynamics, concept of irreversibility, entropy.

Concept of ideal gas, enthalpy and specific heat capacities of an ideal gas, P - V - T surface of an ideal gas, triple point, real gases, Vander-Wall's equation.

Introduction, working principle of two stroke and four stroke cycle, SI engines and CI engines, otto cycle, diesel cycle and dual cycle, location and functions of various parts of IC engines and materials used for them

Meaning of air standard cycle – its use, condition of reversibility of a cycle, description of carnot cycle, otto cycle, diesel cycle, simple problems on efficiency, calculation for different cycles, comparison of otto, diesel cycles for same compression ratio or same peak pressure developed, reasons for highest efficiency of carnot cycle and all other cycles working between same temperature limits

Engine power - indicated and brake power, efficiency - mechanical, thermal, relative and volumetric, methods of finding indicated and brake power, morse test for petrol engine, heat balance sheet, concept of pollutants in SI and CI engines, pollution control, norms for two or four wheelers - EURO - 1, EURO - 2, methods of reducing pollution in IC engines, alternative fuels like CNG, LPG, Hydrogen

Modes of heat transfer, Fourier's law, steady state conduction, composite structures, natural and forced convection, thermal radiation

LIST OF PRACTICALS

- 1. Determination of temperature by
 - i) Thermocouple
 - ii) Pyrometer
 - iii) Infrared thermometer
- 2. Demonstration of mountings and accessories on a boiler.
- 3. Study and demonstration of boilers (through industrial visit)
- 4. Demonstration of air compressors
- 5. Dismantle a two stroke engine; note the function and material of each part, reassemble the engine.

- 6. Dismantle a single cylinder diesel engine. Note the function of each part, reassemble the engine.
- 7. Determination of BHP by dynamometer.

INSTRUCTIONAL STRATEGY

- 1. Use computer based learning aids for effective teaching-learning
- 2. Expose students to real life problems
- 3. Plan assignments so as to promote problem solving abilities and develop continued learning skills

RECOMMENDED BOOKS

- 1. Engineering Thermodynamics by P K Nag; Tata McGraw Hill Publishers, New Delhi
- 2. Engineering Thermodynamics by CP. Arora; Tata McGraw Hill Publishers, New Delhi.
- 3. Thermal Engineering by RK Purohit; Standard Publishers Distributors, New Delhi.

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	06	10
2.	05	08
3.	08	12
4.	12	16
5.	06	10
6.	09	14
7.	06	10
8.	09	14
9.	03	06
Total	64	100

3.2 APPLIED MECHANICS

RATIONALE

The subject Applied Mechanics deals with basic concepts of mechanics like laws of forces, moments, friction, centre of gravity, laws of motion and simple machines which are required by the students for further understanding of other allied subjects. The subject enhances the analytical ability of the students.

DETAILED CONTENTS

1. Introduction

- 1.1 Concept of engineering mechanics definition of mechanics, statics, dynamics, application of engineering mechanics in practical fields. Definition of Applied Mechanics.
- 1.2 Definition, basic quantities and derived quantities of basic units and derived units
- 1.3 Different systems of units (FPS, CGS, MKS and SI) and their conversion from one to another for density, force, pressure, work, power, velocity, acceleration
- 1.4 Concept of rigid body, scalar and vector quantities
- 2. Laws of forces
 - 2.1 Definition of force, measurement of force in SI units, its representation, types of force: Point force/concentrated force & Uniformly distributed force, effects of force, characteristics of a force
 - 2.2 Different force systems (coplanar and non-coplanar), principle of transmissibility of forces, law of super-position
 - 2.3 Composition and resolution of coplanar concurrent forces, resultant force, method of composition of forces, laws of forces, triangle law of forces, polygon law of forces - graphically, analytically, resolution of forces, resolving a force into two rectangular components
 - 2.4 Free body diagram
 - 2.5 Equilibrant force and its determination
 - 2.6 Lami's theorem (concept only)' [Simple problems on above topics]

3. Moment

- 3.1 Concept of moment
- 3.2 Moment of a force and units of moment
- 3.3 Varignon's theorem (definition only)
- 3.4 Principle of moment and its applications (Levers simple and compound, steel yard, safety valve, reaction at support)

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2

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3

(9 hrs)

(9 hrs)

(04 hrs)

- 3.5 Parallel forces (like and unlike parallel force), calculating their resultant
- 3.6 Concept of couple, its properties and effects
- 3.7 General conditions of equilibrium of bodies under coplanar forces
- 3.8 Position of resultant force by moment [Simple problems on the above topics]
- 4. Friction
 - 4.1 Definition and concept of friction, types of friction, force of friction
 - 4.2 Laws of static friction, coefficient of friction, angle of friction, angle of repose, cone of friction
 - 4.3 Equilibrium of a body lying on a horizontal plane, equilibrium of a body lying on a rough inclined plane.
 - 4.4 Calculation of least force required to maintain equilibrium of a body on a rough inclined plane subjected to a force:
 - a) Acting along the inclined plane Horizontally
 - b) At some angle with the inclined plane

5. Centre of Gravity

- 5.1 Concept, definition of centroid of plain figures and centre of gravity of symmetrical solid bodies
- 5.2 Determination of centroid of plain and composite lamina using moment method only, centroid of bodies with removed portion
- 5.3 Determination of center of gravity of solid bodies cone, cylinder, hemisphere and sphere; composite bodies and bodies with portion removed *[Simple problems on the above topics]*
- 6. Simple Machines
 - 6.1. Definition of effort, velocity ratio, mechanical advantage and efficiency of a machine and their relationship, law of machines
 - 6.2. Simple and compound machine (Examples)
 - 6.3. Definition of ideal machine, reversible and self locking machine
 - 6.4. Effort lost in friction, Load lost in friction, determination of maximum mechanical advantage and maximum efficiency
 - 6.5. System of pulleys (first, second, third system of pulleys), determination of velocity ratio, mechanical advantage and efficiency
 - 6.6. Working principle and application of wheel and axle, Weston's Differential Pulley Block, simple screw jack, worm and worm wheel, single and double winch crab. Expression for their velocity ratio and field of their application [Simple problems on the above topics]

(9 hrs)

(8 hrs)

(9 hrs)

LIST OF PRACTICALS

- 1. Verification of the polygon law of forces using gravesend apparatus.
- 2. To verify the forces in different members of jib crane.
- 3. To verify the reaction at the supports of a simply supported beam.
- 4. To find the mechanical advantage, velocity ratio and efficiency in case of an inclined plane.
- 5. To find the mechanical advantage, velocity ratio and efficiency of a screw jack.
- 6. To find the mechanical advantage, velocity ratio and efficiency of worm and worm wheel.
- 7. To find mechanical advantage, velocity ratio and efficiency of single purchase crab.
- 8. To find out center of gravity of regular lamina.
- 9. To find out center of gravity of irregular lamina.
- 10. To determine coefficient of friction between three pairs of given surface.

INSTRUCTIONAL STRATEGY

- 1. Use computer based learning aids for effective teaching-learning
- 2. Expose students to real life problems
- 3. Plan assignments so as to promote problem solving abilities and develop continued learning skills

RECOMMENDED BOOKS

- A Text Book of Applied Mechanics by S Ramamurtham, Dhanpat Rai Publishing Co. Ltd.
- 2. Applied Mechanics by, Col. Harbhajan Singh, TL Singla and Parmod Kumar Singla Published By Abhishek Publication, Chandigarh
- A Text Book of Engineering Mechanics (Applied Mechanics) by RK Khurmi; S Chand and Co. Ltd., New Delhi.
- 4. A Text Book of Applied Mechanics by RK Rajput; Laxmi Publications, New Delhi..
- Text Book of Applied Mechanics by Birinder Singh, Kaption Publishing House, New Delhi.

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	4	8
2	9	20
3	9	20
4	9	18
5	8	16
6	9	18
Total	48	100

81

3.3 ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING

L T Р 3 _ 2

RATIONALE

The objective of this subject is to impart fundamental knowledge and skills regarding basic electrical and electronics engineering, which diploma holders will come across in their professional life. This course will provide the students to understand the basic concepts and principles of d.c. and a.c. fundamentals, electromagnetic induction, batteries, transformers, motors distribution system, domestic installation, electrical safety etc. The students will also learn basic electronics including diodes and transistors and their applications.

DETAILED CONTENTS

1. (03 hrs) Application and Advantage of Electricity

Difference between ac and dc, various applications of electricity, advantages of electrical energy over other types of energy

2. **Basic Electrical Quantities** (04 hrs)

Definition of voltage, current, power and energy with their units, name of instruments used for measuring above quantities, connection of these instruments in an electric circuit

Electromagnetic induction-Faraday's Laws, Lenz's Law; Fleming's rules, Principles of a.c. Circuits; Alternating emf, Definition of cycle, frequency, amplitude and time period. Instantaneous, average, r.m.s and maximum value of sinusoidal wave; form factor and Peak Factor. Concept of phase and phase difference. Concept of resistance, inductance and capacitance in simple a.c. circuit. Power factor and improvement of power factor by use of capacitors. Concept of three phase system; star and delta connections; voltage and current relationship (no derivation)

4. Transformers

> Working principle and construction of single phase transformer, transformer ratio, emf equation, losses and efficiency, cooling of transformers, isolation transformer, CVT, auto transformer (brief idea), applications.

(06 hrs)

5. **Distribution System**

> Difference between high and low voltage distribution system, identification of three-phase wires, neutral wire and earth wire in a low voltage distribution system. Identification of voltages between phases and between one phase and neutral. Difference between three-phase and single-phase supply

6. Electric Motor

> Description and applications of single-phase and three-phase motors. Connection and starting of three-phase induction motors by star-delta starter. Changing direction of rotation of a given 3 phase induction motor. Motors used for driving pumps, compressors, centrifuge, dvers etc. Totally enclosed submersible and flame proof motors

7. **Domestic Installation** (06 hrs)

Distinction between light-fan circuit and single phase power circuit, sub-circuits, various accessories and parts of domestic electrical installation. Identification of wiring systems. Common safety measures and earthing

Electrical shock and precautions against shock, treatment of electric shock, concept of fuses and their classification, selection and application, concept of earthing and various types of earthing, applications of MCBs and ELCBs

9. Batteries (02 hrs)

Construction, charging and maintenance of load and batteries, maintenance free batteries

10. **Basic Electronics**

> Basic idea of semiconductors - P and N type; diodes, zener diodes and their applications, transistor - PNP and NPN, their characteristics and uses. Characteristics and applications of a thyristor, characteristics and applications of stepper motors and servo motors in process control.

LIST OF PRACTICALS

- 1. Connection of a three-phase motor and starter with fuses and reversing of direction of rotation
- 2. Connection of a single-phase induction motor with supply and reversing of its direction of rotation
- Charging and testing of a lead acid battery 3.

(06 hrs)

82

(08 hrs)

(05 hrs)

- 4. Troubleshooting in domestic wiring system, including distribution board
- 5. Connection and reading of an electric energy meter
- 6. Use of ammeter, voltmeter, wattmeter, and multi-meter
- 7. Measurement of power and power factor in a given single phase ac circuit
- 8. Study of different types of fuses, MCBs and ELCBs
- 9. Study of zener as a constant voltage source and to draw its V-I characteristics
- 10. Study of earthing practices
- 11. To draw V-I characteristics of a (i) NPN transistor (ii) thyristor (SCR)
- 12. Study of construction and working of a (i) stepper motor and (ii) servo motor

INSTRUCTIONAL STRATEGY

The teacher should give emphasis on understanding of concept and various terms used in the subject. Practical exercises will reinforce various concepts.

RECOMMENDED BOOKS

- 1. Basic Electrical Engineering by PS Dhogal; Tata McGraw Hill Publishers, New Delhi
- 2. A Text Book of Electrical Technology, Vol. I and II by BL Thareja; S Chand and Co., New Delhi
- 3. Basic Electricity by BR Sharma; Satya Prakashan, New Delhi
- 4. Basic Electrical Engineering by JB Gupta, S Kataria and Sons, Delhi
- 5. Experiments in Basic Electrical Engineering by SK Bhattacharya and KM Rastogi, New Age International Publishers Ltd., New Delhi
- 6. Basic Electronics by VK Mehta; S Chand and Co., New Delhi
- 7. Electrical Machines by SK Bhattacharya; Tata McGraw Hill, New Delhi
- Basic electronics and Linear circuits by NN Bhargava and Kulshreshta, Tata Mc Graw Hill New Delhi.
- 9. Electronic principles by SK Sahdev, Dhanpat Rai and Sons, New Delhi.
- Electronic Devices and circuits by Rama Raddy Narora Publishing House Pvt. Ltd. New Delhi.
- Principles of electrical and electronics Engineering by VK Mehta; S Chand and Co. New Delhi

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	03	06
2	04	08
3	04	10
4	06	12
5	06	12
6	08	16
7	06	12
8	04	10
9	02	04
10	05	10
Total	48	100

3.4 INTRODUCTION TO AERONAUTICS

RATIONALE

This course forms the first exposure to the discipline of Aeronautical Engineering. It starts with familiarization of airplanes and helicopters. The subject is built up slowly and steadily by introducing the terminology and basis of flight mechanics, airplane structures, power plant, systems etc. At the end of the subject, the student will be fully acquainted with the basics of Aeronautical engineering.

DETAILED CONTENTS

1. Introduction

4.

Airplane Propulsion

Mankind's desire to fly, various efforts in Pre-Wright Brothers era, brief historical sketch, Wright flyer, earlier types of flying machines, development of aeronautics, progress in Aircraft design and applications, different types of heavier than air vehicles along with prominent features. Airplane, Helicopter, Hovercraft, V/STOL machines, modern developments

2.	Airplane Aerodynamics	(10 hrs
4.	All plane Actouynamics	(10 11

Nomenclature used in Aerodynamics, different parts of airplane, Wing as lifting surface, Types of wing plan forms, Aerodynamic features like Aerofoil pressure distribution, Aerodynamic forces and moments, Lift and Drag. Drag polar, L/D ratio, high lift devices, Airplane performance like Thrust/Power available, climb and glide, maximum range and endurance, take off and landings, Illustrations through sketches/plots.

3.	Airplane Stability and Control	(7 hrs)
5.	in plane blability and control	(7 115

Airplane axis system, forces and moments about longitudinal, lateral and vertical axes, equilibrium of forces developed on wing and horizontal tail, centre of gravity, its importance in stability and control. Control surfaces, elevators ,ailerons ,and rudder

Requirement of power, various means of producing power, Brief description of thermodynamics of engines, Piston engines, Jet engines. Engine airframe combinations of various types, their performance, detailed functioning of components of a Piston-Prop engine, use of propellers as means of producing forward thrust, functioning of Jet engine, turbo-prop, turbo-fan, turbo-shaft, Prop-fan, possible locations of power plant on airplane

LTP

(7 hrs)

(10 hrs)

4

5.	Airplane Structure, Materials and Production	(9 hrs)
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Structural arrangement of earlier airplane, developments leading to all metal aircraft, Strength to weight ratio - choice of aircraft materials for different parts, detailed description of wing, tail and fuselage joints, stress-strain diagrams, plane and space, trusses, loads on airplane components, mechanical properties of materials.

Flight instruments, air speed indicators, altimeters, rate of climb/descent meter, gyro based instruments, engine performance measuring instruments, basic instruments in avionics.

Elementary ideas about hydraulic and pneumatic systems, pressurization, temperature control and oxygen system, system integration, accessories, aircraft electrical system: generation and distribution of electricity on board the airplane, flight control system temperature / environment, aircraft fuel system, fire protection, ice and rain protection system.

Basic steps in airplane design, airplane specification, part/component wise specification, design and testing for certification, airworthiness requirements, air safety requirements and standards.

INSTRUCTIONAL STRATEGY

- 1. Use computer based learning aids for effective teaching-learning
- 2. Expose students to real life problems about aeronautics
- 3. Plan assignments so as to promote problem solving abilities and develop continued learning skills

RECOMMENDED BOOKS

- 1. Fundamentals of Flight by YR S Shevell; Prentice Hall
- 2. Aircraft Instruments by E H J Pallet; Himalayan Books
- 3. Introduction to Flight by John Anderson Jr.; McGraw Hill
- 4. Aircraft Electrical Systems by E H J Pallet; Himalayan Books
- 5. Jet Engine Manual by E W Somerset Maugham, BIP Publications
- 6. Fundamentals of Flight by Dr. O. P. Sharma and Lalit Gupta.

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	07	10
2	10	16
3	07	10
4	10	16
5	09	14
6	06	10
7	08	14
8	07	10
Total	64	100

3.5 AIRCRAFT MATERIAL & PROCESSES

RATIONALE

Introduction

1

The knowledge of high strength over weight ratio of materials required in Aeronautical Engineering should be taught to students at this stage. The need for surface treatments against corrosion and for improved strengths is essential. In this regard, various processes of manufacturing are studied in this subject by students.

DETAILED CONTENTS

Properties of flight vehicle materials, importance of strength/weight ratio of materials for aerospace vehicles structures, importance of temperature variations, factors affecting choice of material for different parts of airplane

2. Wood and Fabrics (6 hrs) General uses of wood, classification of woods, structure of wood, strength properties of wood, defects in wood, airplane fabrics and its strengthening techniques.

3. Light Metal Alloys (7 hrs)

Aluminium alloys, heat treatment, high strength and high corrosion alloys. magnesium alloys and their properties, heat treatment, application of these alloys to aerospace vehicles.

4. Aircraft Steels (7 hrs)

classical of alloys steels, effect of alloying elements, carbon steel verses alloys. magnesium alloys and their properties, heat treatment, application to aerospace vehicle of these alloys.

5. High Strength and Heat Resistant Alloys (10 hrs)

Classification of heat resistant materials, iron, nickel and cobalt base alloys, refractory materials, ceramics, titanium and its alloys, properties of inconel monal & k-monal, nimonic and super alloys; application to aerospace vehicles

6. Metal Joining Processes (8 hrs)

Weldability, standard welding practices e.g. gas welding, resistance welding, welding of light alloys, riveting.

6

LTP

4

(6 hrs)

Definition, classification and characteristics of composite materials - fibrous composites, laminated composites, particulate composites, properties and types of reinforcement and matrix materials

8. Fiber Reinforced Plastic Processing (10 hrs)

Lay-up and curing, fabricating process - open and closed mould process - hand lay-up techniques, structural laminate bag moulding, production procedures for bag moulding

LIST OF PRACTICALS

- 1) Heat treatment of steel alloys, study of microstructure before and after heat treatment
- 2) Exercise in welding, riveting and spot welding
- 3) Fabrication of fuselage and wing panel/parts
- 4) Demonstration of composite production by Hand lay-up method
- 5) Demonstration of mould preparation through compression moulding
- 6) Demonstration of Sandwich testing for composite material
- 7) Preparation of aircraft models and parts on Lathe

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should show various types of engineering materials to the students. Students should be asked to collect samples of various materials available in the market. Visits to industry should be planned to demonstrate use of various types of materials or Heat Treatment Processes in the industry.

RECOMMENDED BOOKS

- 1. Workshop technology by WAJ Chapman; Replika Press Pvt. Ltd.
- 2. Aircraft Material and Processes by G F Titterton; Himalayan Books, New Delhi
- 3. Advanced Composite materials by Lalit Gupta; Himalayan Books, New Delhi

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	10
2	06	10
3	07	12
4	07	12
5	10	14
6	08	14
7	10	14
8	10	14
Total	64	100

SUGGESTED DISTRIBUTION OF MARKS

(10 hrs)

3.6 **MECHANICS OF FLUID**

RATIONAL

An aircraft capable of flying in spite of its large weight. It has particular shape and becomes air borne with certain speeds. In order to appreciate the principle involved in flying, it is essential to gain knowledge and skill in the area of mechanics of fluids applied to flying

DETAILED CONTENTS

1. **Basic Concepts and Properties**

Fluid – definition, distinction between solid and fluid , units and dimensions, properties of fluids - density, specific weight, specific volume, specific gravity, temperature, viscosity, compressibility, vapour pressure, capillary and surface tension, fluid statics: concept of fluid static pressure, absolute and gauge pressures, pressure measurements by manometers and pressure gauges.

Concept of pressure, Pascal's law and its engineering applications, hydrostatic paradox, action of fluid pressure on a plane (horizontal, vertical and inclined) submerged surface, resultant force and center of pressure, force on a curved surface due to hydrostatic pressure. buoyancy and flotation, stability of floating and submerged bodies, metacentre height and its determination, periodic time of oscillation, pressure distribution in a liquid subjected to constant horizontal/ vertical acceleration, rotation of liquid in a cylindrical container.

Classification of fluid flows, velocity and acceleration of fluid particle, local and convective acceleration, normal and tangential acceleration, streamline, path line and streak line, flow rate and discharge mean velocity, continuity equation in Cartesian and cylindrical, polar coordinates, rotational flows, rotation velocity and circulation, stream and velocity potential functions, flow net

4. Fluid Dynamics

Euler's equation, Bernoulli's equation and steady flow energy equation, representation of energy changes in fluid system, impulse momentum equation, kinetic energy and momentum correction factors, flow along a curved streamline, free and forced vortex motions.

LTP 4 0 2

(12 hrs)

(9 hrs)

5. Dimensional Analysis and Similitude (14 hrs)

Fundamental and derived units and dimensions, dimensional homogeneity, Rayleigh's and Buckingham's Pi method for dimensional analysis, dimensionless numbers and their significance, geometric, kinematic and dynamic similarity, model studies, laminar and turbulent flows: flow regimes and reynolds number, critical velocity and critical Reynolds number, laminar flow in circular cross- section pipes, turbulent flows and flow losses in pipes, Darcy equation, minor head losses in pipes and pipe fittings, hydraulic and energy gradient lines.

6. Flow Measurement (7 hrs)

Manometers, pitot tubes, venturi meter and orifice meters, orifice, mouthpieces, notches and weirs, rotameter

LIST OF PRACTICALS

- 1) Study and demonstrate the flow through a variable area duct and verify Bernoulli's energy equation
- 2) Study and demonstration of the transition from laminar to turbulent flow and to ascertain the lower critical Reynolds number
- 3) To determine the hydraulic coefficients for flow through an orifice
- 4) To determine the friction coefficients for pipes of different diameters
- 5) To determine the head loss in a pipe line due to sudden expansion/ sudden contraction/ bend
- 6) To determine the velocity distribution for pipeline flow with a pitot static probe

INSTRUCTIONAL STRATEGY

Mechanics of fluid being a fundamental subject, teachers are expected to lay considerable stress on understanding the basic concepts, principles and their applications. For this purpose, teachers are expected to give simple problems in the class room and provide tutorial exercises so as to develop necessary knowledge for comprehending the basic concepts and principles. As far as possible, the teaching of the subject be supplemented by demonstrations and practical work in the laboratory.

RECOMMENDED BOOKS

- 1. Fundamentals of Aerodynamics by Anderson J.D; McGraw-Hill Book Co., New York, 1985
- 2. A TextBook of Fluid Mechanics by R K Bansal; Laxmi Publication
- 3. Aerodynamics for Engineering students by Houghton E.L. and Carruthers N.B; Edward Arnold Publishers Ltd., London, 1989.
- 4. Theoretical aerodynamics by Milne Thomson L.H.; Macmillan, 1985

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	12	18
2	12	18
3	10	16
4	09	15
5	14	22
6	07	11
Total	64	100

ECOLOGY AND ENVIRONMENTAL AWARENESS CAMP

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

This is to be organized at a stretch for 3 to 4 days. Lectures will be delivered on following broad topics. There will be no examination for this subject.

- 1. Basics of ecology, eco system and sustainable development
- 2. Conservation of land reforms, preservation of species, prevention of advancement of deserts and lowering of water table
- 3. Sources of pollution natural and man made, their effects on living and non-living organisms
- 4. Pollution of water causes, effects of domestic wastes and industrial effluent on living and non-living organisms
- 5. Pollution of air-causes and effects of man, animal, vegetation and non-living organisms
- 6. Sources of noise pollution and its effects
- 7. Solid waste management; classification of refuse material, types, sources and properties of solid wastes, abatement methods
- 8. Mining, blasting, deforestation and their effects
- 9. Legislation to control environment
- 10. Environmental Impact Assessment (EIA), Elements for preparing EIA statements
- 11. Current issues in environmental pollution and its control
- 12. Role of non-conventional sources of energy in environmental protection