

**PROCEDURE MANUAL****MODULES AND SYLLABUS COVERAGE: THEORY & PRACTICAL**
B1.1 (Aeroplane Turbine) --- (2620Hrs)
SEMESTER WISE BREAK-UP

MODULE	THEORY	PRACTICAL IN-HOUSE	AMO
Semester – I: 3 Electrical Fundamentals-I	36	48	X
4 Electronic Fundamentals	90	48	X
8 Basic Aerodynamics	90	48	X
10 Aviation Legislation-I	72	X	X

	288	144	X
Semester – II: 3 Electrical Fundamentals-II	80	50	X
5 Digital Techniques Electronic Instrument Systems-I	40	50	X
7A Maintenance Practices-I	80	50	X
10 Aviation Legislation-II	120	X	X

	320	150	X
Semester – III: 5 Digital Techniques Electronic Instrument Systems-II	80	40	X
6 Materials and Hardware-I	80	40	X
7A Maintenance Practices-II	80	40	X
11-A Turbine Aeroplane Aerodynamics, Structures and systems -I (Electricals)	80	40	X

	320	160	X



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MODULES AND SYLLABUS COVERAGE: THEORY & PRACTICAL
B1.1 (Aeroplane Turbine) --- (2620Hrs)
SEMESTER WISE BREAKUP

MODULE	THEORY	PRACTICAL	
		IN-HOUSE	AMO
Semester – IV: 6 Materials and Hardware-II	80	50	X
9A Human Factors	80	X	X
11A Turbine Aeroplane Aerodynamics, Structures and systems –II (Air Frame)	80	50	X
15 Gas turbine Engine-I	80	50	X
AMO	X	X	144

	320	150	144
Semester – V: 11-A Turbine Aeroplane Aerodynamics, Structures and systems-III (Air Frame)	80	40	X
11-A Turbine Aeroplane Aerodynamics, Structures and systems-IV (Avionics)	80	40	X
15 Gas turbine Engine-II	80	40	X
17A Propeller	80	40	X
AMO	X	X	144

	320	160	144
GRAND TOTAL:	1568	764	288



**SYLLABUS
CATEGORY B1.1
SEMESTER – I (Theory)**

MODULE 3. ELECTRICAL FUNDAMENTALS-I

(36 Hours)

3.1 Electron Theory (Level 1)

Structure and distribution of electrical charges within: atoms, molecules, ions, compounds; Molecular structure of conductors, semiconductors and insulators.

3.2 Static Electricity and Conduction (Level 2)

Static electricity and distribution of electrostatic charges; Electrostatic laws of attraction and repulsion;

Units of charge, Coulomb's Law; Conduction of electricity in solids, liquids, gases and a vacuum.

3.3 Electrical Terminology (Level 2)

The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.

3.4 Generation of Electricity (Level 1)

Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.

3.5 DC Sources of Electricity (Level 2)

Construction and basic chemical action of: primary cells, secondary cells, lead acid cells, nickel cadmium cells, other alkaline cells; Cells connected in series and parallel; Internal resistance and its effect on a battery; Construction, materials and operation of thermocouples; Operation of photo-cells.

3.6 DC Circuits (Level 2)

Ohms Law, Kirchoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage and current; Significance of the internal resistance of a supply.

3.7 Resistance/Resistor

(a)(Level 2)

Resistance and affecting factors; Specific resistance; Resistor colour code, values and tolerances, preferred values, wattage ratings Resistors in series and parallel; Calculation of total resistance using series, parallel and series parallel combinations; Operation and use of potentiometers and rheostats; Operation of Wheatstone Bridge.



(b)(Level 1)

Positive and negative temperature coefficient conductance;
Fixed resistors, stability, tolerance and limitations, methods of construction;
Variable resistors, thermistors, voltage dependent resistors;
Construction of potentiometers and rheostats;
Construction of Wheatstone Bridge;

3.8 Power (Level 2)

Power, work and energy (kinetic and potential);
Dissipation of power by a resistor;
Power formula;

3.9 Capacitance/Capacitor (Level 2)

Operation and function of a capacitor;
Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric constant, working voltage, voltage rating;
Capacitor types, construction and function;
Capacitor colour coding;
Calculations of capacitance and voltage in series and parallel circuits;
Exponential charge and discharge of a capacitor, time constants;
Testing of capacitors.



PROCEDURE MANUAL

**CATEGORY B1.1
SEMESTER – I (Theory)**

MODULE 4. ELECTRONIC FUNDAMENTALS

(90 Hours)

4.1 Semiconductors

4.1.1 Diodes

(a) (Level 2)

Diode symbols;

Diode characteristics and properties;

Diodes in series and parallel;

Main characteristics and use of silicon controlled rectifiers (thyristors), light emitting diode, photo conductive diode, varistor, rectifier diodes;

Functional testing of diodes.

4.1.2 Transistors

(a) (Level 1)

Transistor symbols;

Component description and orientation;

Transistor characteristics and properties

4.1.3 Integrated Circuits

(a)(Level 1)

Description and operation of logic circuits and linear circuits/operational amplifiers.

4.2 Printed Circuit Boards (Level 1)

Description and use of printed circuit boards.

4.3 Servomechanisms

(a)(Level 1)

Understanding of the following terms: Open and closed loop systems, feedback, follow up, analogue transducers; Principles of operation and use of the following synchro system components/features: resolvers, differential, control and torque, transformers, inductance and capacitance transmitters.



PROCEDURE MANUAL

**CATEGORY B1.1
SEMESTER – I (Theory)**

MODULE 8. BASIC AERODYNAMICS

(90 Hours)

8.1 Physics of the Atmosphere (Level 2)

International Standard Atmosphere (ISA), application to aerodynamics.

8.2 Aerodynamics (Level 2)

Airflow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, up wash and downwash, vortices, stagnation;

The terms: camber, chord, mean aerodynamic chord, profile (parasite) drag, induced drag, centre of pressure, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio; Thrust, Weight, Aerodynamic Resultant; Generation of Lift and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall; Aerofoil contamination including ice, snow, frost.

8.3 Theory of Flight (Level 2)

Relationship between lift, weight, thrust and drag; Glide ratio; Steady state flights, performance;

Theory of the turn; Influence of load factor: stall, flight envelope and structural limitations; Lift augmentation.

8.4 Flight Stability and Dynamics (Level 2)

Longitudinal, lateral and directional stability (active and passive).



PROCEDURE MANUAL

**CATEGORY B1.1
SEMESTER – I (Theory)**

MODULE 10. AVIATION LEGISLATION-1

(72 Hours)

10.1 Regulatory Framework (Level 1)

Role of International Civil Aviation Organisation;

The Aircraft Act and Rules made there under Role of the DGCA; Relationship between CAR-21, CAR-M, CAR-145, CAR-66, CAR 147The Aircraft Rules (Applicable to Aircraft Maintenance and Release)Aeronautical Information Circulars (Applicable to Aircraft Maintenance and Release)CAR Sections 1 and 2.

10.3 CAR-145 — Approved Maintenance Organisations (Level 2)

Detailed understanding of CAR-145 and CAR M Subpart F

10.5 Aircraft Certification

(b) Documents -(Level 2)

Certificate of Airworthiness;

Certificate of Registration;

Noise Certificate;

Weight Schedule;

Radio Station Licence and Approval.



**CATEGORY B1.1
SEMESTER – II (Theory)**

MODULE 3. ELECTRICAL FUNDAMENTALS-II

(80 Hours)

3.10 Magnetism

(a)(Level 2)

Theory of magnetism; Properties of a magnet Action of a magnet suspended in the Earth's magnetic field;

Magnetisation and demagnetisation; Magnetic shielding; Various types of magnetic material;

Electromagnets construction and principles of operation; Hand clasp rules to determine: magnetic field around current carrying conductor.

(b)(Level 2)

Magneto motive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents; Precautions for care and storage of magnets.

3.11 Inductance/Inductor (Level 2)

Faraday's Law; Action of inducing a voltage in a conductor moving in a magnetic field; Induction principles; Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductor turns; Mutual induction; The effect the rate of change of primary current and mutual inductance has on induced voltage; Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other; Lenz's Law and polarity determining rules; Back emf, self induction; Saturation point; Principle uses of inductors;

3.12 DC Motor/Generator Theory (Level 2)

Basic motor and generator theory; Construction and purpose of components in DC generator; Operation of, and factors affecting output and direction of current flow in DC generators; Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors; Series wound, shunt wound and compound motors; Starter Generator construction.



3.13 AC Theory (Level 2)

Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power, Triangular/Square waves; Single/3 phase principles.

3.14 Resistive (R), Capacitive (C) and Inductive (L) Circuits (Level 2)

Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel; Power dissipation in L, C and R circuits; Impedance, phase angle, power factor and current calculations; True power, apparent power and reactive power calculations.

3.15 Transformers (Level 2)

Transformer construction principles and operation; Transformer losses and methods for overcoming them;
Transformer action under load and no-load conditions; Power transfer, efficiency, polarity markings;
Calculation of line and phase voltages and currents; Calculation of power in a three phase system;
Primary and Secondary current, voltage, turns ratio, power, efficiency; Auto transformers.

3.16 Filters (Level 1)

Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.

3.17 AC Generators (Level 2)

Rotation of loop in a magnetic field and waveform produced; Operation and construction of revolving armature and revolving field type AC generators; Single phase, two phase and three phase alternators; Three phase star and delta connections advantages and uses; Permanent Magnet Generators.

3.18 AC Motors (Level 2)

Construction, principles of operation and characteristics of: AC synchronous and induction motors both single and poly phase; Methods of speed control and direction of rotation; Methods of producing a rotating field: capacitor, inductor, shaded or split pole.



**CATEGORY B1.1
SEMESTER – II (Theory)**

**MODULE 5. DIGITAL TECHNIQUES ELECTRONIC INSTRUMENT SYSTEMS-I
(40 Hours)**

5.1 Electronic Instrument Systems (Level 2)

Typical systems arrangements and cockpit layout of electronic instrument systems.

5.2 Numbering Systems (Level 1)

Numbering systems: binary, octal and hexadecimal; Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa.

5.3 Data Conversion (Level 1)

Analogue Data, Digital Data; Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.

5.4 Data Buses(Level 2)

Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications.

5.5 Logic Circuits(Level 2)

Identification of common logic gate symbols, tables and equivalent circuits; Applications used for aircraft systems, schematic diagrams.



PROCEDURE MANUAL

**CATEGORY B1.1
SEMESTER – II (Theory)**

MODULE 7A. MAINTENANCE PRACTICES-I

(80 Hours)

7.1 Safety Precautions-Aircraft and Workshop (Level 3)

Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. Also, instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.

7.2 Workshop Practices (Level 3)

Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards.

7.3 Tools (Level 3)

Common hand tool types; Common power tool types; Operation and use of precision measuring tools;
Lubrication equipment and methods. Operation, function and use of electrical general test equipment;

7.4 Avionic General Test Equipment (Level 2)

Operation, function and use of avionic general test equipment.

7.5 Engineering Drawings, Diagrams and Standards (Level 2)

Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information - Microfilm, microfiche and computerised presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL;
Wiring diagrams and schematic diagrams.

7.6 Fits and Clearances (Level 2)

Drill sizes for bolt holes, classes of fits;
Common system of fits and clearances;
Schedule of fits and clearances for aircraft and engines;
Limits for bow, twist and wear; Standard methods for checking shafts, bearings and other parts.



7.7 Electrical Wiring Interconnection System (EWIS)(Level 3)

Continuity, insulation and bonding techniques and testing; Use of crimp tools: hand and hydraulic operated;

Testing of crimp joints; Connector pin removal and insertion; Co-axial cables: testing and installation precautions; Identification of wire types, their inspection criteria and damage tolerance.

Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding. EWIS installations, inspection, repair, maintenance and cleanliness standards.

7.8 Riveting (Level 2)

Riveted joints, rivet spacing and pitch;
Tools used for riveting and dimpling;
Inspection of riveted joints.

7.9 Pipes and Hoses (Level 2)

Bending and belling/flaring aircraft pipes;
Inspection and testing of aircraft pipes and hoses;
Installation and clamping of pipes.

7.10 Springs (Level 2)

Inspection and testing of springs.

7.11 Bearings(Level 2)

Testing, cleaning and inspection of bearings;
Lubrication requirements of bearings;
Defects in bearings and their causes.

7.12 Transmissions (Level 2)

Inspection of gears, backlash;
Inspection of belts and pulleys, chains and sprockets;
Inspection of screw jacks, lever devices, push-pull rod systems.



PROCEDURE MANUAL

**CATEGORY B1.1
SEMESTER – II (Theory)**

MODULE 10. AVIATION LEGISLATION-II

(120 Hours)

10.2 CAR-66 Certifying Staff - Maintenance (Level 2)

Detailed understanding of CAR-66.

10.4 Aircraft Operations (Level 1)

Commercial Air Transport/Commercial Operations

Air Operators Certificates; Operators Responsibilities, in particular regarding continuing airworthiness and maintenance; Documents to be carried on board; Aircraft Placarding (Markings);

10.5 Aircraft Certification

(a) General - (Level 1)

Certification rules: such as FAA & EACS 23/25/27/29; Type Certification; Supplemental Type Certification;

CAR-21 Design/Production Organisation Approvals.

Aircraft Modifications and repairs approval and certification

Permit to fly requirements

10.6 CAR-M(Level 2)

Detail understanding of CAR M provisions related to Continuing Airworthiness

Detailed understanding of CAR-M.

10.7 Applicable National and International Requirements

(a)(Level 2)

Maintenance Programme, Maintenance checks and inspections; Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists; Airworthiness Directives; Service Bulletins, manufacturers service information; Modifications and repairs; Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.;

(b) (Level 1)

Continuing airworthiness; Test flights; ETOPS /EDTO , maintenance and dispatch requirements;

RVSM, maintenance and dispatch requirements RNP, MNPS Operations.

All Weather Operations, Category 2/3 operations and minimum equipment requirements.

10.8 Safety Management System (Level 2)

State Safety Programme Basic Safety Concepts, Hazards & Safety Risks

SMS Operation, SMS Safety performance, Safety Assurance

10.9 Fuel Tank Safety (Level 2)

Special Federal Aviation Regulations (SFARs) from 14 CFR SFAR 88 of the FAA and of JAA TGL 47, Concept of CDCCL,

Airworthiness Limitations Items (ALI)



PROCEDURE MANUAL

**CATEGORY B1.1
SEMESTER – III (Theory)**

**MODULE 5. DIGITAL TECHNIQUES ELECTRONIC INSTRUMENT SYSTEMS-II
(80 Hours)**

5.6 Basic Computer Structure(Level 2)

Computer terminology (including bit, byte, software, hardware, CPU, IC, and various memory devices such as RAM, ROM, PROM); Computer technology (as applied in aircraft systems).

5.10 Fibre Optics(Level 1)

Advantages and disadvantages of fibre optic data transmission over electrical wire propagation;

Fibre optic data bus; Fibre optic related terms; Terminations; Couplers, control terminals, remote terminals; Application of fibre optics in aircraft systems.

5.11 Electronic Displays (Level 1)

Principles of operation of common types of displays used in modern aircraft, including. Cathode Ray Tubes, Light Emitting Diodes and Liquid - Crystal Display.

5.12 Electrostatic Sensitive Devices (Level 2)

Special handling of components sensitive to electrostatic discharges; Awareness of risks and possible damage, component and personnel anti-static protection devices.

5.13 Software Management Control(Level 1)

Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes.

5.14 Electromagnetic Environment (Level 2)

Influence of the following phenomena on maintenance practices for electronic system: EMC-Electromagnetic Compatibility - EMI-Electromagnetic Interference - HIRF-High Intensity Radiated Field - Lightning/lightning protection

5.15 Typical Electronic/Digital Aircraft Systems

General arrangement of typical electronic/digital aircraft systems and associated BITE(Built In Test Equipment) testing such as:

(a) (Level 2)

ACARS-ARINC Communication and Addressing and Reporting System
EICAS-Engine Indication and Crew Alerting System, FBW-Fly by Wire
FMS-Flight Management System, IRS-Inertial reference system

5.15 Typical Electronic/Digital Aircraft Systems

(b) (Level 2)

ECAM-Electronic Centralised Aircraft Monitoring, EFIS-Electronic Flight Instrument System, GPS-Global Positioning System, TCAS-Traffic Collision Avoidance system
Integrated modular Avionics, Cabin System, Information system



PROCEDURE MANUAL

**CATEGORY B1.1
SEMESTER – III (Theory)**

MODULE 6. MATERIALS AND HARDWARE-I

(80 Hours)

6.1 Aircraft Materials — Ferrous

(a)(Level 2)

Characteristics, properties and identification of common alloy steels used in aircraft;

Heat treatment and application of alloy steels;

(b) (Level 1)

Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance.

6.2 Aircraft Materials — Non-Ferrous

(a) (Level 2)

Characteristics, properties and identification of common non-ferrous materials used in aircraft; Heat treatment and application of non-ferrous materials; and impact resistance.

(b) (Level 1)

Testing of non-ferrous material for hardness, tensile strength, fatigue strength

6.3 Aircraft Materials - Composite and Non- Metallic

6.3.1 Composite and non-metallic other than wood and fabric

(a) (Level 2)

Characteristics, properties and identification of common composite and non metallic materials, other than wood, used in aircraft; Sealant and bonding agents.

(b) (Level 2)

The detection of defects/deterioration in composite and non-metallic material.
Repair of composite and non-metallic material.

6.3.2 Wooden structures 1(Level 2)

Construction methods of wooden airframe structures;

Characteristics, properties and types of wood and glue used in aeroplanes;

Preservation and maintenance of wooden structure;

Types of defects in wood material and wooden structures;

The detection of defects in wooden structure; Repair of wooden structure

6.3.3 Fabric covering (Level 2)

Characteristics, properties and types of fabrics used in aeroplanes;

Inspections methods for fabric; Types of defects in fabric; Repair of fabric covering.

6.4 Corrosion

(a)(Level 1)

Chemical fundamentals;

Formation by, galvanic action process, microbiological, stress;

(b) Types of corrosion and their identification; (Level 3)

Causes of corrosion; Material types, susceptibility to corrosion.



PROCEDURE MANUAL

**CATEGORY B1.1
SEMESTER – III (Theory)**

MODULE 7A. MAINTENANCE PRACTICES-II

(80 Hours)

7.13 Control Cables (Level 2)

Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems.

7.14 Material handling

7.14.1 Sheet Metal (Level 2)

Marking out and calculation of bend allowance;
Sheet metal working, including bending and forming; Inspection of sheet metal work.

7.14.2 Composite and non-metallic (Level 2)

Bonding practices; Environmental conditions
Inspection methods

7.15 Welding, Brazing, Soldering and Bonding

(a) (Level 2)

Soldering methods; inspection of soldered joints.

(b)(Level 2)

Welding and brazing methods; Inspection of welded and brazed joints;
Bonding methods and inspection of bonded joints.

7.16 Aircraft Weight and Balance

(a) (Level 2)

Centre of Gravity/Balance limits calculation: use of relevant documents;

(b) (Level 2)

Preparation of aircraft for weighing; Aircraft weighing;

7.17 Aircraft Handling and Storage (Level 2)

Aircraft taxiing/towing and associated safety precautions;
Aircraft jacking, chocking, securing and associated safety precautions;
Aircraft storage methods;
Refuelling/defuelling procedures;
De-icing/anti-icing procedures;
Electrical, hydraulic and pneumatic ground supplies.
Effects of environmental conditions on aircraft handling and operation.



7.18 Disassembly, Inspection, Repair and Assembly Techniques

(a) **(Level 3)**

Types of defects and visual inspection techniques.
Corrosion removal, assessment and re-protection.

(b) **(Level 2)**

General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programmes;

(c) **(Level 2)**

Non-destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and boroscope methods.

(d) **(Level 2)**

Disassembly and re-assembly techniques. Trouble shooting techniques

(e) **(Level 2)**

Trouble shooting techniques

7.19 Abnormal Events

(a) **(Level 2)**

Inspections following lightning strikes and HIRF penetration.

(b) **(Level 2)**

Inspections following abnormal events such as heavy landings and flight through turbulence.

7.20 Maintenance Procedures (Level 2)

Maintenance planning; Modification procedures; Stores procedures; Certification/release procedures;

Interface with aircraft operation; Maintenance Inspection/Quality Control/Quality Assurance;

Additional maintenance procedures.

Control of life limited components



PROCEDURE MANUAL

**CATEGORY B1.1
SEMESTER – III (Theory)**

**MODULE 11A. TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND
SYSTEMS-I (ELECTRICALS) (80 Hours)**

11.6 Electrical Power (ATA 24) (Level 3)

Batteries Installation and Operation;
DC power generation;
AC power generation;
Emergency power generation;
Voltage regulation;
Power distribution;
Inverters, transformers, rectifiers;
Circuit protection.
External/Ground power;

11.14 Lights (ATA 33) (Level 3)

External:
Navigation,
Anti-collision,
Landing,
Taxiing,
Ice;
Internal:
Cabin,
Cockpit,
Cargo;
Emergency.



**CATEGORY B1.1
SEMESTER – IV(Theory)**

MODULE 6. MATERIALS AND HARDWARE-II

(80 Hours)

6.5 Fasteners

6.5.1 Screw threads (Level 2)

Screw nomenclature; Thread forms, dimensions and tolerances for standard threads used in aircraft; Measuring screw threads;

6.5.2 Bolts, studs and screws (Level 2)

Bolt types: specification, identification and marking of aircraft bolts, international standards;

Nuts: self-locking, anchor, standard types; Machine screws: aircraft specifications; Studs: types and uses, insertion and removal; Self tapping screws, dowels.

6.5.3 Locking devices (Level 2)

Tab and spring washers, locking plates, split pins, palnuts, wire locking, quick release fasteners, keys, circlips, cotter pins.

6.5.4 Aircraft rivets (Level 2)

Types of solid and blind rivets: specifications and identification, heat treatment.

6.6 Pipes and Unions

(a)(Level 2)

Identification of, and types of rigid and flexible pipes and their connectors used in aircraft;

(b)(Level 2)

Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.

6.7 Springs (Level 2)

Types of springs, materials, characteristics and applications.

6.8 Bearings (Level 2)

Purpose of bearings, loads, material, construction; Types of bearings and their application.

6.9 Transmissions (Level 2)

Gear types and their application; Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns; Belts and pulleys, chains and sprockets.

6.10 Control Cables (Level 2)

Types of cables; End fittings, turnbuckles and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems.

6.11 Electrical Cables and Connectors (Level 2)

Cable types, construction and characteristics; High tension and co-axial cables; Crimping; Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes.



PROCEDURE MANUAL

**CATEGORY B1.1
SEMESTER – IV (Theory)**

MODULE 9A. HUMAN FACTORS

(80 Hours)

9.1 General (Level 2)

The need to take human factors into account; Incidents attributable to human factors/human error;
'Murphy's' law.

9.2 Human Performance and Limitations (Level 2)

Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access.

9.3 Social Psychology (Level 1)

Responsibility: individual and group; Motivation and de-motivation; Peer pressure; 'Culture' issues; Team working; Management, supervision and leadership

9.4 Factors Affecting Performance (Level 2)

Fitness/health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and under load; Sleep and fatigue, shift work; Alcohol, medication, drug abuse.

9.5 Physical Environment (Level 1)

Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment.

9.6 Tasks (Level 1)

Physical work; Repetitive tasks; Visual inspection; Complex systems.

9.7 Communication (Level 2)

Within and between teams; Work logging and recording; Keeping up to date, currency; Dissemination of information.

9.8 Human Error (Level 2)

Error models and theories; Types of error in maintenance tasks; Implications of errors (i.e accidents) Avoiding and managing errors.

9.9 Hazards in the Workplace (Level 2)

Recognising and avoiding hazards; Dealing with emergencies.



PROCEDURE MANUAL

CATEGORY B1.1

SEMESTER – IV(Theory)

MODULE 11A. TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS-II (AIRFRAME)

(80 Hours)

11.1 Theory of Flight

11.1.1 Aeroplane Aerodynamics and Flight Controls (Level 2)

Operation and effect of:

- roll control: ailerons and spoilers;
- pitch control: elevators, stabilators, variable incidence stabilisers and canards;
- yaw control, rudder limiters;

Control using elevons, ruddervators;

High lift devices, slots, slats, flaps, flaperons;

Drag inducing devices, spoilers, lift dumpers, speed brakes;

Effects of wing fences, saw tooth leading edges;

Boundary layer control using, vortex generators, stall wedges or leading edge devices;

Operation and effect of trim tabs, balance and anti balance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;

11.1.2 High Speed Flight (Level 2)

Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical

Mach number, compressibility buffet, shock wave, aerodynamic heating, area rule;

Factors affecting airflow in engine intakes of high speed aircraft;

Effects of sweepback on critical Mach number.

11.2 Airframe Structures — General Concepts

(a)(Level 2)

Airworthiness requirements for structural strength;

Structural classification, primary, secondary and tertiary;

Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems;

Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue;

Drains and ventilation provisions; System installation provisions; Lightning strike protection provision.

Aircraft bonding

(b)(Level 2)

Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning, anti-corrosive protection, wing, empennage and engine attachments;

Structure assembly techniques: riveting, bolting, bonding

Methods of surface protection, such as chromating, anodising, painting; Surface cleaning.

Airframe symmetry: methods of alignment and symmetry checks.



11.3 Airframe Structures — Aeroplanes

11.3.1 Fuselage (ATA 52/53/56) (Level 2)

Construction and pressurisation sealing;

Wing, stabiliser, pylon and undercarriage attachments;

Seat installation and cargo loading system;

Doors and emergency exits: construction, mechanisms, operation and safety devices;

Windows and windscreen construction and mechanisms.

11.3.2 Wings (ATA 57) (Level 2)

Construction; Fuel storage;

Landing gear, pylon, control surface and high lift/drag attachments.

11.3.3 Stabilisers (ATA 55) (Level 2)

Construction; Control surface attachment.

11.3.4 Flight Control Surfaces (ATA 55/57) (Level 2)

Construction and attachment;

Balancing — mass and aerodynamic.

11.3.5 Nacelles/Pylons (ATA 54) (Level 2)

Construction; Firewalls; Engine mounts.

11.4 Air Conditioning and Cabin Pressurisation (ATA 21)

11.4.1 Air supply (Level 2)

Sources of air supply including engine bleed, APU and ground cart;

11.4.2 Air Conditioning (Level 3)

Air conditioning systems;

Air cycle and vapour cycle machines

Distribution systems;

Flow, temperature and humidity control system.

11.4.3 Pressurisation (Level 3)

Pressurisation systems;

Control and indication including control and safety valves;

Cabin pressure controllers.

11.4.4 Safety and warning devices (Level 3)

Protection and warning devices.



11.7 Equipment and Furnishings

(a)(Level 2)

Emergency equipment requirements; Seats, harnesses and belts.

(b) (Level 1)

Cabin lay-out; Equipment lay-out; Cabin Furnishing Installation; Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment; Air stairs

11.8 Fire Protection (ATA 26)

(a) (Level 3)

Fire and smoke detection and warning systems;
Fire extinguishing systems; System tests.

(b)(Level 1)

Portable fire extinguisher

11.9 Flight Controls (ATA 27) (Level 3)

Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control;
High lift devices; Lift dump, speed brakes;
System operation: manual, hydraulic, pneumatic, electrical, fly-by-wire;
Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks systems;
Balancing and rigging;
Stall protection/warning system.



PROCEDURE MANUAL

**CATEGORY B1.1
SEMESTER – IV(Theory)**

MODULE 15. GAS TURBINE ENGINE-I

(80 Hours)

15.1 Fundamentals (Level 2)

Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle;
The relationship between force, work, power, energy, velocity, acceleration;
Constructional arrangement and operation of turbojet, turbofan, turbo shaft, turboprop.

15.2 Engine Performance (Level 2)

Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption; Engine efficiencies; By-pass ratio and engine pressure ratio; Pressure, temperature and velocity of the gas flow; Engine ratings, static thrust, influence of speed, altitude and hot climate, flat rating, limitations.

15.3 Inlet (Level 2)

Compressor inlet ducts - Effects of various inlet configurations; Ice protection.

15.4 Compressors (Level 2)

Axial and centrifugal types;
Constructional features and operating principles and applications;
Fan balancing;
Operation: Causes and effects of compressor stall and surge;
Methods of air flow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades;
Compressor ratio.

15.5 Combustion Section (Level 2)

Constructional features and principles of operation.

15.6 Turbine Section (Level 2)

Operation and characteristics of different turbine blade types;
Blade to disk attachment;
Nozzle guide vanes;
Causes and effects of turbine blade stress and creep.

15.7 Exhaust (Level 2)

Constructional features and principles of operation;
Convergent, divergent and variable area nozzles;
Engine noise reduction; Thrust reversers.



15.8 Bearings and Seals(Level 2)

Constructional features and principles of operation.

15.9 Lubricants and Fuels (Level 2)

Properties and specifications;

Fuel additives;

Safety precautions.

15.10 Lubrication Systems (Level 2)

System operation/lay-out and components.

15.11 Fuel Systems (Level 2)

Operation of engine control and fuel metering systems including electronic engine control (FADEC);

Systems lay-out and components.



PROCEDURE MANUAL

**CATEGORY B1.1
SEMESTER – V (Theory)**

MODULE 11A. TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS-III (AIRFRAME) (80 Hours)

11.10 Fuel Systems (ATA 28) (Level 3)

System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling; Longitudinal balance fuel systems.

11.11 Hydraulic Power (ATA 29) (Level 3)

System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Filters Pressure Control; Power distribution; Indication and warning systems; Interface with other systems.

11.12 Ice and Rain Protection (ATA 30) (Level 3)

Ice formation, classification and detection; Anti-icing systems: electrical, hot air and chemical; De-icing systems: electrical, hot air, pneumatic and chemical; Rain repellent; Probe and drain heating. Wiper systems

11.13 Landing Gear (ATA 32) (Level 3)

Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and auto braking; Tyres; Steering. Air-ground sensing

11.15 Oxygen (ATA 35) (Level 3)

System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings;

11.16 Pneumatic/Vacuum (ATA 36) (Level 3)

System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.

11.17 Water/Waste (ATA 38) (Level 3)

Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspects.



PROCEDURE MANUAL

**CATEGORY B1.1
SEMESTER – V (Theory)**

MODULE 11A. TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS-IV (AVIONICS) (80 Hours)

11.5 Instruments/Avionic Systems

11.5.1 Instrument Systems (ATA 31) (Level 2)

Pitot static: altimeter, air speed indicator, vertical speed indicator;
Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn coordinator;
Compasses: direct reading, remote reading;
Angle of attack indication, stall warning systems;
Glass Cockpit, Other aircraft system indication.

11.5.2 Avionic Systems (Level 1)

Fundamentals of system lay-outs and operation of;
Auto Flight (ATA 22); Communications (ATA 23); Navigation Systems (ATA 34).

11.18 On Board Maintenance Systems (ATA 45) (Level 2)

Central maintenance computers;
Data loading system; Electronic library system; Printing;
Structure monitoring (damage tolerance monitoring).

11.19 Integrated Modular Avionics (ATA42) (Level 2)

Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc.



11.20 Cabin Systems (ATA44) (Level 2)

The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). Includes voice, data, music and video transmissions.

The Cabin Intercommunication Data System provides an interface between cockpit/cabin crew and cabin systems. These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels.

The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems:

— Data/Radio Communication, In-Flight Entertainment System.

The Cabin Network Service may host functions such as:

— Access to pre-departure/departure reports,

— E-mail/intranet/Internet access, — Passenger database;

Cabin Core System; In-flight Entertainment System; External Communication System;

Cabin Mass Memory System; Cabin Monitoring System;

Miscellaneous Cabin System.

11.21 Information Systems (ATA46) (Level 2)

The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display.

Typical examples include Air Traffic and Information Management Systems and Network Server Systems,

Aircraft General Information System; Flight Deck Information System;

Maintenance Information System; Passenger Cabin Information System;



**CATEGORY B1.1
SEMESTER – V (Theory)**

MODULE 15. GAS TURBINE ENGINE-II

(80 Hours)

15.12 Air Systems (Level 2)

Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services.

15.13 Starting and Ignition Systems (Level 2)

Operation of engine start systems and components;
Ignition systems and components;
Maintenance safety requirements.

15.14 Engine Indication Systems (Level 2)

Exhaust Gas Temperature/Inter stage Turbine Temperature;
Engine Thrust Indication:
Engine Pressure Ratio, engine turbine discharge pressure or jet pipe pressure systems;
Oil pressure and temperature;
Fuel pressure and flow;
Engine speed;
Vibration measurement and indication;
Torque;
Power.

15.15 Power Augmentation Systems (Level 1)

Operation and applications;
Water injection, water methanol;
Afterburner systems.

15.16 Turbo-prop Engines (Level 2)

Gas coupled/free turbine and gear coupled turbines;
Reduction gears;
Integrated engine and propeller controls;
Over speed safety devices.

15.17 Turbo-shaft engines (Level 2)

Arrangements, drive systems, reduction gearing,
couplings, control systems.



15.18 Auxiliary Power Units (APUs) (Level 2)

Purpose, operation, protective systems.

15.19 Power plant Installation (Level 2)

Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.

15.20 Fire Protection Systems (Level 2)

Operation of detection and extinguishing systems.

15.21 Engine Monitoring and Ground Operation (Level 3)

Procedures for starting and ground run-up;

Interpretation of engine power output and parameters;

Trend (including oil analysis, vibration and boroscope) monitoring;

Inspection of engine and components to criteria, tolerances and data specified by engine manufacturer;

Compressor washing/cleaning; Foreign Object Damage.

15.22 Engine Storage and Preservation (Level 2)

Preservation and de-preservation for the engine and accessories/ systems.



PROCEDURE MANUAL

**CATEGORY B1.1
SEMESTER – V (Theory)**

MODULE 17A. PROPELLER

(80 Hours)

17.1 Fundamentals (Level 2)

Blade element theory;
High/low blade angle, reverse angle, angle of attack, rotational speed;
Propeller slip;
Aerodynamic, centrifugal, and thrust forces; Torque;
Relative airflow on blade angle of attack;
Vibration and resonance.

17.2 Propeller Construction (Level 2)

Construction methods and materials used in wooden, composite and metal propellers;
Blade station, blade face, blade shank, blade back and hub assembly;
Fixed pitch, controllable pitch, constant speed propeller;
Propeller/spinner installation.

17.3 Propeller Pitch Control (Level 2)

Speed control and pitch change methods, mechanical and electrical/electronic;
Feathering and reverse pitch;
Over speed protection.

17.4 Propeller Synchronising (Level 2)

Synchronising and synchro phasing equipment.

17.5 Propeller Ice Protection (Level 2)

Propeller Ice Protection, Fluid and electrical de-icing equipment.

17.6 Propeller Maintenance (Level 3)

Static and dynamic balancing;
Blade tracking;
Assessment of blade damage, erosion, corrosion, impact damage, de-lamination;
Propeller treatment/repair schemes;
Propeller engine running.

17.7 Propeller Storage and Preservation (Level 2)

Propeller preservation and de-preservation

**PROCEDURE MANUAL****MODULES AND SYLLABUS COVERAGE: THEORY & PRACTICAL
B2 (AVIONICS --- (2620 Hrs)
SEMESTER WISE BREAKUP**

<u>MODULE</u>	<u>THEORY</u>	<u>PRACTICAL</u>	
		<u>IN-HOUSE</u>	<u>AMO</u>
Semester – I: 3 Electrical Fundamentals-I	36	48	X
4 Electronic Fundamentals	90	48	X
8 Basic Aerodynamics	90	48	X
10 Aviation Legislation-I	72	X	X

	288	144	X
Semester – II: 3 Electrical Fundamentals-II	80	50	X
5 Digital Techniques Electronic Instrument Systems-I	40	50	X
7A Maintenance Practices-I	80	50	X
10 Aviation Legislation-II	120	X	X

	320	150	X
Semester – III: 5 Digital Techniques Electronic Instrument Systems-II	80	40	X
6 Materials and Hardware-I	80	40	X
7A Maintenance Practices-II	80	40	X
13 Aircraft Aerodynamics, Structures and systems-I (Instruments)	80	40	X

	320	160	X



PROCEDURE MANUAL

MODULES AND SYLLABUS COVERAGE: THEORY & PRACTICAL
B2 (AVIONICS --- (2620 Hrs)
SEMESTER WISE BREAKUP

<u>MODULE</u>	<u>THEORY</u>	<u>PRACTICAL</u>	
		IN-HOUSE	AMO
Semester – IV: 6 Materials and Hardware-II	80	50	X
9A Human Factors	80	X	X
13 Aircraft Aerodynamics, Structures and systems-II (Air Frame)	80	50	X
13 Aircraft Aerodynamics, Structures and systems-III (Comm.&Nav.)	80	50	X
AMO	X	X	144
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	320	150	144
Semester – V: 13 Aircraft Aerodynamics, Structures and systems-IV (Electricals)	80	40	X
13 Aircraft Aerodynamics, Structures and systems-V (Instruments)	80	40	X
13 Aircraft Aerodynamics, Structures and systems-VI (Avionics)	80	40	X
14 Propulsion	80	40	X
AMO	X	X	144
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	320	160	144
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GRAND TOTAL:	1568	764	288



**SYLLABUS
CATEGORY B2
SEMESTER – I (Theory)**

MODULE 3. ELECTRICAL FUNDAMENTALS-1

(36 Hours)

3.1 Electron Theory (Level 1)

Structure and distribution of electrical charges within: atoms, molecules, ions, compounds;

Molecular structure of conductors, semiconductors and insulators.

3.2 Static Electricity and Conduction (Level 2)

Static electricity and distribution of electrostatic charges;

Electrostatic laws of attraction and repulsion;

Units of charge, Coulomb's Law;

Conduction of electricity in solids, liquids, gases and a vacuum.

3.3 Electrical Terminology (Level 2)

The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.

3.4 Generation of Electricity (Level 1)

Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.

3.5 DC Sources of Electricity (Level 2)

Construction and basic chemical action of: primary cells, secondary cells, lead acid cells, nickel cadmium cells, other alkaline cells;

Cells connected in series and parallel; Internal resistance and its effect on a battery;

Construction, materials and operation of thermocouples;

Operation of photo-cells.

3.6 DC Circuits (Level 2)

Ohms Law, Kirchoff's Voltage and Current Laws;

Calculations using the above laws to find resistance, voltage and current;

Significance of the internal resistance of a supply.



3.7 Resistance/Resistor

(a)(Level 2)

Resistance and affecting factors; Specific resistance; Resistor colour code, values and tolerances, preferred values, wattage ratings Resistors in series and parallel; Calculation of total resistance using series, parallel and series parallel combinations; Operation and use of potentiometers and rheostats; Operation of Wheatstone Bridge.

(b)(Level 1)

Positive and negative temperature coefficient conductance; Fixed resistors, stability, tolerance and limitations, methods of construction; Variable resistors, thermistors, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge;

3.8 Power (Level 2)

Power, work and energy (kinetic and potential);
Dissipation of power by a resistor;
Power formula;
Calculations involving power, work and energy.

3.9 Capacitance/Capacitor (Level 2)

Operation and function of a capacitor;
Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric constant, working voltage, voltage rating;
Capacitor types, construction and function;
Capacitor colour coding;
Calculations of capacitance and voltage in series and parallel circuits;
Exponential charge and discharge of a capacitor, time constants;
Testing of capacitors.



PROCEDURE MANUAL

**CATEGORY B2
SEMESTER – I (Theory)**

MODULE 4. ELECTRONIC FUNDAMENTALS

(90 Hours)

4.1 Semiconductors

4.1.1 Diodes

(a) (Level 2)

Diode symbols; Diode characteristics and properties; Diodes in series and parallel; Main characteristics and use of silicon controlled rectifiers (thyristors), light emitting diode, photo conductive diode, varistor, rectifier diodes; Functional testing of diodes.

(b) (Level 2)

Materials, electron configuration, electrical properties;
P and N type materials: effects of impurities on conduction, majority and minority characters;
PN junction in a semiconductor, development of a potential across a PN junction in unbiased, forward biased and reverse biased conditions;
Operation and function of diodes in the following circuits: clippers, clampers, full and half wave rectifiers, bridge rectifiers, voltage doublers and triplers;
Detailed operation and characteristics of the following devices: silicon controlled rectifier (thyristor), light emitting diode, shottky diode, photo conductive diode, varactor diode, varistor, rectifier diodes, Zener diode.

4.1.2 Transistors

(a)(Level 2)

Transistor symbols; Component description and orientation; Transistor characteristics and properties.

(b)(Level 2)

Construction and operation of PNP and NPN transistors; Base, collector and emitter configurations; Testing of transistors. Basic appreciation of other transistor types and their uses. Application of transistors: classes of amplifier (A, B, C); Simple circuits including: bias, decoupling, feedback and stabilisation; Multistage circuit principles: cascades, push-pull, oscillators, multi-vibrators, flip-flop circuits.



4.1.3 Integrated Circuits(Level 2)

Description and operation of logic circuits and linear circuits; Introduction to operation and function of an operational amplifier used as: integrator, differentiator, voltage follower, comparator; Operation and amplifier stages connecting methods: resistive capacitive, inductive (transformer), inductive resistive (IR), direct; Advantages and disadvantages of positive and negative feedback.

4.2 Printed Circuit Boards (Level 2)

Description and use of printed circuit boards.

4.3 Servomechanisms (Level 2)

Understanding of the following terms: Open and closed loop, follow up, servomechanism, analogue, transducer, null, damping, feedback, dead band; Construction operation and use of the following synchro system components: resolvers, differential, control and torque, E and I transformers, inductance transmitters, capacitance transmitters, synchronous transmitters; Servomechanism defects, reversal of synchro leads, hunting.



PROCEDURE MANUAL

**CATEGORY B2
SEMESTER – I (Theory)**

MODULE 8. BASIC AERODYNAMICS

(90 Hours)

8.1 Physics of the Atmosphere(Level 2)

International Standard Atmosphere (ISA), application to aerodynamics.

8.2 Aerodynamics(Level 2)

Airflow around a body;

Boundary layer, laminar and turbulent flow, free stream flow, relative airflow,

Upwash and downwash, vortices, stagnation;

The terms: camber, chord, mean aerodynamic chord, profile (parasite) drag,

induced drag, centre of pressure, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio;

Thrust, Weight, Aerodynamic Resultant;

Generation of Lift and Drag: Angle of Attack, Lift coefficient,

Drag coefficient, polar curve, stall;

Aerofoil contamination including ice, snow, frost.

8.3 Theory of Flight (Level 2)

Relationship between lift, weight, thrust and drag; Glide ratio; Steady state flights, performance; Theory of the turn; Influence of load factor: stall, flight envelope and structural limitations; Lift augmentation.

8.4 Flight Stability and Dynamics (Level 2)

Longitudinal, lateral and directional stability (active and passive).



PROCEDURE MANUAL

**CATEGORY B2
SEMESTER – I (Theory)**

MODULE 10. AVIATION LEGISLATION-I

(72 Hours)

10.1 Regulatory Framework (Level 1)

Role of International Civil Aviation Organisation;
The Aircraft Act and Rules made there under
Role of the DGCA;
Relationship between CAR-21, CAR-M, CAR-145, CAR-66, CAR 147
The Aircraft Rules (Applicable to Aircraft Maintenance and Release)
Aeronautical Information Circulars (Applicable to Aircraft Maintenance and Release)
CAR Sections 1 and 2

10.3 CAR-145 — Approved Maintenance Organisations (Level 2)

Detailed understanding of CAR-145 and CAR M Subpart F

10.5 Aircraft Certification

(b) Documents (Level 2)

Certificate of Airworthiness;
Certificate of Registration;
Noise Certificate;
Weight Schedule;
Radio Station Licence and Approval.



**CATEGORY B2
SEMESTER – II (Theory)**

MODULE 3. ELECTRICAL FUNDAMENTALS-II

(80 Hours)

3.10 Magnetism

(a) (Level 2)

Theory of magnetism; Properties of a magnet Action of a magnet suspended in the Earth's magnetic field;

Magnetisation and demagnetisation;

Magnetic shielding; Various types of magnetic material;

Electromagnets construction and principles of operation;

Hand clasp rules to determine: magnetic field around current carrying conductor.

(b)(Level 2)

Magneto motive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents; Precautions for care and storage of magnets.

3.11 Inductance/Inductor (Level 2)

Faraday's Law; Action of inducing a voltage in a conductor moving in a magnetic field; Induction principles; Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductor turns; Mutual induction; The effect the rate of change of primary current and mutual inductance has on induced voltage; Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other; Lenz's Law and polarity determining rules; Back emf, self induction; Saturation point; Principle uses of inductors;

3.12 DC Motor/Generator Theory (Level 2)

Basic motor and generator theory; Construction and purpose of components in DC generator; Operation of, and factors affecting output and direction of current flow in DC generators; Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors; Series wound, shunt wound and compound motors; Starter Generator construction.



3.13 AC Theory (Level 2)

Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power Triangular/Square waves; Single/3 phase principles.

3.14 Resistive (R), Capacitive (C) and Inductive (L) Circuits (Level 2)

Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel; Power dissipation in L, C and R circuits; Impedance, phase angle, power factor and current calculations; True power, apparent power and reactive power calculations.

3.15 Transformers (Level 2)

Transformer construction principles and operation; Transformer losses and methods for overcoming them;
Transformer action under load and no-load conditions; Power transfer, efficiency, polarity markings;
Calculation of line and phase voltages and currents; Calculation of power in a three phase system;
Primary and Secondary current, voltage, turns ratio, power, efficiency; Auto transformers.

3.16 Filters (Level 1)

Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.

3.17 AC Generators (Level 2)

Rotation of loop in a magnetic field and waveform produced; Operation and construction of revolving armature and revolving field type AC generators; Single phase, two phase and three phase alternators; Three phase star and delta connections advantages and uses; Permanent Magnet Generators.

3.18 AC Motors (Level 2)

Construction, principles of operation and characteristics of: AC synchronous and induction motors both single and poly phase; Methods of speed control and direction of rotation; Methods of producing a rotating field: capacitor, inductor, shaded or split pole.



**CATEGORY B2
SEMESTER – II (Theory)**

**MODULE 5. DIGITAL TECHNIQUES ELECTRONIC INSTRUMENT SYSTEMS-I
(40 Hours)**

5.1 Electronic Instrument Systems (Level 3)

Typical systems arrangements and cockpit layout of electronic instrument systems.

5.2 Numbering Systems (Level 2)

Numbering systems: binary, octal and hexadecimal; Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa.

5.3 Data Conversion (Level 2)

Analogue Data, Digital Data; Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.

5.4 Data Buses(Level 2)

Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications.

5.5 Logic Circuits

(a) (Level 2)

Identification of common logic gate symbols, tables and equivalent circuits; Applications used for aircraft systems, schematic diagrams.

(b) (Level 2)

Interpretation of logic diagrams.



**CATEGORY B2
SEMESTER – II (Theory)**

MODULE 7A. MAINTENANCE PRACTICES-I

(80 Hours)

7.1 Safety Precautions-Aircraft and Workshop (Level 3)

Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. Also, instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.

7.2 Workshop Practices (Level 3)

Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards.

7.3 Tools (Level 3)

Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods. Operation, function and use of electrical general test equipment;

7.4 Avionic General Test Equipment (Level 3)

Operation, function and use of avionic general test equipment.

7.5 Engineering Drawings, Diagrams and Standards (Level 2)

Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information - Microfilm, microfiche and computerised presentations;

Specification 100 of the Air Transport Association (ATA) of America;

Aeronautical and other applicable standards including. ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams.

7.6 Fits and Clearances (Level 1)

Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist and wear; Standard methods for checking shafts, bearings and other parts.

Note: The scope of this module shall reflect the technology of aeroplanes relevant to the B3 category.

7.7 Electrical Wiring Interconnection System (EWIS)(Level 3)

Continuity, insulation and bonding techniques and testing;

Use of crimp tools: hand and hydraulic operated;

Testing of crimp joints; Connector pin removal and insertion;

Co-axial cables: testing and installation precautions;

Identification of wire types, their inspection criteria and damage tolerance.

Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding.

EWIS installations, inspection, repair, maintenance and cleanliness standards.



PROCEDURE MANUAL

**CATEGORY B2
SEMESTER – II (Theory)**

(120 Hours)

MODULE 10. AVIATION LEGISLATION-II

10.2 CAR-66 Certifying Staff - Maintenance (Level 2)

Detailed understanding of CAR-66.

10.4 Aircraft Operations (Level 1)

Commercial Air Transport/Commercial Operations

Air Operators Certificates;

Operators Responsibilities, in particular regarding continuing airworthiness and maintenance;

Documents to be carried on board; Aircraft Placarding (Markings);

10.5 Aircraft Certification

(a) General (Level 1)

Certification rules: such as FAA & EACS 23/25/27/29;

Type Certification;

Supplemental Type Certification;

10.6 CAR-M (Level 2)

Detail understanding of CAR M provisions related to Continuing Airworthiness

Detailed understanding of CAR-M.

10.7 Applicable National and International Requirements

(a)(Level 2)

Maintenance Programme, Maintenance checks and inspections; Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists; Airworthiness Directives; Service Bulletins, manufacturers service information; Modifications and repairs; Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.;

(b) (Level 1)

Continuing airworthiness; Test flights; ETOPS /EDTO , maintenance and dispatch requirements;

RVSM, maintenance and dispatch requirements RNP, MNPS Operations.

All Weather Operations, Category 2/3 operations and minimum equipment requirements.

10.8 Safety Management System (Level 2)

State Safety Programme Basic Safety Concepts

Hazards & Safety Risks, SMS Operation

SMS Safety performance, Safety Assurance

10.9 Fuel Tank Safety (Level 2)

Special Federal Aviation Regulations (SFARs) from 14 CFR SFAR 88 of the FAA and of JAA TGL 47

Concept of CDCCL, Airworthiness Limitations Items (ALI)



**CATEGORY B2
SEMESTER – III (Theory)**

**MODULE 5. DIGITAL TECHNIQUES ELECTRONIC INSTRUMENT SYSTEMS-II
(80 Hours)**

5.6 Basic Computer Structure (Level 2)

Computer related terminology; Operation, layout and interface of the major components in a microcomputer including their associated bus systems; Information contained in single and multi address instruction words;
Memory associated terms; Operation of typical memory devices; Operation, advantages and disadvantages of the various data storage systems.

5.7 Microprocessors (Level 2)

Functions performed and overall operation of a microprocessor; Basic operation of each of the following microprocessor elements: control and processing unit, clock, register, arithmetic logic unit.

5.8 Integrated Circuits (Level 2)

Operation and use of encoders and decoders Function of encoder types Uses of medium, large and very large scale integration.

5.9 Multiplexing (Level 2)

Operation, application and identification in logic diagrams of multiplexers and demultiplexers.

5.10 Fibre Optics(Level 2)

Advantages and disadvantages of fibre optic data transmission over electrical wire propagation;
Fibre optic data bus;
Fibre optic related terms;
Terminations;
Couplers, control terminals, remote terminals;
Application of fibre optics in aircraft systems.

5.11 Electronic Displays (Level 2)

Principles of operation of common types of displays used in modern aircraft, including Cathode Ray Tubes, Light Emitting Diodes and Liquid - Crystal Display.



5.12 Electrostatic Sensitive Devices (Level 2)

Special handling of components sensitive to electrostatic discharges; Awareness of risks and possible damage, component and personnel anti-static protection devices.

5.13 Software Management Control (Level 2)

Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes.

5.14 Electromagnetic Environment (Level 2)

Influence of the following phenomena on maintenance practices for electronic system:

EMC-Electromagnetic Compatibility

EMI-Electromagnetic Interference

HIRF-High Intensity Radiated Field

Lightning/lightning protection

5.15 Typical Electronic/Digital Aircraft Systems (Level 2)

General arrangement of typical electronic/digital aircraft systems and associated BITE(Built In Test Equipment) testing such as:

(a)

ACARS-ARINC Communication and Addressing and Reporting System

EICAS-Engine Indication and Crew Alerting System

FBW-Fly by Wire

FMS-Flight Management System

IRS-Inertial reference system

(b)

ECAM-Electronic Centralised Aircraft Monitoring

EFIS-Electronic Flight Instrument System

GPS-Global Positioning System

TCAS-Traffic Collision Avoidance system

Integrated modular Avionic a

Cabin System

Information system



**CATEGORY B2
SEMESTER – III (Theory)**

MODULE 6. MATERIALS AND HARDWARE-I

(80 Hours)

6.1 Aircraft Materials — Ferrous

(a) (Level 1)

Characteristics, properties and identification of common alloy steels used in aircraft; Heat treatment and application of alloy steels;

(b) (Level 1)

Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance.

6.2 Aircraft Materials — Non-Ferrous

(a)(Level 1)

Characteristics, properties and identification of common non-ferrous materials used in aircraft; Heat treatment and application of non-ferrous materials;

(b) (Level 1)

Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance

6.3 Aircraft Materials - Composite and Non- Metallic

6.3.1 Composite and non-metallic other than wood and fabric

(a) (Level 2)

Characteristics, properties and identification of common composite and non metallic materials, other than wood, used in aircraft; Sealant and bonding agents.

6.4 Corrosion

(a) (Level 1)

Chemical fundamentals;

Formation by, galvanic action process, microbiological, stress;

(b) (Level 2)

Types of corrosion and their identification;

Causes of corrosion;

Material types, susceptibility to corrosion.



CATEGORY B2

SEMESTER – III (Theory)

MODULE 7A. MAINTENANCE PRACTICES-II

(80 Hours)

7.15 Welding, Brazing, Soldering and Bonding (Level 2)

Soldering methods; inspection of soldered joints.

7.16 Aircraft Weight and Balance (Level 2)

Centre of Gravity/Balance limits calculation: use of relevant documents;

7.17 Aircraft Handling and Storage (Level 2)

Aircraft taxiing/towing and associated safety precautions;

Aircraft jacking, chocking, securing and associated safety precautions;

Aircraft storage methods;

Re-fuelling/de-fuelling procedures;

De-icing/anti-icing procedures;

Electrical, hydraulic and pneumatic ground supplies.

Effects of environmental conditions on aircraft handling and operation.

7.18 Disassembly, Inspection, Repair and Assembly Techniques

(a)(Level 3)

Types of defects and visual inspection techniques.

Corrosion removal, assessment and re-protection.

(c)(Level 2)

Disassembly and re-assembly techniques.

Trouble shooting techniques

(d)(Level 2)

Trouble shooting techniques

(e)(Level 2)

Trouble shooting techniques

7.19 Abnormal Events (Level 2)

Inspections following lightning strikes and HIRF penetration.

7.20 Maintenance Procedures (Level 2)

Maintenance planning; Modification procedures;

Stores procedures; Certification/release procedures;

Interface with aircraft operation;

Maintenance Inspection/Quality Control/Quality Assurance;

Additional maintenance procedures. Control of life limited components



PROCEDURE MANUAL

**CATEGORY B2
SEMESTER – III (Theory)**

**MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS -I
(INSTRUMENT) (80 Hours)**

13.8 Instruments (ATA 31) (Level 3)

Classification;
Atmosphere;
Terminology;
Pressure measuring devices and systems;
Pitot static systems;
Altimeters;
Vertical speed indicators;
Airspeed indicators;
Machmeters;
Altitude reporting/alerting systems;
Air data computers;
Instrument pneumatic systems;
Direct reading pressure and temperature gauges;
Temperature indicating systems;
Fuel quantity indicating systems;
Gyroscopic principles;
Artificial horizons;
Slip indicators;
Directional gyros;
Ground Proximity Warning Systems;
Compass systems;
Flight Data Recording systems;
Electronic Flight Instrument Systems;
Instrument warning systems including master warning systems and centralised warning panels;
Stall warning systems and angle of attack indicating systems;
Vibration measurement and indication;
Glass cockpit



**CATEGORY B2
SEMESTER – IV (Theory)**

MODULE 6. MATERIALS AND HARDWARE-II

(80 Hours)

6.5 Fasteners

6.5.1 Screw threads (Level 2)

Screw nomenclature;

Thread forms, dimensions and tolerances for standard threads used in aircraft;

Measuring screw threads;

6.5.2 Bolts, studs and screws (Level 2)

Bolt types: specification, identification and marking of aircraft bolts, international standards; Nuts: self locking, anchor, standard types; Machine screws: aircraft specifications; Studs: types and uses, insertion and removal; Self tapping screws, dowels.

6.5.3 Locking devices (Level 2)

Tab and spring washers, locking plates, split pins, palnuts, wire locking, quick release fasteners, keys, circlips, cotter pins.

6.5.4 Aircraft rivets (Level 1)

Types of solid and blind rivets: specifications and identification, heat treatment.

6.6 Pipes and Unions

(a)(Level 2)

Identification of, and types of rigid and flexible pipes and their connectors used in aircraft;

(b)(Level 1)

Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.

6.7 Springs (Level 1)

Types of springs, materials, characteristics and applications.

6.8 Bearings (Level 2)

Purpose of bearings, loads, material, construction; Types of bearings and their application.



6.9 Transmissions (Level 2)

Gear types and their application; Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns; Belts and pulleys, chains and sprockets.

6.10 Control Cables (Level 1)

Types of cables; End fittings, turnbuckles and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems.

6.11 Electrical Cables and Connectors (Level 2)

Cable types, construction and characteristics; High tension and co-axial cables; Crimping; Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes.



**CATEGORY B2
SEMESTER – IV (Theory)**

MODULE 9A. HUMAN FACTORS

(80 Hours)

9.1 General (Level 2)

The need to take human factors into account;
Incidents attributable to human factors/human error; 'Murphy's' law.

9.2 Human Performance and Limitations (Level 2)

Vision; Hearing; Information processing;
Attention and perception; Memory; Claustrophobia and physical access.

9.3 Social Psychology (Level 1)

Responsibility: individual and group; Motivation and de-motivation;
Peer pressure; 'Culture' issues; Team working;
Management, supervision and leadership

9.4 Factors Affecting Performance (Level 2)

Fitness/health; Stress: domestic and work related;
Time pressure and deadlines; Workload: overload and under load;
Sleep and fatigue, shift work; Alcohol, medication, drug abuse.

9.5 Physical Environment (Level 1)

Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment.

9.6 Tasks (Level 1)

Physical work; Repetitive tasks; Visual inspection; Complex systems.

9.7 Communication (Level 2)

Within and between teams; Work logging and recording;
Keeping up to date, currency; Dissemination of information.

9.8 Human Error (Level 2)

Error models and theories; Types of error in maintenance tasks;
Implications of errors (i.e accidents) Avoiding and managing errors.

9.9 Hazards in the Workplace (Level 2)

Recognising and avoiding hazards; Dealing with emergencies.



**CATEGORY B2
SEMESTER – IV (Theory)**

**MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS-II
(AIR FRAME) (80 Hours)**

13.1 Theory of Flight

(a) (Level 1)

Aeroplane Aerodynamics and Flight Controls Operation and effect of:

- roll control: ailerons and spoilers,
- pitch control: elevators, stabilators, variable incidence stabilisers and canards,
- yaw control, rudder limiters;

Control using elevons, ruddervators;

High lift devices: slots, slats, flaps;

Drag inducing devices: spoilers, lift dumpers, speed brakes;

Operation and effect of trim tabs, servo tabs, control surface bias;

(b) (Level 1)

High Speed Flight Speed of sound, subsonic flight, transonic flight, supersonic flight;
Mach number, critical Mach number;

(c)(Level 1)

Rotary Wing Aerodynamics

Terminology; Operation and effect of cyclic, collective and anti-torque controls.

13.2 Structures — General Concepts

(a) (Level 1)

Fundamentals of structural systems;

(b) (Level 2)

Zonal and station identification systems;

Electrical bonding;

Lightning strike protection provision.

13.7 Flight Controls (ATA 27)

(a) (Level 2)

Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control;

High lift devices;

Lift dump, speed brakes;

System operation: manual, hydraulic, pneumatic;

Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks.

Stall protection systems;



13.11 Air Conditioning and Cabin Pressurisation (ATA21)

1) Air supply (Level 2)

Sources of air supply including engine bleed, APU and ground cart;

2) Air Conditioning

Air conditioning systems; **(Level 2)**

Air cycle and vapour cycle machines; **(Level 3)**

Distribution systems; **(Level 1)**

Flow, temperature and humidity control system. **(Level 3)**

3) Pressurisation (Level 2)

Pressurisation systems;

Control and indication including control and safety valves;

Cabin pressure controllers.

4) Safety and warning devices (Level 3)

Protection and warning devices.

13.13 Fuel Systems (ATA 28)

System lay-out; **(Level 1)**

Fuel tanks; **(Level 1)**

Supply systems; **(Level 1)**

Dumping, venting and draining; **(Level 2)**

Cross-feed and transfer; **(Level 2)**

Indications and warnings; **(Level 3)**

Refuelling and defuelling; **(Level 2)**

Longitudinal balance fuel systems. **(Level 3)**

13.14 Hydraulic Power (ATA 29)

System lay-out; **(Level 1)**

Hydraulic fluids; **(Level 1)**

Hydraulic reservoirs and accumulators; **(Level 1)**

Pressure generation: electrical, mechanical, pneumatic; **(Level 3)**

Emergency pressure generation; **(Level 3)**

Filters; **(Level 1)**

Pressure control; **(Level 3)**

Power distribution; **(Level 1)**

Indication and warning systems; **(Level 3)**

Interface with other systems. **(Level 3)**



13.16 Landing Gear (ATA 32)

Construction, shock absorbing; **(Level 1)**

Extension and retraction systems: normal and emergency; **(Level 3)**

Indications and warnings; **(Level 3)**

Wheels, brakes, antiskid and auto braking; **(Level 3)**

Tyres; **(Level 1)**

Steering; **(Level 3)**

Air-ground sensing. **(Level 3)**

13.18 Pneumatic/Vacuum (ATA 36)

System lay-out; **(Level 2)**

Sources: engine/APU, compressors, reservoirs, ground supply; **(Level 2)**

Pressure control; **(Level 3)**

Distribution; **(Level 1)**

Indications and warnings; **(Level 3)**

Interfaces with other systems. **(Level 3)**

13.19 Water/Waste (ATA 38) (Level 2)

Water system lay-out, supply, distribution, servicing and draining;

Toilet system lay-out, flushing and servicing.



PROCEDURE MANUAL

**CATEGORY B2
SEMESTER – IV (Theory)**

**MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS -III
(COMN & NAV) (80 Hours)**

13.4 Communication/Navigation (ATA 23/34) (Level 3)

Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver and transmitter; Working principles of following systems:

- Very High Frequency (VHF) communication,
- High Frequency (HF) communication,
- Audio,
- Emergency Locator Transmitters,
- Cockpit Voice Recorder,
- Very High Frequency omni-directional range (VOR),
- Automatic Direction Finding (ADF),
- Instrument Landing System (ILS),
- Microwave Landing System (MLS),
- Flight Director systems, Distance Measuring Equipment (DME),
- Very Low Frequency and hyperbolic navigation (VLF/Omega),
- Doppler navigation,
- Area navigation, RNAV systems,
- Flight Management Systems,
- Global Positioning System (GPS), Global Navigation Satellite Systems (GNSS),
- Inertial Navigation System,
- Air Traffic Control transponder, secondary surveillance radar,
- Traffic Alert and Collision Avoidance System (TCAS),
- Weather avoidance radar,
- Radio altimeter,
- ARINC communication and reporting.



**CATEGORY B2
SEMESTER – V (Theory)**

**MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS-IV
(ELECTRICALS) (80 Hours)**

13.5 Electrical Power (ATA 24) (Level 3)

Batteries Installation and Operation;
DC power generation;
AC power generation;
Emergency power generation;
Voltage regulation;
Power distribution;
Inverters, transformers, rectifiers;
Circuit protection;
External/Ground power.

13.9 Lights (ATA 33) (Level 3)

External:
Navigation, Landing, Taxiing, Ice;
Internal:
Cabin, Cockpit, Cargo; Emergency.

13.12 Fire Protection (ATA 26)

(a) (Level 3)

Fire and smoke detection and warning systems;
Fire extinguishing systems;
System tests;

(b) (Level 1)

Portable fire extinguisher

13.15 Ice and Rain Protection (ATA 30)

Ice formation, classification and detection; **(Level 2)**
Anti-icing systems: electrical, hot air and chemical; **(Level 2)**
De-icing systems: electrical, hot air, pneumatic, chemical; **(Level 3)**
Rain repellent; **(Level 1)**
Probe and drain heating; **(Level 3)**
Wiper Systems. **(Level 1)**



**CATEGORY B2
SEMESTER – V (Theory)**

**MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS -V
(INSTRUMENT) (80 Hours)**

13.3 Auto flight (ATA 22) (Level 3)

Fundamentals of automatic flight control including working principles and current terminology;

Command signal processing;

Modes of operation: roll, pitch and yaw channels;

Yaw dampers; Stability Augmentation System in helicopters;

Automatic trim control;

Autopilot navigation aids interface;

Auto throttle systems;

Automatic Landing Systems:

principles and categories, modes of operation, approach, glide slope, land, go-around, system monitors and failure conditions.

13.7 Flight Controls (ATA 27)(Level 3)

System operation: electrical, fly-by-wire.

13.10 On Board Maintenance Systems (ATA 45) (Level 3)

Central maintenance computers; Data loading system;

Electronic library system; Printing;

Structure monitoring (damage tolerance monitoring).

13.17 Oxygen (ATA 35)

System lay-out: cockpit, cabin; **(Level 3)**

Sources, storage, charging and distribution; **(Level 3)**

Supply regulation; **(Level 3)**

Indications and warnings. **(Level 3)**



PROCEDURE MANUAL

CATEGORY B2

SEMESTER – V (Theory)

MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS -VI

(AVIONICS)

(80 Hours)

13.6 Equipment and Furnishings (ATA 25) (Level 3)

Electronic emergency equipment requirements;
Cabin entertainment equipment.

13.20 Integrated Modular Avionics (ATA42) (Level 3)

Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others:

Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc.;

Core System;
Network Components.

13.21 Cabin Systems (ATA44) (Level 3)

The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). Includes voice, data, music and video transmissions.

The Cabin Intercommunication Data System provides an interface between cockpit/ cabin crew and cabin systems.

These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels.

The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems:

— Data/Radio Communication, In-Flight Entertainment System

The Cabin Network Service may host functions such as:

— Access to pre-departure/departure reports,
— E-mail/intranet/Internet access,
— Passenger database;

Cabin Core System;



PROCEDURE MANUAL

In-flight Entertainment System;
External Communication System;
Cabin Mass Memory System;
Cabin Monitoring System;
Miscellaneous Cabin System.

13.22 Information Systems (ATA46)(Level 3)

The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche.

Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller.

Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display.

Typical examples include Air Traffic and Information Management Systems and Network Server Systems.

Aircraft General Information System;
Flight Deck Information System;
Maintenance Information System;
Passenger Cabin Information System;
Miscellaneous Information System.



**CATEGORY B2
SEMESTER – V (Theory)**

MODULE 14. PROPULSION

(80 Hours)

14.1 Turbine Engines

(a)(Level 1)

Constructional arrangement and operation of turbojet, turbofan, turbo shaft and turbo propeller engines;

(b)(Level 2)

Electronic Engine control and fuel metering systems (FADEC).

14.2 Engine Indicating Systems (Level 2)

Exhaust gas temperature/Inter stage turbine temperature systems;

Engine speed;

Engine Thrust Indication: Engine Pressure Ratio, engine turbine discharge pressure or jet pipe pressure systems;

Oil pressure and temperature;

Fuel pressure, temperature and flow;

Manifold pressure;

Engine torque;

Propeller speed.

14.3 Starting and Ignition Systems (Level 2)

Operation of engine start systems and components; Ignition systems and components;

Maintenance safety requirements



PROCEDURE MANUAL

MODULES AND SYLLABUS COVERAGE: THEORY
B1.3 (Helicopter Turbine) -- (1504Hrs)

Module	Subject	Hours
3	Electrical Fundamentals	94
4	Electronic Fundamentals	94
5	Digital Techniques Electronic Instrument Systems	94
6	Materials and Hardware	188
7A	Maintenance Practices	188
8	Basic Aerodynamics	94
9A	Human Factors	94
10	Aviation Legislation	188
12	Helicopter Aerodynamics, structures and systems	282
15	Gas turbine Engine	188
	Total	1504

MODULES AND SYLLABUS COVERAGE: PRACTICAL (In house)
B1.3 (Helicopter Turbine)--- (716Hrs)

Module	Subject	Hours
3	Electrical Fundamentals	60
4	Electronic Fundamentals	60
5	Digital Techniques Electronic Instrument Systems	60
6	Materials and Hardware	104
7A	Maintenance Practices	104
8	Basic Aerodynamics	60
12	Helicopter Aerodynamics, structures and systems	164
15	Gas turbine Engine	104
	Total	716



PROCEDURE MANUAL

MODULES AND SYLLABUS COVERAGE: THEORY & PRACTICAL

B1.3 (Helicopter Turbine) --- (2520Hrs)

SEMESTER WISE BREAKUP

	MODULE	THEORY	PRACTICAL	
			IN-HOUSE	AMO
Semester – I:	3 (Electrical Fundamentals)	94	60	X
	4 (Electronic Fundamentals)	94	60	X
	8 (Basic Aerodynamics)	94	60	X
	10 (Aviation Legislation-I)	94	X	X

		376	180	X
Semester – II:	5 (Digital Techniques Electronic Instrument Systems)	94	60	X
	6 (Materials and Hardware-I)	94	60	X
	7A (Maintenance Practices-I)	94	60	X
	10 (Aviation Legislation-II)	94	X	X
	AMO	X	X	150

		376	180	150
Semester – III:	6 (Materials and Hardware-II)	94	44	X
	7A (Maintenance Practices-II)	94	44	X
	12 (Helicopter Aerodynamics, structures and systems-I)	94	44	X
	15 (Gas turbine Engine-I)	94	44	X
	AMO	X	X	X

		376	176	X
Semester – IV:	9A (Human Factors)	94	X	X
	12 (Helicopter aerodynamics, Structures and systems-II)	94	60	X
	12 (Helicopter Aerodynamics, structures and systems-III)	94	60	X
	15 (Gas turbine Engine-II)	94	60	X
	AMO	X	X	150

		376	180	150
		GRAND TOTAL 1504	716	300



**SYLLABUS
CATEGORY B1.3
SEMESTER – I (Theory)**

MODULE 3. ELECTRICAL FUNDAMENTALS:

(94 Hrs)

3.1 Electron Theory (Level 1)

Structure and distribution of electrical charges within: atoms, molecules, ions, compounds;
Molecular structure of conductors, semiconductors and insulators.

3.2 Static Electricity and Conduction (Level 2)

Static electricity and distribution of electrostatic charges;
Electrostatic laws of attraction and repulsion;
Units of charge, Coulomb's Law;
Conduction of electricity in solids, liquids, gases and a vacuum.

3.3 Electrical Terminology (Level 2)

The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.

3.4 Generation of Electricity (Level 1)

Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.

3.5 DC Sources of Electricity (Level 2)

Construction and basic chemical action of: primary cells, secondary cells, lead acid cells, nickel cadmium cells, other alkaline cells;
Cells connected in series and parallel; Internal resistance and its effect on a battery;
Construction, materials and operation of thermocouples;
Operation of photo-cells.

3.6 DC Circuits (Level 2)

Ohms Law, Kirchhoff's Voltage and Current Laws;
Calculations using the above laws to find resistance, voltage and current;
Significance of the internal resistance of a supply.



3.7 Resistance/Resistor

(a) (Level 2)

Resistance and affecting factors;

Specific resistance;

Resistor colour code, values and tolerances, preferred values, wattage ratings; Resistors in series and parallel;

Calculation of total resistance using series, parallel and series parallel combinations;

Operation and use of potentiometers and rheostats;

Operation of Wheatstone Bridge.

(b) (Level 1)

Positive and negative temperature coefficient conductance;

Fixed resistors, stability, tolerance and limitations, methods of construction;

Variable resistors, thermistors, voltage dependent resistors;

Construction of potentiometers and rheostats;

Construction of Wheatstone Bridge;

3.8 Power (Level 2)

Power, work and energy (kinetic and potential);

Dissipation of power by a resistor;

Power formula;

Calculations involving power, work and energy.

3.9 Capacitance/Capacitor (Level 2)

Operation and function of a capacitor;

Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric constant, working voltage, voltage rating;

Capacitor types, construction and function;

Capacitor colour coding;

Calculations of capacitance and voltage in series and parallel circuits;

Exponential charge and discharge of a capacitor, time constants;

Testing of capacitors.

3.10 Magnetism

(a) (Level 2)

Theory of magnetism; Properties of a magnet

Action of a magnet suspended in the Earth's magnetic field;

Magnetisation and demagnetisation; Magnetic shielding;

Various types of magnetic material;

Electromagnets construction and principles of operation;

Hand clasp rules to determine: magnetic field around current carrying conductor.



(b) **(Level 2)**

Magneto motive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents;

Precautions for care and storage of magnets.

3.11 Inductance/Inductor (Level 2)

Faraday's Law;

Action of inducing a voltage in a conductor moving in a magnetic field;

Induction principles;

Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductor turns;

Mutual induction;

The effect the rate of change of primary current and mutual inductance has on induced voltage;

Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other;

Lenz's Law and polarity determining rules;

Back emf, self-induction;

Saturation point;

Principle uses of inductors;

3.12 DC Motor/Generator Theory (Level 2)

Basic motor and generator theory;

Construction and purpose of components in DC generator;

Operation of, and factors affecting output and direction of current flow in DC generators;

Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors;

Series wound, shunt wound and compound motors;

Starter Generator construction.

3.13 AC Theory (Level 2)

Sinusoidal waveform: phase, period, frequency, cycle;

Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power

Triangular/Square waves;

Single/3 phase principles.



3.14 Resistive (R), Capacitive (C) and Inductive (L) Circuits (Level 2)

Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel;

Power dissipation in L, C and R circuits;

Impedance, phase angle, power factor and current calculations;

True power, apparent power and reactive power calculations.

3.15 Transformers (Level 2)

Transformer construction principles and operation;

Transformer losses and methods for overcoming them;

Transformer action under load and no-load conditions;

Power transfer, efficiency, polarity markings;

Calculation of line and phase voltages and currents;

Calculation of power in a three phase system;

Primary and Secondary current, voltage, turns ratio, power, efficiency;

Auto transformers.

3.16 Filters (Level 1)

Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.

3.17 AC Generators (Level 2)

Rotation of loop in a magnetic field and waveform produced;

Operation and construction of revolving armature and revolving field type AC generators;

Single phase, two phase and three phase alternators;

Three phase star and delta connections advantages and uses;

Permanent Magnet Generators.

3.18 AC Motors (Level 2)

Construction, principles of operation and characteristics of: AC synchronous and induction motors both single and poly phase;

Methods of speed control and direction of rotation;

Methods of producing a rotating field: capacitor, inductor, shaded or split pole.



PROCEDURE MANUAL

**CATEGORY B1.3
SEMESTER – I (Theory)**

MODULE 4. ELECTRONIC FUNDAMENTALS: (94 Hrs)

4.1 Semiconductors

4.1.1 Diodes

(a) **(Level 2)**

Diode symbols;

Diode characteristics and properties;

Diodes in series and parallel;

Main characteristics and use of silicon controlled rectifiers (thyristors), light emitting diode, photo conductive diode, varistor, rectifier diodes;

Functional testing of diodes.

4.1.2 Transistors

(a) **(Level 1)**

Transistor symbols;

Component description and orientation;

Transistor characteristics and properties.

4.1.3 Integrated Circuits

(a) **(Level 1)**

Description and operation of logic circuits and linear circuits/operational amplifiers.

4.2 Printed Circuit Boards (Level 1)

Description and use of printed circuit boards.

4.3 Servomechanisms

(a) **(Level 1)**

Understanding of the following terms: Open and closed loop systems, feedback, follow up, analogue transducers;

Principles of operation and use of the following synchro system components/features: resolvers, differential, control and torque, transformers, inductance and capacitance transmitters.



PROCEDURE MANUAL

**CATEGORY B1.3
SEMESTER – I (Theory)**

MODULE 8. BASIC AERODYNAMICS:

(94 Hrs)

8.1 Physics of the Atmosphere (Level 2)

International Standard Atmosphere (ISA), application to aerodynamics.

8.2 Aerodynamics (Level 2)

Airflow around a body;

Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, up-wash and downwash, vortices, stagnation;

The terms: camber, chord, mean aerodynamic chord, profile (parasite) drag, induced drag, centre of pressure, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio;

Thrust, Weight, Aerodynamic Resultant;

Generation of Lift and Drag: Angle of Attack, Lift coefficient,

Drag coefficient, polar curve, stall;

Aerofoil contamination including ice, snow, frost.

8.3 Theory of Flight (Level 2)

Relationship between lift, weight, thrust and drag;

Glide ratio;

Steady state flights, performance;

Theory of the turn;

Influence of load factor: stall, flight envelope and structural limitations;

Lift augmentation.

8.4 Flight Stability and Dynamics (Level 2)

Longitudinal, lateral and directional stability (active and passive).



PROCEDURE MANUAL

**CATEGORY B1.3
SEMESTER – I (Theory)**

MODULE 10- I: AVIATION LEGISLATION- I:

(94 Hrs)

10.1 Regulatory Framework (Level 1)

Role of International Civil Aviation Organisation;

The Aircraft Act and Rules made there under

Role of the DGCA;

Relationship between CAR-21, CAR-M, CAR-145, CAR-66, CAR 147

The Aircraft Rules (Applicable to Aircraft Maintenance and Release)

Aeronautical Information Circulars (Applicable to Aircraft Maintenance and Release)

CAR Sections 1 and 2

10.2 CAR-66 Certifying Staff - Maintenance (Level 2)

Detailed understanding of CAR-66.

10.3 CAR-145 — Approved Maintenance Organisations (Level 2)

Detailed understanding of CAR-145 and CAR M Subpart F

10.4 Aircraft Operations (Level 1)

Commercial Air Transport/Commercial Operations

Air Operators Certificates;

Operators Responsibilities, in particular regarding continuing airworthiness and maintenance;

Documents to be carried on board;

Aircraft Placarding (Markings);



PROCEDURE MANUAL

**CATEGORY B1.3
SEMESTER – II (Theory)**

MODULE 5. DIGITAL TECHNIQUES ELECTRONIC INSTRUMENT SYSTEMS: (94 Hrs)

5.1 Electronic Instrument Systems (Level 2)

Typical systems arrangements and cockpit layout of electronic instrument systems.

5.2 Numbering Systems (Level 1)

Numbering systems: binary, octal and hexadecimal;
Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa.

5.3 Data Conversion (Level 1)

Analogue Data, Digital Data;
Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.

5.4 Data Buses (Level 2)

Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications.

5.5 Logic Circuits

(a) (Level 2)

Identification of common logic gate symbols, tables and equivalent circuits;
Applications used for aircraft systems, schematic diagrams.

5.6 Basic Computer Structure

(a) (Level 2)

Computer terminology (including bit, byte, software, hardware, CPU, IC, and various memory devices such as RAM, ROM, PROM);
Computer technology (as applied in aircraft systems).

5.10 Fibre Optics (Level 1)

Advantages and disadvantages of fibre optic data transmission over electrical wire propagation;
Fibre optic data bus;
Fibre optic related terms;
Terminations;
Couplers, control terminals, remote terminals;
Application of fibre optics in aircraft systems.



PROCEDURE MANUAL

5.11 Electronic Displays (Level 2)

Principles of operation of common types of displays used in modern aircraft, including
Cathode Ray Tubes, Light Emitting Diodes and Liquid
Crystal Display.

5.12 Electrostatic Sensitive Devices (Level 2)

Special handling of components sensitive to electrostatic discharges;
Awareness of risks and possible damage, component and personnel
anti-static protection devices.

5.13 Software Management Control (Level 2)

Awareness of restrictions, airworthiness requirements and possible
catastrophic effects of unapproved changes to software programmes.

5.14 Electromagnetic Environment (Level 2)

Influence of the following phenomena on maintenance practices for
electronic system:
EMC-Electromagnetic Compatibility
EMI-Electromagnetic Interference
HIRF-High Intensity Radiated Field
Lightning/lightning protection

5.15 Typical Electronic/Digital Aircraft Systems (Level 2)

General arrangement of typical electronic/digital aircraft systems and
associated BITE(Built In Test Equipment) testing such as:

(a) For B1 and B2 only:

ACARS-ARINC Communication and Addressing and Reporting System

EICAS-Engine Indication and Crew Alerting System

FBW-Fly by Wire

FMS-Flight Management System

IRS-Inertial reference system

(b) For B1, B2 and B3:

ECAM-Electronic Centralised Aircraft Monitoring

EFIS-Electronic Flight Instrument System

GPS-Global Positioning System

TCAS-Traffic Collision Avoidance system

Integrated modular Avionics

Cabin System

Information system



PROCEDURE MANUAL

**CATEGORY B1.3
SEMESTER – II (Theory)**

MODULE 6 – I. MATERIALS AND HARDWARE– I:

(94 Hrs)

6.1 Aircraft Materials — Ferrous

(a) (Level 2)

Characteristics, properties and identification of common alloy steels used in aircraft;

Heat treatment and application of alloy steels;

(b) (Level 1)

Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance.

6.2 Aircraft Materials — Non-Ferrous

(a) (Level 2)

Characteristics, properties and identification of common non-ferrous materials used in aircraft;

Heat treatment and application of non-ferrous materials;

(b) (Level 1)

Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance.

6.3 Aircraft Materials - Composite and Non- Metallic

6.3.1 Composite and non-metallic other than wood and fabric

(a) (Level 2)

Characteristics, properties and identification of common composite and non metallic materials, other than wood, used in aircraft;

Sealant and bonding agents.

(b) (Level 2)

The detection of defects/deterioration in composite and non-metallic material.

Repair of composite and non-metallic material.

6.3.2 Wooden structures (Level 2)

Construction methods of wooden airframe structures;

Characteristics, properties and types of wood and glue used in aeroplanes;

Preservation and maintenance of wooden structure;

Types of defects in wood material and wooden structures;

The detection of defects in wooden structure;

Repair of wooden structure.



6.3.3 Fabric covering (Level 2)

Characteristics, properties and types of fabrics used in aeroplanes;
Inspections methods for fabric;
Types of defects in fabric;
Repair of fabric covering.

6.4 Corrosion

(a) (Level 1)

Chemical fundamentals;
Formation by, galvanic action process, microbiological, stress;

(b) (Level 2)

Types of corrosion and their identification;
Causes of corrosion;
Material types, susceptibility to corrosion.

6.5 Fasteners

6.5.1 Screw threads (Level 2)

Screw nomenclature;
Thread forms, dimensions and tolerances for standard threads used in aircraft;
Measuring screw threads;

6.5.2 Bolts, studs and screws (Level 2)

Bolt types: specification, identification and marking of aircraft bolts, international standards;
Nuts: self locking, anchor, standard types;
Machine screws: aircraft specifications;
Studs: types and uses, insertion and removal;
Self tapping screws, dowels.



PROCEDURE MANUAL

**CATEGORY B1.3
SEMESTER – II (Theory)**

MODULE 7A -I. MAINTENANCE PRACTICES –I:

(94 Hrs)

7.1 Safety Precautions-Aircraft and Workshop (Level 3)

Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals.

Also, instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.

7.2 Workshop Practices (Level 3)

Care of tools, control of tools, use of workshop materials;
Dimensions, allowances and tolerances, standards of workmanship;
Calibration of tools and equipment, calibration standards.

7.3 Tools (Level 3)

Common hand tool types;
Common power tool types;
Operation and use of precision measuring tools;
Lubrication equipment and methods.
Operation, function and use of electrical general test equipment;

7.4 Avionic General Test Equipment (Level 2)

Operation, function and use of avionic general test equipment.

7.5 Engineering Drawings, Diagrams and Standards (Level 2)

Drawing types and diagrams, their symbols, dimensions, tolerances and projections;

Identifying title block information

Microfilm, microfiche and computerised presentations;

Specification 100 of the Air Transport Association (ATA) of America;

Aeronautical and other applicable standards including

ISO, AN, MS, NAS and MIL;

Wiring diagrams and schematic diagrams.

7.6 Fits and Clearances (Level 2)

Drill sizes for bolt holes, classes of fits;

Common system of fits and clearances;

Schedule of fits and clearances for aircraft and engines;

Limits for bow, twist and wear;

Standard methods for checking shafts, bearings and other parts.



7.7 Electrical Wiring Interconnection System (EWIS) (Level 3)

Continuity, insulation and bonding techniques and testing;

Use of crimp tools: hand and hydraulic operated;

Testing of crimp joints;

Connector pin removal and insertion;

Co-axial cables: testing and installation precautions;

Identification of wire types, their inspection criteria and damage tolerance.

Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding.

EWIS installations, inspection, repair, maintenance and cleanliness standards.

7.8 Riveting (Level 2)

Riveted joints, rivet spacing and pitch;

Tools used for riveting and dimpling;

Inspection of riveted joints.

7.9 Pipes and Hoses (Level 2)

Bending and beelling/flaring aircraft pipes;

Inspection and testing of aircraft pipes and hoses;

Installation and clamping of pipes.

7.10 Springs (Level 2)

Inspection and testing of springs.

7.11 Bearings (Level 2)

Testing, cleaning and inspection of bearings;

Lubrication requirements of bearings;

Defects in bearings and their causes.

7.12 Transmissions (Level 2)

Inspection of gears, backlash;

Inspection of belts and pulleys, chains and sprockets;

Inspection of screw jacks, lever devices, push-pull rod systems.



PROCEDURE MANUAL

**CATEGORY B1.3
SEMESTER – II (Theory)**

MODULE 10- II: AVIATION LEGISLATION- II:

(94 Hrs)

10.5 Aircraft Certification

(a) General - **(Level 1)**

Certification rules: such as FAA & EACS 23/25/27/29;

Type Certification;

Supplemental Type Certification;

CAR-21 Design/Production Organisation Approvals.

Aircraft Modifications and repairs approval and certification

Permit to fly requirements

(b) Documents **(Level 2)**

Certificate of Airworthiness;

Certificate of Registration;

Noise Certificate;

Weight Schedule;

Radio Station Licence and Approval.

10.6 CAR-M (Level 2)

Detail understanding of CAR M provisions related to Continuing Airworthiness

Detailed understanding of CAR-M.

10.7 Applicable National and International Requirements

(a) **(Level 2)**

Maintenance Programme, Maintenance checks and inspections;

Master Minimum Equipment Lists, Minimum Equipment

List, Dispatch Deviation Lists;

Airworthiness Directives;

Service Bulletins, manufacturers service information;

Modifications and repairs;

Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.;

(b) **(Level 1)**

Continuing airworthiness;

Test flights;

ETOPS /EDTO , maintenance and dispatch requirements;

RVSM, maintenance and dispatch requirements

RNP, MNPS Operations

All Weather Operations,

Category 2/3 operations and minimum equipment requirements.



10.8 Safety Management System (Level 2)

State Safety Programme
Basic Safety Concepts
Hazards & Safety Risks
SMS Operation
SMS Safety performance
Safety Assurance

10.9 Fuel Tank Safety (Level 2)

Special Federal Aviation Regulations (SFARs) from 14 CFR SFAR 88 of the FAA
and of JAA TGL 47
Concept of CDCCL,
Airworthiness Limitations Items (ALI)



**CATEGORY B1.3
SEMESTER – III (Theory)**

MODULE 6 – II. MATERIALS AND HARDWARE – II:

(94 Hrs)

6.5.3 Locking devices (Level 2)

Tab and spring washers, locking plates, split pins, palnuts, wire locking, quick release fasteners, keys, circlips, cotter pins.

6.5.4 Aircraft rivets (Level 2)

Types of solid and blind rivets: specifications and identification, heat treatment.

6.6 Pipes and Unions

(a) (Level 2)

Identification of, and types of rigid and flexible pipes and their connectors used in aircraft;

(b) (Level 2)

Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.

6.7 Springs (Level 2)

Types of springs, materials, characteristics and applications.

6.8 Bearings (Level 2)

Purpose of bearings, loads, material, construction;
Types of bearings and their application.

6.9 Transmissions (Level 2)

Gear types and their application;
Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns; Belts and pulleys, chains and sprockets.

6.10 Control Cables (Level 2)

Types of cables; End fittings, turnbuckles and compensation devices;
Pulleys and cable system components;
Bowden cables; Aircraft flexible control systems.

6.11 Electrical Cables and Connectors (Level 2)

Cable types, construction and characteristics;
High tension and co-axial cables; Crimping;
Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes.



PROCEDURE MANUAL

**CATEGORY B1.3
SEMESTER – III (Theory)**

MODULE 7A - II. MAINTENANCE PRACTICES – II:

(94 Hrs)

7.13 Control Cables (Level 2)

Swaging of end fittings;
Inspection and testing of control cables;
Bowden cables; aircraft flexible control systems.

7.14 Material handling

7.14.1 Sheet Metal (Level 2)

Marking out and calculation of bend allowance;
Sheet metal working, including bending and forming;
Inspection of sheet metal work.

7.14.2 Composite and non-metallic (Level 2)

Bonding practices;
Environmental conditions
Inspection methods

7.15 Welding, Brazing, Soldering and Bonding

(a) (Level 2)

Soldering methods; inspection of soldered joints.

(b) (Level 2)

Welding and brazing methods;
Inspection of welded and brazed joints;
Bonding methods and inspection of bonded joints.

7.16 Aircraft Weight and Balance

(a) (Level 2)

Centre of Gravity/Balance limits calculation: use of relevant documents;

(b) (Level 2)

Preparation of aircraft for weighing;
Aircraft weighing;

7.17 Aircraft Handling and Storage (Level 2)

Aircraft taxiing/towing and associated safety precautions;
Aircraft jacking, chocking, securing and associated safety precautions;
Aircraft storage methods;
Refuelling/defuelling procedures;
De-icing/anti-icing procedures;
Electrical, hydraulic and pneumatic ground supplies.
Effects of environmental conditions on aircraft handling and operation.



7.18 Disassembly, Inspection, Repair and Assembly Techniques

(a) **(Level 3)**

Types of defects and visual inspection techniques.
Corrosion removal, assessment and re-protection.

(b) **(Level 2)**

General repair methods, Structural Repair Manual;
Ageing, fatigue and corrosion control programmes;

(c) **(Level 2)**

Non destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and boroscope methods.

(d) **(Level 2)**

Disassembly and re-assembly techniques.

(e) **(Level 2)**

Trouble shooting techniques

7.19 Abnormal Events

(a) **(Level 2)**

Inspections following lightning strikes and HIRF penetration.

(b) **(Level 2)**

Inspections following abnormal events such as heavy landings and flight through turbulence.

7.20 Maintenance Procedures (Level 2)

Maintenance planning;

Modification procedures;

Stores procedures;

Certification/release procedures;

Interface with aircraft operation;

Maintenance Inspection/Quality Control/Quality Assurance;

Additional maintenance procedures.

Control of life limited components



PROCEDURE MANUAL

**CATEGORY B1.3
SEMESTER – III (Theory)**

**MODULE 12- I HELICOPTER AERODYNAMICS, STRUCTURES AND SYSTEMS - I
(94 Hrs)**

12.1 Theory of Flight — Rotary Wing Aerodynamics (Level 2)

Terminology;
Effects of gyroscopic precession;
Torque reaction and directional control;
Dissymmetry of lift, Blade tip stall;
Translating tendency and its correction;
Coriolis effect and compensation;
Vortex ring state, power settling, over pitching;
Auto-rotation;
Ground effect.

12.2 Flight Control Systems (Level 3)

Cyclic control;
Collective control;
Swash plate;
Yaw control: Anti-Torque Control, Tail rotor, bleed air;
Main Rotor Head: Design and Operation features;
Blade Dampers: Function and construction;
Rotor Blades: Main and tail rotor blade construction and attachment;
Trim control, fixed and adjustable stabilisers;
System operation: manual, hydraulic, electrical and flyby-wire;
Artificial feel;
Balancing and Rigging.

12.3 Blade Tracking and Vibration Analysis (Level 3)

Rotor alignment;
Main and tail rotor tracking;
Static and dynamic balancing;
Vibration types, vibration reduction methods;
Ground resonance.

12.4 Transmissions (Level 3)

Gear boxes, main and tail rotors;
Clutches, free wheel units and rotor brake.
Tail rotor drive shafts, flexible couplings, bearings,
vibration dampers and bearing hangers



12.5 Airframe Structures

(a) (Level 2)

Airworthiness requirements for structural strength;
Structural classification, primary, secondary and tertiary;
Fail safe, safe life, damage tolerance concepts;
Zonal and station identification systems;
Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue;
Drains and ventilation provisions;
System installation provisions;
Lightning strike protection provision.

(b)(Level 2)

Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning and anti-corrosive protection.
Pylon, stabiliser and undercarriage attachments;
Seat installation;
Doors: construction, mechanisms, operation and safety devices;
Windows and windscreen construction;
Fuel storage;
Firewalls;
Engine mounts;
Structure assembly techniques: riveting, bolting, bonding;
Methods of surface protection, such as chromating, anodising, painting;
Surface cleaning.
Airframe symmetry: methods of alignment and symmetry checks.



PROCEDURE MANUAL

**CATEGORY B1.3
SEMESTER – III (Theory)**

MODULE 15- I GAS TURBINE ENGINE – I

(94 Hrs)

15.1 Fundamentals (Level 2)

Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle;
The relationship between force, work, power, energy, velocity, acceleration;
Constructional arrangement and operation of turbojet, turbofan, turbo shaft, turboprop.

15.2 Engine Performance (Level 2)

Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption;
Engine efficiencies;
By-pass ratio and engine pressure ratio;
Pressure, temperature and velocity of the gas flow;
Engine ratings, static thrust, influence of speed, altitude and hot climate, flat rating, limitations.

15.3 Inlet (Level 2)

Compressor inlet ducts
Effects of various inlet configurations;
Ice protection.

15.4 Compressors (Level 2)

Axial and centrifugal types;
Constructional features and operating principles and applications;
Fan balancing;
Operation:
Causes and effects of compressor stall and surge;
Methods of air flow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades;
Compressor ratio.

15.5 Combustion Section (Level 2)

Constructional features and principles of operation.



15.6 Turbine Section (Level 2)

Operation and characteristics of different turbine blade types;
Blade to disk attachment;
Nozzle guide vanes;
Causes and effects of turbine blade stress and creep.

15.7 Exhaust (Level 2)

Constructional features and principles of operation;
Convergent, divergent and variable area nozzles;
Engine noise reduction;
Thrust reversers.

15.8 Bearings and Seals (Level 2)

Constructional features and principles of operation.

15.9 Lubricants and Fuels (Level 2)

Properties and specifications;
Fuel additives;
Safety precautions.

15.10 Lubrication Systems (Level 2)

System operation/lay-out and components.

15.11 Fuel Systems (Level 2)

Operation of engine control and fuel metering systems including electronic engine control (FADEC);
Systems lay-out and components.



PROCEDURE MANUAL

**CATEGORY B1.3
SEMESTER – IV (Theory)**

MODULE 9A. HUMAN FACTORS:

(94 Hrs)

9.1 General (Level 2)

The need to take human factors into account;
Incidents attributable to human factors/human error;
'Murphy's' law.

9.2 Human Performance and Limitations (Level 2)

Vision;
Hearing;
Information processing;
Attention and perception;
Memory;
Claustrophobia and physical access.

9.3 Social Psychology (Level 1)

Responsibility: individual and group;
Motivation and de-motivation;
Peer pressure;
'Culture' issues;
Team working;
Management, supervision and leadership

9.4 Factors Affecting Performance (Level 2)

Fitness/health;
Stress: domestic and work related;
Time pressure and deadlines;
Workload: overload and under load;
Sleep and fatigue, shift work;
Alcohol, medication, drug abuse.

9.5 Physical Environment (Level 1)

Noise and fumes;
Illumination;
Climate and temperature;
Motion and vibration;
Working environment.



9.6 Tasks (Level 1)

Physical work;
Repetitive tasks;
Visual inspection;
Complex systems.

9.7 Communication (Level 2)

Within and between teams;
Work logging and recording;
Keeping up to date, currency;
Dissemination of information.

9.8 Human Error (Level 2)

Error models and theories;
Types of error in maintenance tasks;
Implications of errors (i.e accidents)
Avoiding and managing errors.

9.9 Hazards in the Workplace (Level 2)

Recognising and avoiding hazards;
Dealing with emergencies.



PROCEDURE MANUAL

**CATEGORY B1.3
SEMESTER – IV (Theory)**

MODULE 12- II HELICOPTER AERODYNAMICS, STRUCTURES AND SYSTEMS– II :

(94 Hrs)

12.6 Air Conditioning (ATA 21)

12.6.1 Air supply (Level 2)

Sources of air supply including engine bleed and ground cart;

12.6.2 Air Conditioning (Level 3)

Air conditioning systems;
Distribution systems;
Flow and temperature control systems;
Protection and warning devices.

12.9 Equipment and Furnishings (ATA 25)

(a)(Level 2)

Emergency equipment requirements;
Seats, harnesses and belts;
Lifting systems.

(b) (Level 1)

Emergency flotation systems;
Cabin lay-out, cargo retention;
Equipment lay-out;
Cabin Furnishing Installation.

12.10 Fire Protection (ATA 26) (Level 3)

Fire and smoke detection and warning systems;
Fire extinguishing systems;
System tests.

12.11 Fuel Systems (ATA 28) (Level 3)

System lay-out;
Fuel tanks;
Supply systems;
Dumping, venting and draining;
Cross-feed and transfer;
Indications and warnings;
Refuelling and de-fuelling.



12.12 Hydraulic Power (ATA 29) (Level 3)

System lay-out;
Hydraulic fluids;
Hydraulic reservoirs and accumulators;
Pressure generation: electric, mechanical, pneumatic;
Emergency pressure generation;
Filters
Pressure Control;
Power distribution;
Indication and warning systems;
Interface with other systems.

12.13 Ice and Rain Protection (ATA 30) (Level 3)

Ice formation, classification and detection;
Anti-icing and de-icing systems: electrical, hot air and chemical;
Rain repellent and removal;
Probe and drain heating.
Wiper system

12.14 Landing Gear (ATA 32)(Level 3)

Construction, shock absorbing;
Extension and retraction systems: normal and emergency;
Indications and warning;
Wheels, tyres, brakes;
Steering;
Air-ground sensing
Skids, floats.

12.16 Pneumatic/Vacuum (ATA 36)(Level 3)

System lay-out;
Sources: engine, compressors, reservoirs, ground supply.;
Pressure control;
Distribution;
Indications and warnings;
Interfaces with other systems.



PROCEDURE MANUAL

**CATEGORY B1.3
SEMESTER – IV (Theory)**

**MODULE 12- III HELICOPTER AERODYNAMICS, STRUCTURES AND SYSTEMS- III:
(94 Hrs)**

12.7 Instruments/Avionic Systems

12.7.1 Instrument Systems (ATA 31) (Level 2)

Pitot static: altimeter, air speed indicator, vertical speed indicator;
Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn coordinator;
Compasses: direct reading, remote reading;
Vibration indicating systems — HUMS;
Glass Cockpit
Other aircraft system indication.

12.7.2 Avionic Systems (Level 1)

Fundamentals of system layouts and operation of:
Auto Flight (ATA 22);
Communications (ATA 23);
Navigation Systems (ATA 34).

12.8 Electrical Power (ATA 24) (Level 3)

Batteries Installation and Operation;
DC power generation, AC power generation;
Emergency power generation;
Voltage regulation, Circuit protection.
Power distribution;
Inverters, transformers, rectifiers;
External/Ground power.

12.15 Lights (ATA 33) (Level 3)

External: navigation, landing, taxiing, ice;
Internal: cabin, cockpit, cargo;
Emergency.



12.17 Integrated Modular Avionics (ATA42) (Level 2)

Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others:

Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc.

Core System;

Network Components.

12.18 On Board Maintenance Systems (ATA45) (Level 2)

Central maintenance computers;

Data loading system;

Electronic library system;

Printing;

Structure monitoring (damage tolerance monitoring).

12.19 Information Systems (ATA46) (Level 2)

The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display.

Typical examples include Air Traffic and Information Management Systems and Network Server Systems.

Aircraft General Information System;

Flight Deck Information System;

Maintenance Information System;

Passenger Cabin Information System;

Miscellaneous Information System.



**CATEGORY B1.3
SEMESTER – IV (Theory)**

MODULE 15- II GAS TURBINE ENGINE – II:

(94 Hrs)

15.12 Air Systems (Level 2)

Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services.

15.13 Starting and Ignition Systems (Level 2)

Operation of engine start systems and components;
Ignition systems and components;
Maintenance safety requirements.

15.14 Engine Indication Systems (Level 2)

Exhaust Gas Temperature/Inter stage Turbine Temperature;
Engine Thrust Indication: Engine Pressure Ratio, engine turbine discharge pressure or jet pipe pressure systems;
Oil pressure and temperature;
Fuel pressure and flow;
Engine speed;
Vibration measurement and indication;
Torque;
Power.

15.15 Power Augmentation Systems(Level 1)

Operation and applications;
Water injection, water methanol;
Afterburner systems.

15.16 Turbo-prop Engines (Level 2)

Gas coupled/free turbine and gear coupled turbines;
Reduction gears;
Integrated engine and propeller controls;
Over speed safety devices.

15.17 Turbo-shaft engines (Level 2)

Arrangements, drive systems, reduction gearing, couplings, control systems.



15.18 Auxiliary Power Units (APUs) (Level 2)

Purpose, operation, protective systems.

15.19 Power plant Installation (Level 2)

Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.

15.20 Fire Protection Systems (Level 2)

Operation of detection and extinguishing systems.

15.21 Engine Monitoring and Ground Operation (Level 3)

Procedures for starting and ground run-up;

Interpretation of engine power output and parameters;

Trend (including oil analysis, vibration and boroscope) monitoring;

Inspection of engine and components to criteria, tolerances and data specified by engine manufacturer;

Compressor washing/cleaning;

Foreign Object Damage.

15.22 Engine Storage and Preservation (Level 2)

Preservation and de-preservation for the engine and accessories/ systems.



PROCEDURE MANUAL

**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – I**

Module – 3 (Electrical Fundamental-I)

Hours: 48

- | | |
|--|----------|
| 1. Verification of Ohm's Law. | (08 hrs) |
| 2. Wiring practices of Single and Double wiring methods. | (08 hrs) |
| 3. Measurement of voltage and specific gravity of electrolyte in lead acid battery using volt meter and hydrometer respectively. | (08 hrs) |
| 4. Wiring the Lamp circuit with relay control. | (08 hrs) |
| 5. Verification of Kirchhoff's voltage and current law in series, parallel and Series-parallel circuits. | (08 hrs) |
| 6. Finding the unknown resistance value by Wheatstone bridge tester. | (08 hrs) |



PROCEDURE MANUAL

**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – I**

Module – 4 (Electronic Fundamental)

Hours: 48

- | | |
|---|----------|
| 1. Verification of characteristics of PN diodes. | (06 hrs) |
| 2. Finding the serviceability of Diode with multi-meter. | (06 hrs) |
| 3. Construction and operations of Center tap full wave rectifier. | (06 hrs) |
| 4. Construction and operations of Full wave Bridge rectifier. | (06 hrs) |
| 5. Verification of Zener diode characteristics. | (06 hrs) |
| 6. Testing of SCR for serviceability. | (06 hrs) |
| 7. Testing of transistors for serviceability. | (06 hrs) |
| 8. Study the operation of Operational Amplifier as an Integrator, Differentiator. | (06 hrs) |



**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – I**

MODULE 8: (Basic Aerodynamics)

Hours: 48

- | | |
|---|----------|
| 1. Study of Low speed wind tunnel. | (06 hrs) |
| 2. Flow around the body by Smoke visualisation-Demo. | (06 hrs) |
| 3. Study and drag characteristics of airflow around bluff bodies. | (06 hrs) |
| 4. Lift characteristics on Symmetrical airfoil. | (06 hrs) |
| 5. Lift characteristics on Cambered airfoil. | (06 hrs) |
| 6. Plot a graph C_l vs Angle of attack and locate the stalling angle. | (06 hrs) |
| 7. Plot a graph C_d vs Angle of attack and locate the critical angle of attack. | (06 hrs) |
| 8. Plot a graph L/D and locate the best L/D ratio. | (06 hrs) |



PROCEDURE MANUAL

**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – II**

Module – 3 (Electrical Fundamental-II)

Hours: 50

- | | |
|---|----------|
| 1. Finding the polarity of electro-magnet by using Grip rule. | (08 hrs) |
| 2. Verification of electromagnetic lines around the current carrying conductor. | (08 hrs) |
| 3. Replacement of brush in a DC generator. | (10 hrs) |
| 4. Measuring insulation resistance of DC motor. | (08 hrs) |
| 5. Voltage regulation of alternators. | (08 hrs) |
| 6. Speed control of AC motor by varying frequency. | (08 hrs) |



PROCEDURE MANUAL

**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – II**

MODULE 5: (Digital Techniques Electronic Instrument Systems-I)

Hours: 50

1. Verification of logic gates with truth table of AND, NOT, OR and Ex- OR. (06 hrs)
2. Verification of Universal Gates- NAND, NOR Gate. (08 hrs)
3. Construction and Verification of Multiplexer. (06 hrs)
4. Construction and Verification of De-multiplexer. (06 hrs)
5. Construction and Verification of Encoder. (06 hrs)
6. Construction and Verification of Decoder. (06 hrs)
7. Demonstration of Analog to Digital Convertor. (06 hrs)
8. Demonstration of Digital to Analog Convertor. (06 hrs)



**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – II**

MODULE 7:(Maintenance Practices-I)

Hours: 50

1. Demonstration on Riveted joints, rivet spacing and pitch.(05 hrs)
2. Identification of Tools used for riveting and dimpling.(05 hrs)
3. Inspection riveted joints.(05 hrs)
4. Bending and belling/ flaring aircraft pipes.(05 hrs)
5. Demonstration of aircraft pipes and hoses.(05 hrs)
6. Installation and clamping of pipes.(05 hrs)
7. Inspection and testing of springs.(05 hrs)
8. Cleaning and inspection of bearings.(05 hrs)
9. Lubrication of bearings.(05 hrs)
10. Workshop practices: Square fitting and 'L' fitting. (05 hrs)



**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – III**

MODULE 5: (Digital Techniques Electronic Instrument Systems-II) Hours: 40

1. Verification of Demorgan's theorem. (06 hrs)
2. Decimal to BCD conversion. (08 hrs)
3. BCD to Decimal Conversion. (08 hrs)
4. Assembly and Verification of Half adder and Full adder. (06 hrs)
5. Construction of Aircraft Landing Gear Indication and Warning System by logic circuit. (06 hrs)
6. Study of aircraft electro static discharger protection for static sensitive components. (06 hrs)



PROCEDURE MANUAL

**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – III**

MODULE 6: (Materials and Hardware-I)

Hours: 40

- | | |
|--|----------|
| 1. Identification, Types, and purpose of fasteners. | (06 hrs) |
| 2. Identification of different types of standard threads used in aircraft. | (06 hrs) |
| 3. Identification of different types of Aircraft Bolts, its Specifications and Markings. | (06 hrs) |
| 4. Identification of different types of Nuts. | (06 hrs) |
| 5. Ferrous material hardness test. | (06 hrs) |
| 6. Ferrous material impact resistance test. | (06 hrs) |
| 7. Studs: Types and removal of stud. | (04 hrs) |



PROCEDURE MANUAL

**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – III**

MODULE 7: (Maintenance Practices-II)

Hours: 40

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|--|----------|
| 1. Inspection and testing of control cables. | (06 hrs) |
| 2. Marking out and calculation of bend allowance for sheet metal bend. | (06 hrs) |
| 3. Gas welding. | (06 hrs) |
| 4. Arc welding. | (06 hrs) |
| 5. TIG and MIG welding. | (10 hrs) |
| 6. Inspection of welded joints. | (06 hrs) |



PROCEDURE MANUAL

**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – III**

Module – 11 A(Turbine Aerodynamics, Structures and systems –I)

Hours: 40

- | | |
|---|----------|
| 1. Charging Procedures of Lead Acid Batteries. | (06 hrs) |
| 2. Charging Procedures of Nickel Cadmium Batteries. | (06 hrs) |
| 3. Removal and installation of Landing lights of Dornier Aircraft (DO-228). | (06 hrs) |
| 4. Removal and installation of Navigation of Dornier Aircraft (DO-228). | (06 hrs) |
| 5. Familiarization of cockpit panels, switches and circuit breakers of Dornier Aircraft (DO-228). | (08 hrs) |
| 6. Familiarization of Power distribution and Bus bar locations of Dornier Aircraft (DO-228). | (08 hrs) |



PROCEDURE MANUAL

**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – IV**

MODULE – 6 (Materials and Hardware-II)

Hours: 50

1. Identification Composites and its uses. (08 hrs)
2. Types of locking devices and its identification. (08 hrs)
3. Wire locking procedure. (08 hrs)
4. Identification of different types of Rivets and its uses. (06 hrs)
5. Identification of different types of pipes and its colour code. (06 hrs)
6. Identification of different types of Bearings and its advantages. (06 hrs)
7. Types of Control cables and turn buckles. (08 hrs)



PROCEDURE MANUAL

**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – IV**

Module – 11 A(Turbine Aerodynamics, Structures and systems –II)	Hours: 50
1. Identification of Aircraft Station and Zones.	(04 hrs)
2. Identification of aircraft structures Primary, Secondary, and Territory.	(04 hrs)
3. Identification of Major structural components of Aircraft.	(04 hrs)
4. Removal/fitment of Aileron.	(04 hrs)
5. Removal/fitment of Flap.	(04 hrs)
6. Aircraft jacking up procedure.	(06 hrs)
7. Aircraft levelling procedure.	(06 hrs)
8. Aircraft Symmetry checks Procedure.	(06 hrs)
9. Dismantling of ACM.	(06 hrs)
10. Dismantling and Assembling of Cabin Compressor.	(06 hrs)



PROCEDURE MANUAL

**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – IV**

MODULE – 15 (Gas Turbine Engine-I)

Hours: 50

- | | |
|--|----------|
| 1. Inspection on axial flow compressor. | (08 hrs) |
| 2. Inspection on centrifugal flow compressor. | (08 hrs) |
| 3. Inspection on combustion chamber. | (06 hrs) |
| 4. Inspection on turbine blade. | (06 hrs) |
| 5. Removal and fitment of turbine rotor blade. | (06 hrs) |
| 6. Removal, cleaning and fitment of oil filter. | (08 hrs) |
| 7. Disassembly and assembly of fuel cooled oil cooler. | (08 hrs) |



PROCEDURE MANUAL

**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – V**

Module 11A(Turbine Aerodynamics, Structures and systems –III)

Hours: 40

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|---|----------|
| 1 Hydraulic oil charging procedure. | (05 hrs) |
| 2 Demonstration of Aircraft Landing gear Retraction/Extension test. | (05 hrs) |
| 3. Demonstration of Aircraft Landing gear indications and warning. | (05 hrs) |
| 4. Demonstration of Aircraft Landing gear emergency extension. | (05 hrs) |
| 5. Functional checks on Aircraft primary Flight controls. | (05 hrs) |
| 6. Functional checks on Aircraft secondary flight Flaps. | (05 hrs) |
| 7. Location of Aircraft fuel tanks and Fuel system components. | (05 hrs) |
| 8. Study of Aircraft refuelling procedure. | (05 hrs) |



PROCEDURE MANUAL

**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – V**

Module – 11 A (Turbine Aerodynamics, Structures and systems –IV) Hours: 40

1. Individually identifying and classification of aircraft instruments. (08 hrs)
2. Familiarisation of cockpit instruments layout. (08 hrs)
3. Removal and installation of Fuel quantity gauge on Dornier Aircraft (DO-228). (08 hrs)
4. Familiarisation of various types of antennas. (08 hrs)
5. Familiarisation of HF, VHF components. (08 hrs)



PROCEDURE MANUAL

**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – V**

Module 15(Gas turbine Engine-II)

Hours: 40

- | | |
|--|----------|
| 1. Removal and fitment of air blow off valve /air bleed valve. | (08 hrs) |
| 2. Disassembly and assembly of Gear type pump. | (08 hrs) |
| 3. Disassembly and assembly of fuel heater. | (08 hrs) |
| 4. Removal and fitment of engine cowlings and panels. | (08 hrs) |
| 5. Preparation for ground run. | (08 hrs) |



PROCEDURE MANUAL

**CATEGORY B1.1 (Aeroplane Turbine) PRACTICAL
SEMESTER – V**

MODULE 17: (Propeller)

Hours: 40

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|--|----------|
| 1. Inspection on propeller blades. | (08 hrs) |
| 2. Propeller track check. | (08 hrs) |
| 3. Propeller balancing check (vertical). | (08 hrs) |
| 4. Propeller balancing check (Horizontal). | (08 hrs) |
| 5. Removal and Installation of propeller. | (08 hrs) |



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – I**

Module – 3 (Electrical Fundamental-I)

Hours: 48

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|--|----------|
| 1. Verification of Ohm's Law. | (08 hrs) |
| 2. Wiring practices of Single and Double wiring methods. | (08 hrs) |
| 3. Measurement of voltage and specific gravity of electrolyte in lead acid battery using volt meter and hydrometer respectively. | (08 hrs) |
| 4. Wiring the Lamp circuit with relay control. | (08 hrs) |
| 5. Verification of Kirchhoff's voltage and current law in series, parallel and Series-parallel circuits. | (08 hrs) |
| 6. Finding the unknown resistance value by Wheatstone bridge tester. | (08 hrs) |



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – I**

Module – 4 (Electronic Fundamental)

Hours: 48

- | | |
|---|----------|
| 1. Verification of characteristics of PN diodes. | (06 hrs) |
| 2. Finding the serviceability of Diode with multi-meter. | (06 hrs) |
| 3. Construction and operations of Center tap full wave rectifier. | (06 hrs) |
| 4. Construction and operations of Full wave Bridge rectifier. | (06 hrs) |
| 5. Verification of Zener diode characteristics. | (06 hrs) |
| 6. Testing of SCR for serviceability. | (06 hrs) |
| 7. Testing of transistors for serviceability. | (06 hrs) |
| 8. Study the operation of Operational Amplifier as an Integrator, Differentiator. | (06 hrs) |



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – I**

MODULE 8: (Basic Aerodynamics)

Hours: 48

- | | |
|---|----------|
| 1. Study of Low speed wind tunnel. | (06 hrs) |
| 2. Flow around the body by Smoke visualisation-Demo. | (06 hrs) |
| 3. Study and drag characteristics of airflow around bluff bodies. | (06 hrs) |
| 4. Lift characteristics on Symmetrical airfoil. | (06 hrs) |
| 5. Lift characteristics on Cambered airfoil. | (06 hrs) |
| 6. Plot a graph C_l vs Angle of attack and locate the stalling angle. | (06 hrs) |
| 7. Plot a graph C_d vs Angle of attack and locate the critical angle of attack. | (06 hrs) |
| 8. Plot a graph L/D and locate the best L/D ratio. | (06 hrs) |



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – II**

Module – 3 (Electrical Fundamental-II)

Hours: 50

- | | |
|---|----------|
| 1. Finding the polarity of electro-magnet by using Grip rule. | (08 hrs) |
| 2. Verification of electromagnetic lines around the current carrying conductor. | (08 hrs) |
| 3. Replacement of brush in a DC generator. | (10 hrs) |
| 4. Measuring insulation resistance of DC motor. | (08 hrs) |
| 5. Voltage regulation of alternators. | (08 hrs) |
| 6. Speed control of AC motor by varying frequency. | (08 hrs) |



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – II**

MODULE 5:(Digital Techniques Electronic Instrument Systems-I)

Hours: 50

1. Verification of logic gates with truth table of AND, NOT, OR and Ex- OR. (06 hrs)
2. Verification of Universal Gates- NAND, NOR Gate. (08 hrs)
3. Construction and Verification of Multiplexer. (06 hrs)
4. Construction and Verification of Demultiplexer. (06 hrs)
5. Construction and Verification of Encoder. (06 hrs)
6. Construction and Verification of Decoder. (06 hrs)
7. Demonstration of Analog to Digital Convertor. (06 hrs)
8. Demonstration of Digital to Analog Convertor. (06 hrs)



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – II**

MODULE 7: (Maintenance Practices-I)

Hours: 50

- | | |
|--|----------|
| 1. Bending and belling/ flaring aircraft pipes. | (08 hrs) |
| 2. Demonstration of aircraft pipes and hoses. | (08 hrs) |
| 3. Installation and clamping of pipes. | (08 hrs) |
| 4. Cleaning and inspection of bearings. | (08 hrs) |
| 5. Lubrication of bearings. | (08 hrs) |
| 6. Workshop practices: Square fitting and 'L' fitting. | (10 hrs) |



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – III**

MODULE 5:(Digital Techniques Electronic Instrument Systems-II)

Hours: 40

1. Verification of Demorgan's theorem. (06 hrs)
2. Decimal to BCD conversion. (08 hrs)
3. BCD to Decimal Conversion. (08 hrs)
4. Assembly and Verification of Half adder and Full adder. (06 hrs)
5. Construction of Aircraft Landing Gear Indication and Warning System by logic circuit. (06 hrs)
6. Study of aircraft electro static discharger protection for static sensitive components. (06 hrs)



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – III**

MODULE 6: (Materials and Hardware-I) Hours: 40

1. Identification, Types, and purpose of fasteners. (06 hrs)
2. Identification of different types of standard threads used in aircraft. (06 hrs)
3. Identification of different types of Aircraft Bolts, its Specifications and Markings. (06 hrs)
4. Identification of different types of Nuts. (06 hrs)
5. Ferrous material hardness test. (06 hrs)
6. Ferrous material impact resistance test. (06 hrs)

7. Studs: Types and removal of stud. (04 hrs)



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – III**

MODULE 7: (Maintenance Practices-II)

Hours: 40

- | | |
|--|----------|
| 1. Marking out and calculation of bend allowance for sheet metal bend. | (08 hrs) |
| 2. Gas welding. | (08 hrs) |
| 3. Arc welding. | (08 hrs) |
| 4. TIG and MIG welding. | (08 hrs) |
| 5. Inspection of welded joints. | (08 hrs) |



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – III**

MODULE 13 [Aircraft Aerodynamics, Structures and systems-I (Instrument)]

Hours: 40

01. Individual Identification of aircraft Instrument and Integrated Systems. (08 hrs)
02. Disassembly, Inspection and Reassembly of Bourdon Tube instruments and calibration with Dead weight tester. (08 hrs)
03. Friction test on Direct reading compass. (04 hrs)
04. Familiarization of pitot static probe heating element with mock up. (04 hrs)
05. Disassembly, Inspection, and Reassembly of Altimeter and Calibration with Vacuum Chamber. (08 hrs)
06. Disassembly, Inspection, and Reassembly of Digital Air data computer. (08 hrs)



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – IV**

MODULE – 6 (Materials and Hardware-II)

Hours: 50

- | | |
|--|----------|
| 1. Identification Composites and its uses. | (08 hrs) |
| 2. Types of locking devices and its identification. | (08 hrs) |
| 3. Wire locking procedure. | (08 hrs) |
| 4. Identification of different types of Rivets and its uses. | (06 hrs) |
| 5. Identification of different types of pipes and its colour code. | (06 hrs) |
| 6. Identification of different types of Bearings and its advantages. | (06 hrs) |
| 7. Types of Control cables and turn buckles. | (08 hrs) |



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – IV**

MODULE 13 [Aircraft Aerodynamics, Structures and systems-II(A/F)]

Hours: 50

01. Familiarisation of Aircraft Primary flight control-Aileron. (05 hrs)
02. Familiarisation of Aircraft Primary flight controls- Elevator. (05 hrs)
03. Familiarisation of Aircraft Primary flight controls- Rudder. (05 hrs)
04. Familiarisation of Aircraft Secondary flight controls. (05 hrs)
05. Familiarisation of Aircraft Auxiliary flight controls. (05 hrs)
06. Identification of aircraft structures Primary, Secondary, and territory. (05 hrs)
07. Identification of Aircraft Station and Zones. (05 hrs)
08. Demonstration Aircraft Landing gear Retraction/Extension test. (05 hrs)
09. Familiarization with Hydraulic system components. (05 hrs)
10. Inspection procedures of wheel brake system. (05 hrs)



PROCEDURE MANUAL

**CATEGORY B2(Avionics) PRACTICAL
SEMESTER – IV**

**MODULE 13 [Aircraft Aerodynamics, Structures and systems-III (Comm. &Nav.)]
Hours: 50**

1. Basic maintenance practices of Electronic Shock Mount Rack, Polaroid Pins with Cable Connectors. (08 hrs)
2. Familiarization for handling the Radio equipments and Intercom in the Cockpit. (08 hrs)
3. Removal and Installation of VHF communication Trans-receiver and Control Unit of Dornier Aircraft (DO-228). (10 hrs)
4. Removal and Fitment of Weather Radar Trans-receiver of Dornier Aircraft (DO-228). (08 hrs)
5. Disentailing of DME trans-receiver. (08 hrs)
6. Familiarization of Instrument landing system (ILS) with mock-up. (08 hrs)



**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – V**

MODULE 13 [Aircraft Aerodynamics, Structures and systems-IV- (Electricals)]

Hours: 40

1. Charging Procedures of Lead Acid and Nickel Cadmium Batteries. (06 hrs)
2. Capacity testing procedures of Lead Acid and Nickel Cadmium Batteries. (06 hrs)
3. Procedures for activation of Lead Acid Batteries. (04 hrs)
4. Familiarization of Power distribution and Bus bar locations of Dornier Aircraft (DO-228). (06 hrs)
5. Familiarization of cockpit panels, switches and circuit breakers of Dornier Aircraft (DO-228). (06 hrs)
6. Removal and installation of Navigation and Landing lights of Dornier Aircraft(DO-228). (06 hrs)
7. Removal and fitment of Fire extinguisher bottle of Dornier Aircraft (DO-228). (06 hrs)



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – V**

MODULE 13 [Aircraft Aerodynamics, Structures and systems-V (Instrument)]

Hours: 40

1. Dismantling, Inspection and reassembly of Gyro attitude indicator. (06 hrs)
2. Pitot static leak test using pitot static leak tester. (06 hrs)
3. Removal /fitment of AFCS control panel of Dornier Aircraft (DO-228). (06 hrs)
4. Audio warning check of AOA sensor when crossing the critical angle of attack with Mock-up. (06 hrs)
5. Dismantling, Inspection and reassembly of fuel and oil pressure gauge. (06 hrs)
6. Removal and installation of fuel quantity indicator of Dornier Aircraft (DO-228). (06 hrs)
7. Oxygen components identification and charging precautions. (04 hrs)



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – V**

MODULE 13 [Aircraft Aerodynamics, Structures and systems-VI (Avionics)]

Hours: 40

1. Removal /fitment of ELT on Dornier Aircraft (DO-228). (08 hrs)
2. Weather warning Radar antenna removal and installation on Dornier Aircraft (DO-228) (08 hrs)
3. CVR removal and installation on Dornier Aircraft (DO-228). (08 hrs)
4. Identification of cabin emergency equipments in Dornier Aircraft. (08 hrs)
5. Familiarisation of Radio equipments on Dornier Aircraft (DO-228). (08 hrs)



PROCEDURE MANUAL

**CATEGORY B2 (Avionics) PRACTICAL
SEMESTER – V**

MODULE 14: [Propulsion]

Hours: 40

- | | |
|--|----------|
| 1. Inspection on axial flow compressor. | (08 hrs) |
| 2. Removal and fitment of turbine rotor blade. | (08 hrs) |
| 3. Insulation resistance check of thermocouple and measuring TGT with mock-up. | (08 hrs) |
| 4. Engine speed monitoring with Tacho-generator and Tacho-indicator. | (08 hrs) |
| 5. Removal and fitment of Starter Generator. | (08 hrs) |



**CATEGORY B1.3 (Helicopter Turbine) PRACTICAL
SEMESTER – I**

MODULE 3. ELECTRICAL FUNDAMENTALS :

Hours: 60

1. Identification of electrical symbols and its components. (2hrs)
2. Wiring practices of Single and Double wiring methods. (4hrs)
3. Practice of power generation by Magnetic Induction method. (4hrs)
4. Practice of Thermal power generation. (4hrs)
5. Measurement of voltage and specific gravity of electrolyte in lead acid battery using volt meter and hydrometer respectively. (4hrs)
6. Wiring the circuit with relay control. (4hrs)
7. Verification of resistance value by colour code with ohmmeter of carbon resistor, (2hrs)
8. Verification of total resistance in series, parallel and series parallel circuits by calculation. (4hrs)
9. Finding the unknown resistance value by Wheatstone bridge tester. (4hrs)
10. Finding the effect of capacitor connected in AC and DC power. (4hrs)
11. Finding the polarity of magnet using Grip rule. (4hrs)
12. Verification of electromagnetic lines of force around the current carrying conductor. (4hrs)
13. Dismantling of DC Generator – Familiarization of components and its function, inspection and maintenance practices. (6hrs)
14. Dismantling of DC Motor– Familiarization of components and its function, inspection and maintenance practices. (6hrs)
15. Checking the Open and Short circuit of armature coil by using Growler and Earth fault by using Megger. (4hrs)



**CATEGORY B1.3 (Helicopter Turbine) PRACTICAL
SEMESTER – I**

MODULE 4. ELECTRONIC FUNDAMENTALS:

Hours: 60

1. Verification of characteristics of PN diodes. (04hrs)
2. Finding the serviceability of Diode with multi-meter. (04hrs)
3. Construction and operations of half wave and Center tap full wave rectifiers.(04hrs)
4. Construction and operations of Full wave Bridge rectifier. (04hrs)
5. Verification of Zener diode characteristics. (04hrs)
6. Construction and verification of the operation of IC based Voltage Regulator (IC 7805). (04hrs)
7. Testing of SCR for serviceability. (04hrs)
8. Study of SCR power control/phase control. (04hrs)
9. Testing of transistors for serviceability. (04hrs)
10. Assembling and checking the operation of Amplifier using transistor. (04hrs)
11. Assembling and testing the operation of an Astable multi vibrator using discrete transistors. (04hrs)
12. Assembling and testing the operation of Bistable multi vibrator (Flip-flop Circuit). (04hrs)
13. Characteristics of common Emitter Amplifier. (04hrs)
14. Assembling and testing the operation of Crystal Oscillator. (04hrs)
15. Study the operation of Operational Amplifier as an Integrator, Differentiator. (04hrs)



PROCEDURE MANUAL

**CATEGORY B1.3 (Helicopter Turbine) PRACTICAL
SEMESTER - I**

MODULE 8. BASIC AERODYNAMICS:

Hours: 60

1. Study the factors governing Lift and Drag. (10 hrs)
2. Plot a graph C_{lvs} Angle of attack and locate the stalling angle. (12 hrs)
3. Plot a graph C_d vs Angle of attack and locate the critical angle of attack. (12 hrs)
4. Plot a graph L/D and locate the best L/D ratio. (12 hrs)
5. Study the relationship between Lift, Weight, Thrust and Drag. (14 hrs)



**CATEGORY B1.3 (Helicopter Turbine) PRACTICAL
SEMESTER – II**

MODULE 5. DIGITAL TECHNIQUES ELECTRONIC INSTRUMENT SYSTEMS: Hours: 60

1. Verification of logic gates with truth table of AND, NOT, OR and Ex- OR. (05hrs)
2. Verification of Universal Gates- NAND, NOR Gate. (05hrs)
3. Construction and Verification of Multiplexer. (05hrs)
4. Construction and Verification of De-multiplexer. (05hrs)
5. Construction and Verification of Encoder. (05hrs)
6. Construction and Verification of Decoder. (05hrs)
7. Demonstration of Analog to Digital Convertor. (05hrs)
8. Demonstration of Digital to Analog Convertor. (05hrs)
9. Verification of Demorgan's theorem. (05hrs)
10. Decimal to BCD conversion. (05hrs)
11. BCD to Decimal Conversion. (05hrs)
12. Construction of Aircraft Landing Gear Indication and Warning System by logic circuit. (05hrs)



**CATEGORY B1.3 (Helicopter Turbine) PRACTICAL
SEMESTER – II**

MODULE 6 – I. MATERIALS AND HARDWARE – I

Hours: 60

1. Identification of various types of ferrous and non-ferrous materials. (06hrs)
2. Ferrous material hardness test. (06hrs)
3. Ferrous material impact resistance test. (06hrs)
4. Identification Composites and its uses. (06hrs)
5. familiarisation and identification of wooden structure. (06hrs)
6. Identification, Types, and purpose of fasteners. (06hrs)
7. Removal and fitment of fastners. (06hrs)
8. Identification of different types of standard threads used in aircraft. (06hrs)
9. Identification of different types of Aircraft Bolts, its Specifications and Markings. (06hrs)
10. Identification of different types of Nuts. (06hrs)



PROCEDURE MANUAL

**CATEGORY B1.3 (Helicopter Turbine) PRACTICAL
SEMESTER – II**

MODULE 7A -I. MAINTENANCE PRACTICES -I

Hours: 60

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|--|---------|
| 1. Demonstration on Riveted joints, rivet spacing and pitch. | (08hrs) |
| 2. Identification of Tools used for riveting and dimpling. | (04hrs) |
| 3. Inspection riveted joints. | (06hrs) |
| 4. Bending and belling/ flaring aircraft pipes. | (08hrs) |
| 5. Demonstration of aircraft pipes and hoses. | (04hrs) |
| 6. Installation and clamping of pipes. | (06hrs) |
| 7. Inspection and testing of springs. | (06hrs) |
| 8. Cleaning and inspection of bearings. | (06hrs) |
| 9. Lubrication of bearings. | (06hrs) |
| 10. Workshop practices: Square fitting and 'L' fitting. | (06hrs) |



PROCEDURE MANUAL

**CATEGORY B1.3 (Helicopter Turbine) PRACTICAL
SEMESTER – III**

MODULE 6 – II. MATERIALS AND HARDWARE – II

Hours: 44

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|--|---------|
| 1. Types of locking devices and its identification. | (06hrs) |
| 2. Wire locking procedure. | (05hrs) |
| 3. Identification of different types of Rivets and its uses. | (06hrs) |
| 4. Identification of different types of pipes and its colour code. | (05hrs) |
| 5. Identification of different types of standard union connectors. | (06hrs) |
| 6. Identification of different types of Bearings and its advantages. | (06hrs) |
| 7. Identification, types and uses of different gears. | (06hrs) |
| 8. Types of Control cables and turn buckles | (04hrs) |



PROCEDURE MANUAL

**CATEGORY B1.3 (Helicopter Turbine) PRACTICAL
SEMESTER – III**

MODULE 7A - II. MAINTENANCE PRACTICES – II

Hours: 44

1. Inspection and testing of control cables. (08hrs)
2. Marking out and calculation of bend allowance for sheet metal bend. (06hrs)
3. Soldering methods; inspection of soldered joints. (06hrs)
4. Gas welding. (04hrs)
5. Arc welding. (04hrs)
6. TIG and MIG welding. (06hrs)
7. Inspection of welded joints. (04hrs)
8. Machine shop: power tools, step turning/facing and step turning/taper turning. (06hrs)



**CATEGORY B1.3 (Helicopter Turbine) PRACTICAL
SEMESTER – III**

MODULE 12- I HELICOPTER AERODYNAMICS, STRUCTURES AND SYSTEMS – I

Hours: 44

1. General safety precautions to be observed when working on or near the helicopter. (06hrs)
2. Demonstration and purpose of main rotor assembly. (07hrs)
3. Demonstration and purpose of Tail rotor assembly. (07hrs)
4. Familiarisation and function of cyclic pitch control. (08hrs)
5. Familiarisation and function of collective pitch control. (08hrs)
6. Demonstration of main rotor blade track check by Flag method. (08hrs)



**CATEGORY B1.3 (Helicopter Turbine) PRACTICAL
SEMESTER – III**

MODULE 15- I GAS TURBINE ENGINE – I

Hours: 44

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| 1. Familiarisation of Avon k 109 engine. | (06hrs) |
| 2. Familiarisation of Artouste III B engine. | (06hrs) |
| 3. Familiarisation of TV-3 engine. | (06hrs) |
| 4. Inspection on axial flow compressor. | (06hrs) |
| 5. Inspection on centrifugal flow compressor. | (06hrs) |
| 6. Inspection on combustion chamber. | (04hrs) |
| 7. Inspection on turbine blade. | (04hrs) |
| 8. Removal and fitment of turbine rotor blade. | (06hrs) |



**CATEGORY B1.3 (Helicopter Turbine) PRACTICAL
SEMESTER – IV**

**MODULE 12- II HELICOPTER AERODYNAMICS, STRUCTURES AND SYSTEMS - II
Hours: 60**

1. Familiarisation of cabin furnishing system, harness and carpets. (06hrs)
2. Familiarisation of helicopter Hydraulic system and location of components. (08hrs)
3. Familiarisation of different types of Landing gear assembly. (06hrs)
4. Layout of Helicopter landing gear system components. (08hrs)
5. Removal and fitment of Tyre. (08hrs)
6. Inspection on wheel assembly, brake assembly and tyre. (08hrs)
7. Location and inspection of fuel tanks and pipe lines. (08hrs)
8. Removal and fitment of brake assembly. (08hrs)



**CATEGORY B1.3 (Helicopter Turbine) PRACTICAL
SEMESTER – IV**

MODULE 12- III HELICOPTER AERODYNAMICS, STRUCTURES AND SYSTEMS - III

Hours: 60

1. Charging Procedures of Lead Acid Batteries. (5hrs)
2. Charging Procedures of Nickel Cadmium Batteries. (5hrs)
3. Removal and installation of Landing light. (6hrs)
4. Removal and installation of navigation light. (6hrs)
5. Individually identifying and classification of aircraft instruments. (4hrs)
6. Familiarisation of cockpit instruments and integrated system. (4hrs)
7. Familiarisation of cockpit instruments layout. (4hrs)
8. Disassembly and assembly of Altimeter. (6hrs)
9. Familiarisation of different types of mounting racks/trays and locking mechanisms. (4hrs)
10. Familiarisation of various types of antennas. (4hrs)
11. Familiarisation of HF components. (6hrs)
12. Familiarisation of VHF components. (6hrs)



PROCEDURE MANUAL

**CATEGORY B1.3 (Helicopter Turbine) PRACTICAL
SEMESTER – IV**

MODULE 15- II GAS TURBINE ENGINE – II

Hours: 60

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| 1. Removal and fitment of engine cowlings and panels. | (06hrs) |
| 2. Removal, cleaning and fitment of oil filter. | (06hrs) |
| 3. Removal and fitment of air blow off valve /air bleed valve. | (06hrs) |
| 4. Replenishment of engine oil. | (06hrs) |
| 5. Disassembly and assembly of fuel cooled oil cooler. | (06hrs) |
| 6. Disassembly and assembly of Gear type pump. | (06hrs) |
| 7. Disassembly and assembly of fuel heater. | (06hrs) |
| 8. Familiarisation of flight deck. | (06hrs) |
| 9. Refuelling and defueling of helicopter fuel tank. | (06hrs) |
| 10. Preparation of ground run. | (06hrs) |