4.1.7. Basic Knowledge Theory Syllabus – For B1.2 Category Batches Inducted/ Admitted in July 2023 and Onwards.

MODULE 3 – ELECTRICAL FUNDAMENTALS

APPLICABILITY IN SEMESTER	1.	FIRST SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	B1.2 CATEGORY	
	100	

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
3.1	**ELECTRON THEORY**			
	a.	Structure and distribution of electrical charges within: atoms, molecules, ions, compounds;	1	02
	b.	Molecular structure of conductors, semiconductors and insulators.		
3.2.	**STATIC ELECTRICITY AND CONDUCTION**			
	a.	Static electricity and distribution of electrostatic charges;	2	02
	b.	Electrostatic laws of attraction and repulsion;		
	c.	Units of charge, Coulomb's Law;		
	d.	Conduction of electricity in solids, liquids, gases and a vacuum.		
3.3.	**ELECTRICAL TERMINOLOGY**			
	a.	The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.	2	02
3.4.	**GENERATION OF ELECTRICITY**			
	a.	Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.	2	02
3.5.	**DC SOURCES OF ELECTRICITY**			
	a.	Construction and basic chemical action of: primary cells,	2	10
	b.	Secondary cells, lead acid cells, nickel cadmium cells, other		

MODULE 3 – ELECTRICAL FUNDAMENTALS

APPLICABILITY IN SEMESTER	1.	FIRST SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS

THEORY HOURS ALLOTED	B1.2 CATEGORY	B1.2 CATEGORY
	100	100

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
3.5. Cont…	c.	Alkaline cells;	2	Cont… Cont…
	d.	Cells connected in series and parallel;		
	e.	Internal resistance and its effect on a battery;		
	f.	Construction, materials and operation of thermocouples;		
	g.	Operation of photocells.		
3.6.		**DC CIRCUITS**		
	a.	Ohms Law, Kirchhoff's Voltage and Current Laws;	2	04
	b.	Calculations using the above laws to find resistance, voltage and current;		
	c.	Significance of the internal resistance of a supply.		
3.7.		**RESISTANCE/ RESISTOR**		
	a.	Resistance and affecting factors;	2	09
	b.	Specific resistance;		
	c.	Resistor colour code, values and tolerances, preferred values, wattage ratings;		
	d.	Resistors in series and parallel;		
	e.	Calculation of total resistance using series, parallel and series parallel combinations;		
	f.	Operation and use of potentiometers and rheostats;		
	g.	Operation of Wheatstone Bridge.		
	h.	Positive and negative temperature coefficient conductance;	1	

MODULE 3 – ELECTRICAL FUNDAMENTALS

APPLICABILITY IN SEMESTER	1.	FIRST SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS

THEORY HOURS ALLOTED	B1.2 CATEGORY	B1.2 CATEGORY
	100	100

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
3.7. Cont…	i.	Fixed resistors, stability, tolerance and limitations, methods of construction;	1	Cont…
	j.	Variable resistors, thermistors, voltage dependent resistors;		
	k.	Construction of potentiometers and rheostats;		
	l.	Construction of Wheatstone Bridge;		
3.8.	POWER			
	a.	Power, work and energy (kinetic and potential);	2	02
	b.	Dissipation of power by a resistor;		
	c.	Power formula;		
	d.	Calculations involving power, work and energy.		
3.9.	CAPACITANCE/CAPACITOR			
	a.	Operation and function of a capacitor;	2	08
	b.	Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric Constant, working voltage, voltage rating;		
	c.	Capacitor types, construction and function;		
	d.	Capacitor colour coding;		
	e.	Calculations of capacitance and voltage in series and parallel circuits;		
	f.	Exponential charge and discharge of a capacitor, time constants;		
	g.	Testing of capacitors.		

MODULE 3 – ELECTRICAL FUNDAMENTALS

APPLICABILITY IN SEMESTER	**1.**	**FIRST SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS**
THEORY HOURS ALLOTED	**B1.2 CATEGORY**	
	100	

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
3.10.	**MAGNETISM**			
	a.	Theory of magnetism;	2	07
	b.	Properties of a magnet, Action of a magnet suspended in the Earth's magnetic field;		
	c.	Magnetization and Demagnetization;		
	d.	Magnetic shielding;		
	e.	Various types of magnetic material;		
	f.	Electromagnet's construction and principles of operation;		
	g.	Hand clasp rules to determine: magnetic field around current carrying conductor.		
	h.	Magnetomotive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents;		
	i.	Precautions for care and storage of magnets		
3.11.	**INDUCTANCE/ INDUCTOR**			
	a.	Faraday's Law;	2	06
	b.	Action of inducing a voltage in a conductor moving in a magnetic field;		
	c.	Induction principles;		
	d.	Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductors turns;		
	e.	Mutual induction;		

MODULE 3 – ELECTRICAL FUNDAMENTALS

APPLICABILITY IN SEMESTER	**1.**	**FIRST SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS**

THEORY HOURS ALLOTED	**B1.2 CATEGORY**	
	100	

Sl. No.		**Topics to be Covered**	**Level B1.2**	**Hours Allotted B1.2**
3.11. Cont…	f.	The effect the rate of change of primary current and mutual inductance has on induced voltage;	2	Cont… Cont…
	g.	Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other;		
	h.	Lenz's Law and polarity determining rules;		
	i.	Back EMF, self-induction;		
	j.	Saturation point;		
	k.	Principle uses of inductors;		
3.12.	**DC MOTOR/GENERATOR THEORY**			
	a.	Basic motor and generator theory;	2	08
	b.	Construction and purpose of components in DC generator		
	c.	Operation of, and factors affecting output and direction of current flow in DC Generators		
	d.	Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors;		
	e.	Series wound, shunt wound and compound motors;		
	f.	Starter Generator construction.		
3.13.	**AC THEORY**			
	a.	Sinusoidal waveform: phase, period, frequency, cycle;	2	06
	b.	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;		
	c.	Single/ 3 phase principles.		

MODULE 3 – ELECTRICAL FUNDAMENTALS

APPLICABILITY IN SEMESTER	**1.**	**FIRST SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS**

THEORY HOURS ALLOTED	**B1.2 CATEGORY**	
	100	

Sl. No.	**Topics to be Covered**		**Level B1.2**	**Hours Allotted B1.2**
3.14.	**RESISTIVE (R), CAPACITIVE (C) AND INDUCTIVE (L) CIRCUIT**			
	a.	Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel;	2	06
	b.	Power dissipation in L, C and R circuits;		
	c.	Impedance, phase angle, power factor and current calculations;		
	d.	True power, apparent power and reactive power calculations.		
3.15.	**TRANSFORMERS**			
	a.	Transformer construction principles and operation;	2	08
	b.	Transformer losses and methods for overcoming them;		
	c.	Transformer action under load and no-load conditions;		
	d.	Power transfer, efficiency, polarity markings;		
	e.	Calculation of line and phase voltages and currents;		
	f.	Calculation of power in a three-phase system;		
	g.	Primary and Secondary current, voltage, turns ratio, power, efficiency;		
	h.	Auto transformers.		
3.16.	**FILTERS**			
	a.	Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.	1	02
3.17.	**AC GENERATORS**			
	a.	Rotation of loop in a magnetic field and waveform produced;	2	08

MODULE 3 – ELECTRICAL FUNDAMENTALS

APPLICABILITY IN SEMESTER	1.	FIRST SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	B1.2 CATEGORY	
	100	

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
3.17. Cont…	b.	Operation and construction of revolving armature and revolving field type AC generators;	2	Cont… Cont…
	c.	Single phase, two phase and three phase alternators;		
	d.	Three phase star and delta connections advantage and uses;		
	e.	Permanent Magnet Generators.		
3.18	AC MOTORS			
	a.	Construction, principles of operation and characteristics of: AC synchronous and induction motors both single and polyphase;	2	08
	b.	Methods of speed control and direction of rotation;		
	c.	Methods of producing a rotating field: capacitor, inductor, shaded or split Pole.		

MODULE 4 – ELECTRONIC FUNDAMENTALS

APPLICABILITY IN SEMESTER	1.	SECOND SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	B1.2 CATEGORY	
	70	

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
4.1.	SEMICONDUCTORS			
4.1.1.	DIODES			
	a.	Diode symbols, Diode characteristics and properties;	2	15
	b.	Diodes in series and parallel;		
	c.	Main characteristics and use of silicon-controlled rectifiers (Thyristor), light emitting diode, photo conductive diode, varistor, rectifier diodes;		
	d.	Functional testing of diodes.		

MODULE 4 – ELECTRONIC FUNDAMENTALS

APPLICABILITY IN SEMESTER	**1.**	**SECOND SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS**
THEORY HOURS ALLOTED	**B1.2 CATEGORY**	
	70	

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
4.1.2.	**TRANSISTORS**			
	a.	Transistor symbols;	1	15
	b.	Component description and orientation;		
	c.	Transistor characteristics and properties.		
4.1.3.	**INTEGRATED CIRCUITS**			
	a.	Description and operation of logic circuits and linear circuits/operational amplifiers.	1	15
4.2.	**PRINTED CIRCUIT BOARDS**			
	a.	Description and use of printed circuit boards.	1	05
4.3.	**SERVOMECHANISM**			
	a.	Understanding of the following terms: Open and closed loop systems, feedback, follow up, analogue transducers;	1	20
	b.	Principles of operation and use of the following synchro system components/features: resolvers, differential, control and torque, transformers, inductance and capacitance transmitters.		

MODULE 5 – DIGITAL TECHNIQUES ELECTRONIC INSTRUMENT SYSTEMS

APPLICABILITY IN SEMESTER	**1.**	**THIRD SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS**
THEORY HOURS ALLOTED	**B1.2 CATEGORY**	
	65	

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
5.1.	**ELECTRONIC INSTRUMENT SYSTEMS**			
	a.	Typical systems arrangements and cockpit layout of electronic instrument systems.	2	06
5.10.	**FIBRE OPTICS**			
	a.	Advantages and disadvantages of Fibre optic data transmission over electrical wire propagation;	1	10
	b.	Fibre optic data bus;		
	c.	Fibre optic related terms;		
	d.	Terminations;		
	e.	Couplers, control terminals, remote terminals;		
	f.	Application of Fibre optics in aircraft systems.		
5.11.	**ELECTRONIC DISPLAYS**			
	a.	Principles of operation of common types of displays used in modern aircraft, including Cathode Ray Tubes, Light Emitting Diodes and Liquid Crystal Display.	2	10
5.12.	**ELECTROSTATIC SENSITIVE DEVICES**			
	a.	Special handling of components sensitive to electrostatic discharges;	2	04
	b.	Awareness of risks and possible damage, component and personnel anti-static protection devices.		
5.13.	**SOFTWARE MANAGEMENT CONTROL**			
	a.	Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes.	2	05

MODULE 5 – DIGITAL TECHNIQUES ELECTRONIC INSTRUMENT SYSTEMS

APPLICABILITY IN SEMESTER	1.	THIRD SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	B1.2 CATEGORY	
	65	

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
5.14.	**ELECTROMAGNETIC ENVIRONMENT**			
	a.	Influence of the following phenomena on maintenance practices for electronic system:	2	10
		i. EMC-Electromagnetic Compatibility		
		ii. EMI-Electromagnetic Interference		
		iii. HIRF-High Intensity Radiated Field		
		iv. Lightning/ Lightning protection		
5.15.	**TYPICAL ELECTRONIC/ DIGITAL AIRCRAFT SYSTEMS**			
	a.	General arrangement of typical electronic/digital aircraft systems and associated BITE (Built in Test Equipment) testing such as	2	20
		i. ACARS-ARINC Communication and Addressing and Reporting System		
		ii. EICAS-Engine Indication and Crew Alerting System		
		iii. FBW-Fly by Wire		
		iv. FMS-Flight Management System		
		v. IRS-Inertial reference system		
		vi. ECAM-Electronic Centralised Aircraft Monitoring		
		vii. EFIS-Electronic Flight Instrument System		
		viii. GPS-Global Positioning System		
		ix. TCAS-Traffic Collision Avoidance system		
		x. Integrated modular Avionica		
		xi. Cabin System		
		xii. Information system		

MODULE 6 – MATERIALS AND HARDWARE

APPLICABILITY IN SEMESTER	**1.**	**SECOND & THIRD SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS**
THEORY HOURS ALLOTED	**B1.2 CATEGORY**	
	SECOND SEMESTER	**60 (PARA 6.1 – 6.4)**
	THIRD SEMESTER	**60 (PARA 6.5 – 6.11)**

Sl. No.		Topics to be Covered	Level		Hours Allotted	
			B1.2		B1.2	
6.1.	**AIRCRAFT MATERIALS – FERROUS**					
	a.	Characteristics, properties and identification of common alloy steels used in aircraft;	2		15	
	b.	Heat treatment and application of alloy steels;				
	c.	Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance.	1			
6.2.	**AIRCRAFT MATERIALS – NON-FERROUS**					
	a.	Characteristics, properties and identification of common non-ferrous materials used in aircraft;	2		15	
	b.	Heat treatment and application of non-ferrous materials;				
	c.	Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance.	1			
6.3.	**AIRCRAFT MATERIALS - COMPOSITE AND NON- METALLIC**					
6.3.1.	**COMPOSITE AND NON-METALLIC OTHER THAN WOOD AND FABRIC**					
	a.	Characteristics, properties and identification of common composite and non-metallic materials, other than wood, used in aircraft;	2		10	
	b.	Sealant and bonding agents.				
	c.	The detection of defects/deterioration in composite and non-metallic material.				
	d.	Repair of composite and non-metallic material.				

MODULE 6 – MATERIALS AND HARDWARE

APPLICABILITY IN SEMESTER	**1.**	**SECOND & THIRD SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS**

THEORY HOURS ALLOTED	**B1.2 CATEGORY**	
	SECOND SEMESTER	**60 (PARA 6.1 – 6.4)**
	THIRD SEMESTER	**60 (PARA 6.5 – 6.11)**

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
6.3.2.	**WOODEN STRUCTURES**			
	a.	Construction methods of wooden airframe structures	2	05
	b.	Characteristics, properties and types of wood and glue used in Airplanes;		
	c.	Preservation and maintenance of wooden structure;		
	d.	Types of defects in wood material and wooden structures;		
	e.	The detection of defects in wooden structure;		
	f.	Repair of wooden structure.		
6.3.3.	**FABRIC COVERING**			
	a.	Characteristics, properties and types of fabrics used in airplanes;	2	05
	b.	Inspections methods for fabric;		
	c.	Types of defects in fabric; Repair of fabric covering.		
6.4.	**CORROSION**			
	a.	Chemical fundamentals;	1	10
	b.	Formation by, galvanic action process, microbiological, stress;		
	c.	Types of corrosion and their identification;	3	
	d.	Causes of corrosion;		
	e.	Material types, susceptibility to corrosion.		

MODULE 6 – MATERIALS AND HARDWARE

APPLICABILITY IN SEMESTER	1.	SECOND & THIRD SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS

THEORY HOURS ALLOTED	B1.2 CATEGORY	
	SECOND SEMESTER	60 (PARA 6.1 – 6.4)
	THIRD SEMESTER	60 (PARA 6.5 – 6.11)

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
6.5.		FASTENERS		
6.5.1.		SCREW THREADS		
	a.	Screw nomenclature;	2	10
	b.	Thread forms, dimensions and tolerances for standard threads used in aircraft;		
	c.	Measuring screw threads;		
6.5.2.		BOLTS, STUDS AND SCREWS		
	a.	Bolt types: specification, identification and marking of aircraft bolts, international standards;	2	10
	b.	Nuts: self-locking, anchor, standard types;		
	c.	Machine screws: aircraft specifications;		
	d.	Studs: types and uses, insertion and removal;		
	e.	Self-tapping screws, dowels.		
6.5.3.		LOCKING DEVICES		
	a.	Tab and spring washers, locking plates, split pins, palnuts, wire locking, quick release fasteners, keys, circlips, and cotter pins.	2	04
6.5.4.		AIRCRAFT RIVETS		
	a.	Types of solid and blind rivets: specifications and identification, heat treatment.	2	10

MODULE 6 – MATERIALS AND HARDWARE

APPLICABILITY IN SEMESTER	1.	SECOND & THIRD SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	B1.2 CATEGORY	
	SECOND SEMESTER	60 (PARA 6.1 – 6.4)
	THIRD SEMESTER	60 (PARA 6.5 – 6.11)

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
6.6.	**PIPES AND UNIONS**			
	a.	Identification of, and types of rigid and flexible pipes and their connectors used in aircraft;	2	04
	b.	Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.	2	
6.7.	**SPRINGS**			
	a.	Types of springs, materials, characteristics and applications.	2	02
6.8.	**BEARINGS**			
	a.	Purpose of bearings, loads, material, construction;	2	05
	b.	Types of bearings and their application.		
6.9.	**TRANSMISSIONS**			
	a.	Gear types and their application;	2	05
	b.	Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns;		
	c.	Belts and pulleys, chains and sprockets.		
6.10.	**CONTROL CABLES**			
	a.	Types of cables;	2	05
	b.	End fittings, turnbuckles and compensation devices;		
	c.	Pulleys and cable system components;		
	d.	Bowden cables;		
	e.	Aircraft flexible control systems.		

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MODULE 6 – MATERIALS AND HARDWARE

APPLICABILITY IN SEMESTER	1.	SECOND & THIRD SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS

THEORY HOURS ALLOTED	B1.2 CATEGORY	
	SECOND SEMESTER	60 (PARA 6.1 – 6.4)
	THIRD SEMESTER	60 (PARA 6.5 – 6.11)

Sl. No.		Topics to be Covered	Level B1.2		Hours Allotted B1.2	
6.11.		ELECTRICAL CABLES AND CONNECTORS				
	a.	Cable types, construction and characteristics;	2	2	05	05
	b.	High tension and co-axial cables;				
	c.	Crimping;				
	d.	Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes.				

MODULE 7A – MAINTENANCE PRACTICES

APPLICABILITY IN SEMESTER	**1.**	**THIRD SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS**
THEORY HOURS ALLOTED	**B1.2 CATEGORY**	
	120	

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
7.1.	**SAFETY PRECAUTIONS – AIRCRAFT AND WORKSHOP**			
	a.	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.	3	05
7.2.	**WORKSHOP PRACTICES**			
	a.	Care of tools, control of tools, use of workshop materials;	3	05
	b.	Dimensions, allowances and tolerances, standards of workmanship;		
	c.	Calibration of tools and equipment, calibration standards.		
7.3.	**TOOLS**			
	a.	Common hand tool types;	3	35
	b.	Common power tool types;		
	c.	Operation and use of precision measuring tools;		
	d.	Lubrication equipment and methods.		
	e.	Operation, function and use of electrical general test equipment;		
7.4.	**AVIONIC GENERAL TEST EQUIPMENT**			
	a.	Operation, function and use of avionic general test equipment.	2	04

MODULE 7A – MAINTENANCE PRACTICES

APPLICABILITY IN SEMESTER	1.	THIRD SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	B1.2 CATEGORY	
	120	

Sl. No.	Topics to be Covered		Level B1.2		Hours Allotted B1.2	
7.5.	**ENGINEERING DRAWINGS, DIAGRAMS AND STANDARDS**					
	a.	Drawing types and diagrams, their symbols, dimensions, tolerances and projections;	2	2	05	05
	b.	Identifying title block information Microfilm, microfiche and computerized presentations;				
	c.	Specification 100 of the Air Transport Association (ATA) of America;				
	d.	Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL;				
	e.	Wiring diagrams and schematic diagrams.				
7.6.	**FITS AND CLEARANCES**					
	a.	Drill sizes for bolt holes, classes of fits;	2	1	05	04
	b.	Common system of fits and clearances;				
	c.	Schedule of fits and clearances for aircraft and engines;				
	d.	Limits for bow, twist and wear;				
	e.	Standard methods for checking shafts, bearings and other parts.				
7.7.	**ELECTRICAL WIRING INTERCONNECTION SYSTEM (EWIS)**					
	a.	Continuity, insulation and bonding techniques and testing;	3	3	10	10
	b.	Use of crimp tools: hand and hydraulic operated;				
	c.	Testing of crimp joints;				
	d.	Connector pin removal and insertion;				
	e.	Co-axial cables: testing and installation precautions;				

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MODULE 7A – MAINTENANCE PRACTICES

APPLICABILITY IN SEMESTER	1.	THIRD SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED		B1.2 CATEGORY
		120

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
7.7. Cont…	f.	Identification of wire types, their inspection criteria and damage tolerance.	3	10
	g.	Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding.		
	h.	EWIS installations, inspection, repair, maintenance and cleanliness standards.		
7.8.	**RIVETING**			
	a.	Riveted joints, rivet spacing and pitch;	2	05
	b.	Tools used for riveting and dimpling;		
	c.	Inspection of riveted joints.		
7.9.	**PIPES AND HOSES**			
	a.	Bending and belling/flaring aircraft pipes;	2	03
	b.	Inspection and testing of aircraft pipes and hoses;		
	c.	Installation and clamping of pipes.		
7.10.	**SPRINGS**			
	a.	Inspection and testing of springs.	2	01
7.11.	**BEARINGS**			
	a.	Testing, cleaning and inspection of bearings;	2	02
	b.	Lubrication requirements of bearings;		
	c.	Defects in bearings and their causes.		

MODULE 7A – MAINTENANCE PRACTICES

APPLICABILITY IN SEMESTER	1.	THIRD SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	B1.2 CATEGORY	
	120	

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
7.12.		**TRANSMISSIONS**		
	a.	Inspection of gears, backlash;	2	01
	b.	Inspection of belts and pulleys, chains and sprockets;		
	c.	Inspection of screw jacks, lever devices, push-pull rod systems.		
7.13.		**CONTROL CABLES**		
	a.	Swaging of end fittings;	2	02
	b.	Inspection and testing of control cables;		
	c.	Bowden cables; aircraft flexible control systems.		
7.14.		**MATERIAL HANDLING**		
7.14.1.		**SHEET METAL**		
	a.	Marking out and calculation of bend allowance;	2	02
	b.	Sheet metal working, including bending and forming;		
	c.	Inspection of sheet metal work.		
7.14.2.		**COMPOSITE AND NON-METALLIC**		
	a.	Bonding practices;	2	02
	b.	Environmental conditions		
	c.	Inspection methods		

MODULE 7A – MAINTENANCE PRACTICES

APPLICABILITY IN SEMESTER	1.	THIRD SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED		B1.2 CATEGORY
		120

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2	
7.15.	WELDING, BRAZING, SOLDERING AND BONDING				
	a.	Soldering methods; inspection of soldered joints.	2	05	
	b.	Welding and brazing methods;			
	c.	Inspection of welded and brazed joints;			
	d.	Bonding methods and inspection of bonded joints.			
7.16.	AIRCRAFT WEIGHT AND BALANCE				
	a.	Centre of Gravity/Balance limits calculation: use of relevant documents;	2	05	
	b.	Preparation of aircraft for weighing;			
	c.	Aircraft weighing;			
7.17.	AIRCRAFT HANDLING AND STORAGE				
	a.	Aircraft taxiing/towing and associated safety precautions;	2	07	
	b.	Aircraft jacking, chocking, securing and associated safety precautions;			
	c.	Aircraft storage methods;			
	d.	Refuelling/ defueling procedures;			
	e.	De-icing/ anti-icing procedures;			
	f.	Electrical, hydraulic and pneumatic ground supplies.			
	g.	Effects of environmental conditions on aircraft handling and operation.			

MODULE 7A – MAINTENANCE PRACTICES

APPLICABILITY IN SEMESTER	1.	THIRD SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	B1.2 CATEGORY	
	120	

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
7.18.	**DISASSEMBLY, INSPECTION, REPAIR AND ASSEMBLY TECHNIQUES**			
	a.	Types of defects and visual inspection techniques.	3	07
	b.	Corrosion removal, assessment and re-protection.		
	c.	General repair methods, Structural Repair Manual;	2	
	d.	Ageing, fatigue and corrosion control programmes;		
	e.	Non-destructive inspection techniques including, penetrant, radiographic, Eddy current, ultrasonic and Boroscope methods.		
	f.	Disassembly and re-assembly techniques.		
	g.	Trouble shooting techniques		
7.19.	**ABNORMAL EVENTS**			
	a.	Inspections following lightning strikes and HIRF penetration.	2	02
	b.	Inspections following abnormal events such as heavy landings and flight through turbulence.		
7.20.	**MAINTENANCE PROCEDURES**			
	a.	Maintenance planning;	2	07
	b.	Modification procedures;		
	c.	Store's procedures;		
	d.	Certification/release procedures;		
	e.	Interface with aircraft operation;		
	f.	Maintenance Inspection/Quality Control/Quality Assurance;		
	g.	Additional maintenance procedures. Control of life limited components		

MODULE 8 – BASIC AERODYNAMICS

APPLICABILITY IN SEMESTER	1.	FIRST SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	B1.2 CATEGORY	
	60	

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
8.1.	PHYSICS OF THE ATMOSPHERE			
	a.	International Standard Atmosphere (ISA), application to aerodynamics.	2	02
8.2.	AERODYNAMICS			
	a.	Airflow around a body;	2	30
	b.	Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, up wash and downwash, vortices, stagnation		
	c.	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;		
	d.	Thrust, Weight, Aerodynamic Resultant;		
	e.	Generation of Lift and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall;		
	f.	Aerofoil contamination including ice, snow, frost.		
8.3.	THEORY OF FLIGHT			
	a.	Relationship between lift, weight, thrust and drag;	2	18
	b.	Glide ratio;		
	c.	Steady state flights, performance;		
	d.	Theory of the turn;		

MODULE 8 – BASIC AERODYNAMICS

APPLICABILITY IN SEMESTER	1.	FIRST SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	B1.2 CATEGORY	
	60	

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
8.3. Cont…	e.	Influence of load factor: stall, flight envelope and structural limitations;	2	18
	f.	Lift augmentation.		
8.4.	FLIGHT STABILITY AND DYNAMICS			
	a.	Longitudinal, lateral and directional stability (active and passive).	2	10

MODULE 9A – HUMAN FACTOR

APPLICABILITY IN SEMESTER	1.	SECOND SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED		B1.2 CATEGORY
		70

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
9.1.	GENERAL			
	a.	The need to take human factors into account;	2	10
	b.	Incidents attributable to human factors/human error;		
	c.	'Murphy's' law.		
9.2.	HUMAN PERFORMANCE AND LIMITATIONS			
	a.	Vision;	2	10
	b.	Hearing;		
	c.	Information processing;		
	d.	Attention and perception;		
	e.	Memory;		
	f.	Claustrophobia and physical access.		
9.3.	SOCIAL PSYCHOLOGY			
	a.	Responsibility: individual and group;	1	05
	b.	Motivation and de-motivation;		
	c.	Peer pressure;		
	d.	'Culture' issues;		
	e.	Team working;		
	f.	Management, supervision and leadership		

MODULE 9A – HUMAN FACTOR

APPLICABILITY IN SEMESTER	1.	SECOND SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	B1.2 CATEGORY	
	70	

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
9.4.	FACTORS AFFECTING PERFORMANCE			
	a.	Fitness/health;	2	10
	b.	Stress: domestic and work related;		
	c.	Time pressure and deadlines;		
	d.	Workload: overload and underload;		
	e.	Sleep and fatigue, shift work;		
	f.	Alcohol, medication, drug abuse.		
9.5.	PHYSICAL ENVIRONMENT			
	a.	Noise and fumes;	1	05
	b.	Illumination;		
	c.	Climate and temperature;		
	d.	Motion and vibration;		
	e.	Working environment.		
9.6.	TASKS			
	a.	Physical work;	1	05
	b.	Repetitive tasks;		
	c.	Visual inspection;		
	d.	Complex systems.		

MODULE 9A – HUMAN FACTOR

APPLICABILITY IN SEMESTER	1.	SECOND SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	B1.2 CATEGORY	
	70	

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
9.7.	COMMUNICATION			
	a.	Within and between teams;	2	10
	b.	Work logging and recording;		
	c.	Keeping up to date, currency;		
	d.	Dissemination of information.		
9.8.	HUMAN ERROR			
	a.	Error models and theories;	2	10
	b.	Types of error in maintenance tasks;		
	c.	Implications of errors (i.e., accidents)		
	d.	Avoiding and managing errors.		
9.9.	HAZARDS IN THE WORKPLACE			
	a.	Recognizing and avoiding hazards;	2	05
	b.	Dealing with emergencies.		

MODULE 10 – AVIATION LEGISLATION

APPLICABILITY IN SEMESTER	**1.**	**FIRST & SECOND SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS**

THEORY HOURS ALLOTED	**SEMESTER**	**B1.2 CATEGORY**
	FIRST	**140 (PARA 10.1 – 10.4)**
	SECOND	**120 (PARA 10.5 – 10.9)**

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
10.1.	**REGULATORY FRAMEWORK**			
	a.	Role of International Civil Aviation Organization (ICAO);	1	65
	b.	Aircraft Act and Rules made under the ICAO role of the DGCA		
	c.	Relationship between CAR-21, CAR-M, CAR-145, CAR-66, CAR 147.		
	d.	The Aircraft Rules (Applicable to Aircraft Maintenance and Release)		
	e.	Aeronautical Information Circulars (Applicable to Aircraft Maintenance and Release)		
	f.	CAR Section 1 and 2		
10.2.	**CAR-66 CERTIFYING STAFF – MAINTENANCE**			
	a.	Detailed understanding of CAR-66.	2	25
10.3.	**CAR – M**			
	a.	Detail understanding of CAR M provisions related to Continuing Airworthiness	2	35
	b.	Detailed understanding of CAR-M.		
10.4.	**AIRCRAFT OPERATIONS**			
	a.	Commercial Air Transport/Commercial Operations;	1	15
	b.	Air Operators Certificates;		
	c.	Operators Responsibilities, in particular regarding continuing airworthiness and maintenance;		
	d.	Documents to be carried on board;		
	e.	Aircraft Placarding (Markings);		

MODULE 10 – AVIATION LEGISLATION

APPLICABILITY IN SEMESTER	1.	FIRST & SECOND SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS

THEORY HOURS ALLOTED	SEMESTER	B1.2 CATEGORY
	FIRST	140 (PARA 10.1 – 10.4)
	SECOND	120 (PARA 10.5 – 10.9)

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
10.5.		**AIRCRAFT CERTIFICATION**		
	a.	General – Certification rules: such as FAA & EACS 23/25/27/29;	1	25
	b.	Type Certification;		
	c.	Supplemental Type Certification;		
	d.	CAR-21 Design/Production Organization Approvals.		
	e.	Aircraft Modifications and repairs approval and certification		
	f.	Permit to fly requirements		
	g.	Documents- Certificate of Airworthiness;	2	
	h.	Certificate of Registration;		
	i.	Noise Certificate;		
	j.	Weight Schedule;		
	k.	Radio Station License and Approval.		
10.6.		**CAR-145 — APPROVED MAINTENANCE ORGANIZATIONS**		
	a.	Detailed understanding of CAR-145 and CAR M Subpart F	2	35

MODULE 10 – AVIATION LEGISLATION

APPLICABILITY IN SEMESTER	1.	FIRST & SECOND SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS

THEORY HOURS ALLOTED	SEMESTER	B1.2 CATEGORY
	FIRST	140 (PARA 10.1 – 10.4)
	SECOND	120 (PARA 10.5 – 10.9)

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
10.7.		APPLICABLE NATIONAL AND INTERNATIONAL REQUIREMENTS		
	a.	Maintenance Programme, Maintenance checks and inspections;	2	25
	b.	Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists;		
	c.	Airworthiness Directives; Service Bulletins, manufacturers service information; Modifications and repairs		
	d.	Maintenance documentation: maintenance manuals, structural repair manual, Illustrated parts catalogue, etc.;		
	e.	Continuing airworthiness;		
	f.	Test flights;		
	g.	ETOPS /EDTO, maintenance and dispatch requirements;		
	h.	RVSM, maintenance and dispatch requirements		
	i.	RNP, MNPS Operations, All Weather Operations		
	j.	Category 2/3 operations and minimum equipment requirements.		
10.8.		SAFETY MANAGEMENT SYSTEM		
	a.	State Safety Programme	2	20
	b.	Basic Safety Concepts		
	c.	Hazards & Safety Risks		
	d.	SMS Operation		
	e.	SMS Safety performance		
	f.	Safety Assurance		

MODULE 10 – AVIATION LEGISLATION

APPLICABILITY IN SEMESTER	1.	FIRST & SECOND SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS

THEORY HOURS ALLOTED	SEMESTER	B1.2 CATEGORY
	FIRST	140 (PARA 10.1 – 10.4)
	SECOND	120 (PARA 10.5 – 10.9)

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
10.9.		FUEL TANK SAFETY		
	a.	Special Federal Aviation Regulations (SFARs) from 14 CFR SFAR 88 of the FAA and of JAA TGL 47	2	15
	b.	Concept of CDCCL		
	c.	Airworthiness Limitations Items (ALI)		

MODULE 11B – TURBINE AEROPLANE AERODYNAMICS, STRUCTURE AND SYSTEMS

APPLICABILITY IN SEMESTER	**1.**	**FOURTH, FIFTH & SIXTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS**
THEORY HOURS ALLOTED	**FOURTH SEMESTER**	**68 (PARA 11.1 – 11.5)**
	FIFTH SEMESTER	**53 (PARA 11.6 – 11.11)**
	SIXTH SEMESTER	**69 (PARA 11.12 – 11.17)**

Sl. No.	Topics to be Covered			Level B1.2	Hours Allotted B1.2
11.1.	**THEORY OF FLIGHT**				
11.1.1.	**AEROPLANE AERODYNAMICS AND FLIGHT CONTROLS**				
	a.	Operation and effect of:		2	15
		i.	Roll control: ailerons and spoilers;		
		ii.	Pitch control: elevators, Stabilator, variable incidence stabilizers and canards;		
		iii.	Yaw control, rudder limiters;		
	b.	Control using Elevons, Ruddervators;			
	c.	High lift devices, slots, slats, flaps, flaperons;			
	d.	Drag inducing devices, spoilers, lift dumpers, speed brakes;			
	e.	Effects of wing fences, saw tooth leading edges;			
	f.	Boundary layer control using, vortex generators, stall wedges or leading-edge devices;			
	g.	Operation and effect of trim tabs, balance and anti-balance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;			

MODULE 11B – TURBINE AEROPLANE AERODYNAMICS, STRUCTURE AND SYSTEMS

APPLICABILITY IN SEMESTER	1.	FOURTH, FIFTH & SIXTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	FOURTH SEMESTER	68 (PARA 11.1 – 11.5)
	FIFTH SEMESTER	53 (PARA 11.6 – 11.11)
	SIXTH SEMESTER	69 (PARA 11.12 – 11.17)

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
11.2.		AIRFRAME STRUCTURES — GENERAL CONCEPTS		
	a.	Airworthiness requirements for structural strength;	2	15
	b.	Structural classification, primary, secondary and tertiary;		
	c.	Fail safe, safe life, damage tolerance concepts;		
	d.	Zonal and station identification systems;		
	e.	Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue;		
	f.	Drains and ventilation provisions;		
	g.	System installation provisions;		
	h.	Lightning strike protection provision.		
	i.	Aircraft bonding		
	j.	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;		
	k.	Structure assembly techniques: riveting, bolting, bonding		
	l.	Methods of surface protection, such as Chromating, anodizing, painting;		
	m.	Surface cleaning.		
	n.	Airframe symmetry: methods of alignment and symmetry checks.		

MODULE 11B – TURBINE AEROPLANE AERODYNAMICS, STRUCTURE AND SYSTEMS

APPLICABILITY IN SEMESTER	**1.**	**FOURTH, FIFTH & SIXTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS**
THEORY HOURS ALLOTED	**FOURTH SEMESTER**	**68 (PARA 11.1 – 11.5)**
	FIFTH SEMESTER	**53 (PARA 11.6 – 11.11)**
	SIXTH SEMESTER	**69 (PARA 11.12 – 11.17)**

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
11.3.	**AIRFRAME STRUCTURES — AEROPLANES**			
11.3.1.	**FUSELAGE (ATA 52/ 53/ 56)**			
	a.	Construction and pressurization sealing;	2	08
	b.	Wing, stabilizer, pylon and undercarriage attachments;		
	c.	Seat installation		
	d.	Doors and emergency exits: construction, and operation		
	e.	Windows and windscreen construction and mechanisms.		
11.3.2.	**WINGS (ATA 57)**			
	a.	Construction;	2	03
	b.	Fuel storage;		
	c.	Landing gear, pylon, control surface and high lift/drag attachments.		
11.3.3.	**STABILIZERS (ATA 55)**			
	a.	Construction;	2	02
	b.	Control surface attachment.		
11.3.4.	**FLIGHT CONTROL SURFACES (ATA 55/ 57)**			
	a.	Construction and attachment;	2	03
	b.	Balancing — mass and aerodynamic.		

MODULE 11B – TURBINE AEROPLANE AERODYNAMICS, STRUCTURE AND SYSTEMS

APPLICABILITY IN SEMESTER	**1.**	**FOURTH, FIFTH & SIXTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS**
THEORY HOURS ALLOTED	**FOURTH SEMESTER**	**68 (PARA 11.1 – 11.5)**
	FIFTH SEMESTER	**53 (PARA 11.6 – 11.11)**
	SIXTH SEMESTER	**69 (PARA 11.12 – 11.17)**

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
11.3.5.	**NACELLES/ PYLONS (ATA 54)**			
	a.	Construction;	2	02
	b.	Firewalls;		
	c.	Engine mounts.		
11.4.	**HYDRAULIC POWER (ATA 29)**			
	a.	System lay-out;	3	15
	b.	Hydraulic fluids;		
	c.	Hydraulic reservoirs and accumulators;		
	d.	Pressure generation: electric, mechanical,		
	e.	Filters		
	f.	Pressure Control;		
	g.	Power distribution;		
	h.	Indication and warning systems;		
11.5.	**ICE AND RAIN PROTECTION (ATA 30)**			
	a.	Ice formation, classification and detection;	3	05
	b.	De-icing systems: electrical, hot air, pneumatic and chemical;		
	c.	Probe and drain heating.		
	d.	Wiper systems		

MODULE 11B – TURBINE AEROPLANE AERODYNAMICS, STRUCTURE AND SYSTEMS

APPLICABILITY IN SEMESTER	1.	FOURTH, FIFTH & SIXTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	FOURTH SEMESTER	68 (PARA 11.1 – 11.5)
	FIFTH SEMESTER	53 (PARA 11.6 – 11.11)
	SIXTH SEMESTER	69 (PARA 11.12 – 11.17)

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
11.6.	**LANDING GEAR (ATA 32)**			
	a.	Construction, shock absorbing;	3	15
	b.	Extension and retraction systems: normal and emergency;		
	c.	Indications and warning;		
	d.	Wheels, brakes, antiskid and auto braking;		
	e.	Tires		
	f.	Steering.		
	g.	Air-ground sensing		
11.7.	**AIR CONDITIONING AND CABIN PRESSURIZATION (ATA 21)**			
	Pressurization and air conditioning systems;		3	05
	Cabin pressure controllers, protection and warning devices			
	Heating Systems			

MODULE 11B – TURBINE AEROPLANE AERODYNAMICS, STRUCTURE AND SYSTEMS

APPLICABILITY IN SEMESTER	**1.**	**FOURTH, FIFTH & SIXTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS**
THEORY HOURS ALLOTED	**FOURTH SEMESTER**	**68 (PARA 11.1 – 11.5)**
	FIFTH SEMESTER	**53 (PARA 11.6 – 11.11)**
	SIXTH SEMESTER	**69 (PARA 11.12 – 11.17)**

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
11.8.		**INSTRUMENTS/ AVIONIC SYSTEMS**		
11.8.1.		**INSTRUMENT SYSTEMS (ATA 31)**		
	a.	Pitot static: altimeter, air speed indicator, vertical speed indicator;	2	10
	b.	Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn coordinator;		
	c.	Compasses: direct reading, remote reading;		
	d.	Angle of attack indication, stall warning systems;		
	e.	Glass Cockpit		
	f.	Other aircraft system indication.		
11.8.2.		**AVIONIC SYSTEMS**		
	a.	Fundamentals of system lay-outs and operation of;	1	05
	b.	Auto Flight (ATA 22);		
	c.	Communications (ATA 23);		
	d.	Navigation Systems (ATA 34).		
11.9.		**WATER/WASTE (ATA 38)**		
	a.	Water system lay-out, supply, distribution, servicing and draining;	3	03
	b.	Toilet system lay-out, flushing and servicing;		
	c.	Corrosion aspects.		

MODULE 11B – TURBINE AEROPLANE AERODYNAMICS, STRUCTURE AND SYSTEMS

APPLICABILITY IN SEMESTER	1.	FOURTH, FIFTH & SIXTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	FOURTH SEMESTER	68 (PARA 11.1 – 11.5)
	FIFTH SEMESTER	53 (PARA 11.6 – 11.11)
	SIXTH SEMESTER	69 (PARA 11.12 – 11.17)

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
11.10.	**FLIGHT CONTROLS (ATA 27)**			
	a.	Primary controls: aileron, elevator, rudder, spoiler;	3	10
	b.	Trim control;		
	c.	High lift devices;		
	d.	Lift dump, speed brakes;		
	e.	System operation: manual,		
	f.	gust locks		
	g.	Balancing and rigging;		
	h.	Stall protection/warning system.		
11.11.	**FIRE PROTECTION (ATA 26)**			
	a.	Fire and smoke detection and warning systems;	3	05
	b.	Fire extinguishing systems;		
	c.	System tests.		
	d.	Portable fire extinguisher	1	
11.12.	**OXYGEN (ATA 35)**			
	a.	System lay-out: cockpit, cabin;	3	04
	b.	Sources, storage, charging and distribution;		
	c.	Supply regulation;		
	d.	Indications and warnings;		

MODULE 11B – TURBINE AEROPLANE AERODYNAMICS, STRUCTURE AND SYSTEMS		
APPLICABILITY	1.	FOURTH, FIFTH & SIXTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/

IN SEMESTER		ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	FOURTH SEMESTER	68 (PARA 11.1 – 11.5)
	FIFTH SEMESTER	53 (PARA 11.6 – 11.11)
	SIXTH SEMESTER	69 (PARA 11.12 – 11.17)

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
11.13.	**PNEUMATIC/ VACUUM (ATA 36)**			
	a.	System lay-out;	3	10
	b.	Sources: engine/APU, compressors, reservoirs, ground supply;		
	c.	Pressure control; Distribution;		
	d.	Indications and warnings;		
	e.	Interfaces with other systems.		
11.14.	**EQUIPMENT AND FURNISHINGS (ATA 25)**			
	a.	Emergency equipment requirements;	2	15
	b.	Seats, harnesses and belts.		
	c.	Cabin lay-out;	1	
	d.	Equipment lay-out;		
	e.	Cabin Furnishing Installation;		
	f.	Cabin entertainment equipment;		
	g.	Galley installation;		
	h.	Cargo handling and retention equipment;		
	i.	Airstairs.		
11.15.	**FUEL SYSTEMS (ATA 28)**			
	a.	System lay-out;	3	20
	b.	Fuel tanks;		
	c.	Supply systems;		

MODULE 11B – TURBINE AEROPLANE AERODYNAMICS, STRUCTURE AND SYSTEMS

APPLICABILITY IN SEMESTER	1.	FOURTH, FIFTH & SIXTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	FOURTH SEMESTER	68 (PARA 11.1 – 11.5)
	FIFTH SEMESTER	53 (PARA 11.6 – 11.11)
	SIXTH SEMESTER	69 (PARA 11.12 – 11.17)

Sl. No.		Topics to be Covered	Level B1.2	Hours Allotted B1.2
	d.	Dumping, venting and draining;	3	Cont…
	e.	Cross-feed and transfer;		
	f.	Indications and warnings;		
	g.	Refuelling and defueling;		
11.16.		**ELECTRICAL POWER (ATA 24)**		
	a.	Batteries Installation and Operation;	3	15
	b.	DC power generation;		
	c.	AC power generation;		
	d.	Emergency power generation;		
	e.	Voltage regulation;		
	f.	Power distribution;		
	g.	Inverters, transformers, rectifiers;		
	h.	Circuit protection.		
	I	External/Ground power;		
11.17.		**LIGHTS (ATA 33)**		
	a.	External: navigation, anti-collision, landing, taxiing, ice;	3	05
	b.	Internal: cabin, cockpit, cargo;		
	c.	Emergency.		

MODULE 16 – PISTON ENGINE

APPLICABILITY IN SEMESTER	**1.**	**FOURTH, FIFTH & SIXTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS**
THEORY HOURS ALLOTED	**FOURTH SEMESTER**	**40 (PARA 16.1 – 16.4)**
	FIFTH SEMESTER	**35 (PARA 16.5 – 16.9)**
	SIXTH SEMESTER	**30 (PARA 16.10 – 16.13)**

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
16.1.	**FUNDAMENTALS**			
	a.	Mechanical, thermal and volumetric efficiencies;	2	5
	b.	Operating principles — 2 stroke, 4 stroke, Otto and Diesel;		
	c.	Piston displacement and compression ratio;		
	d.	Engine configuration and firing order.		
16.2.	**ENGINE PERFORMANCE**			
	a.	Power calculation and measurement;	2	5
	b.	Factors affecting engine power;		
	c.	Mixtures/leaning, pre-ignition.		
16.3	**Engine Construction**			
	a.	Crank case, crank shaft, cam shafts, sumps;	2	15
	b.	Accessory gearbox;		
	c.	Cylinder and piston assemblies;		
	d.	Connecting rods, inlet and exhaust manifolds;		
	e.	Valve mechanisms;		
	f.	Propeller reduction gearboxes.		

MODULE 16 – PISTON ENGINE

APPLICABILITY IN SEMESTER	1.	FOURTH, FIFTH & SIXTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	FOURTH SEMESTER	40 (PARA 16.1 – 16.4)
	FIFTH SEMESTER	35 (PARA 16.5 – 16.9)
	SIXTH SEMESTER	30 (PARA 16.10 – 16.13)

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
16.4	**Engine Fuel Systems**		2	5
16.4.1	**Carburetors**			
	a.	Types, construction and principles of operation;		
	b.	Icing and heating.		
16.4.2	**Fuel injection systems**			
	a.	Types, construction and principles of operation.	2	5
16.4.3	**Electronic engine control**			
	a.	Operation of engine control and fuel metering systems	2	5
	b.	including electronic engine control (FADEC);		
	c.	Systems lay-out and components.		
16.5	**Starting and Ignition Systems**			
	a.	Starting systems, pre-heat systems;	2	10
	b.	Magneto types, construction and principles of operation;		
	c.	Ignition harnesses, spark plugs;		
	d.	Low and high tension systems.		

MODULE 16 – PISTON ENGINE

APPLICABILITY IN SEMESTER	1.	FOURTH, FIFTH & SIXTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	FOURTH SEMESTER	40 (PARA 16.1 – 16.4)
	FIFTH SEMESTER	35 (PARA 16.5 – 16.9)
	SIXTH SEMESTER	30 (PARA 16.10 – 16.13)

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
16.6	**Induction, Exhaust and Cooling Systems**			
	a.	Construction and operation of: induction systems	2	10
	b.	including alternate air systems;		
	c.	Exhaust systems, engine cooling systems — air and liquid.		
16.7	**Supercharging/Turbocharging**			
	a.	Principles and purpose of supercharging and its effects on engine parameters;	2	5
	b.	Construction and operation of supercharging/turbocharging systems;		
	c.	System terminology;		
	d.	Control systems;		
	e.	System protection.		
16.8	**Lubricants and Fuels**			
	a.	Properties and specifications;	2	2
	b.	Fuel additives;		
	c.	Safety precautions.		
16.9	**Lubrication Systems**			
	a.	System operation/lay-out and components.	2	8

MODULE 16 – PISTON ENGINE

APPLICABILITY IN SEMESTER	1.	FOURTH, FIFTH & SIXTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTED	FOURTH SEMESTER	40 (PARA 16.1 – 16.4)
	FIFTH SEMESTER	35 (PARA 16.5 – 16.9)
	SIXTH SEMESTER	30 (PARA 16.10 – 16.13)

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
16.10	**Engine Indication Systems**			
	a.	Engine speed;	2	5
	b.	Cylinder head temperature;		
	c.	Coolant temperature;		
	d.	Oil pressure and temperature;		
	e.	Exhaust Gas Temperature;		
	f.	Fuel pressure and flow;		
	g.	Manifold pressure.		
16.11	**Powerplant Installation**			
	a.	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.	2	10
16.12	**Engine Monitoring and Ground Operation**			
	a.	Procedures for starting and ground run-up;	3	10
	b.	Interpretation of engine power output and parameters;		
	c.	Inspection of engine and components: criteria, tolerances, and data specified by engine manufacturer.		
16.13	**Engine Storage and Preservation**			
	a.	Preservation and depreservation for the engine and accessories/ systems	2	5

MODULE 17A – PROPELLER

APPLICABILITY IN SEMESTER	1.	FOURTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTTED	B1.2 CATEGORY	
	40	

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
17.1.	**FUNDAMENTALS**			
	a.	Blade element theory;	2	10
	b.	High/low blade angle, reverse angle, angle of attack, rotational speed;		
	c.	Propeller slip;		
	d.	Aerodynamic, centrifugal, and thrust forces;		
	e.	Torque;		
	f.	Relative airflow on blade angle of attack;		
	g.	Vibration and resonance.		
17.2.	**PROPELLER CONSTRUCTION**			
	a.	Construction methods and materials used in wooden, composite and metal propellers;	2	10
	b.	Blade station, blade face, blade shank, blade back and hub assembly;		
	c.	Fixed pitch, controllable pitch, co nstant speeding propeller;		
	d.	Propeller/spinner installation.		
17.3.	**PROPELLER PITCH CONTROL**			
	a.	Speed control and pitch change methods, mechanical and electrical/electronic;	2	10
	b.	Feathering and reverse pitch;		
	c.	Overspeed protection.		

MODULE 17A – PROPELLER

APPLICABILITY IN SEMESTER	1.	FOURTH SEMESTER – B1.2 CATEGORY BATCHES INDUCTED/ ADMITTED IN JULY 2023 AND ONWARDS
THEORY HOURS ALLOTTED	B1.2 CATEGORY	
	40	

Sl. No.	Topics to be Covered		Level B1.2	Hours Allotted B1.2
17.4.	**PROPELLER SYNCHRONIZING**			
	a.	Synchronizing and synchrophasing equipment.	2	02
17.5.	**PROPELLER ICE PROTECTION**			
	a.	Fluid and electrical de-icing equipment.	2	02
17.6.	**PROPELLER MAINTENANCE**			
	a.	Static and dynamic balancing;	3	04
	b.	Blade tracking;		
	c.	Assessment of blade damage, erosion, corrosion, impact damage, delamination;		
	d.	Propeller treatment/repair schemes;		
	e.	Propeller engine running.		
17.7.	**PROPELLER STORAGE AND PRESERVATION**			
	a.	Propeller preservation and de-preservation	2	02