

# B.Sc Aviation Curriculum & Syllabus

**Regulations 2021** 

(Based on Choice Based Credit System)

Effective from the Academic year 2021-2022

**Department of Aviation** 

# PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

- **PEO1:** To help students to achieve deep knowledge of aviation stream we also aim to find, develop and streamline the student's interest in aviation and different aviation related field.
- **PEO2**: To develop skill to identify problem that may be hazardous to the safe operations of an aircraft in the quickest and safest possible manner and solving the problem within time constraint.
- **PEO3**: To prepare a well-trained and knowledgeable aviation personnel to cope up with ever developing aviation industry by frequently updating syllabus in accordance to the latest update in aviation field.
- **PEO4**: To help students to work as a team to prevent, find or solve a situation together and encourages multi crew coordination (MCC) for efficient working with minimum error.
- **PEO5**: Encourage and train students to be well groomed and prepare them to appear on radio telephony exam conducted by Ministry of communication, Govt of India to increase their scope of job opportunity Graduates will have solid basics in Mathematics, Programming, and Computer Network, Network Security, Cyber Security fundamentals and advancements to solve technical problems.

# PROGRAMME OUTCOMES (PO)

- **PO1:** Understand the role and responsibility of aviation personnel, having leadership quality to have a streamlined operation for the benefit of company.
- **PO2:** Gain knowledge about safe operation of aircraft and finding the possibility which hinders the safety of aircraft operation.
- **PO3:** Understand the flow and functions of various teams, working in an airport for smooth operation of aircraft and choosing the department of his own personal interest
- **PO4:** Understand the restrictions, rules, the Do's and Don'ts within an aerodrome area, to help the security executives to create a more safe air operations.
- **PO5:** Knows to work as a team in different situation and handling the situation as a team and knows the value of multi crew coordination (MCC).
- **PO6:** Have a clear idea about different documents and manual which are used by different department in aviation, the procedure to use and the process of updating it
- **PO7:** Have basic knowledge about aero medical, understands resource management, work load, stress management. Can judge various weather conditions, weather report, forecast and its effect.

# PROGRAMME SPECIFIC OUTCOMES (PSO)

- **PSO1:** Be well familiar with various department of aviation stream and have deep knowledge about their responsibilities and duties.
- **PSO2**: Be competent in the field of aviation meteorology, air regulations, air navigations, aircraft technical, radio telephony
- **PSO3**: To adopt them self with the new technology which is developed to improve the safety, efficiency and streamlined flow of air traffic.
- **PSO4**: Well known about the importance of muti crew coordination (MCC), working and handling the situation as a team.
- **PSO5**: Will be a professional aviation personal who knows their roles and responsibilities in their concerned field and ability to grow in their field for the benefit of them self and aviation industry.

# **Board of Studies Members**

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HoD

Department of Aviation,

Vels Institute of Science, Technology and Advanced Studies,

Chennai.

InternalBoardMember : Dr.M.Chandrasekaran

Professor and Director

Department of Mechanical Engineering

Vels Institute of Science, Technology and Advanced Studies,

Chennai.

Capt. Ranjitha

Assistant professor,

Department of Aviation

Vels Institute of Science, Technology and Advanced Studies,

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ExternalMember : Capt. Sujith Chandar

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	Department of Aviation
	Bishop Heber College,
	Trichy
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	Honorary secretary
	Madras Flying Club
	Chennai.

# **B.Sc. - AVIATION**

# **CURRICULUM**

# MINIMUM CREDITS TO BE EARNED: 134

Category Code No.		Course	Hours / Week			Credits	Maximum Marks		
Category	Category Code No.	Course	Lecture	Tutorial	Practical	Credits	CA	SEE	Total
SEMESTER I									
LANG		TAMILI / HINDI / FRENCH	4	0	0	4	40	60	100
ENG		ENGLISH PAPER –I	4	0	0	4	40	60	100
CORE		FAMILIARIZATION OF AIRPORT	4	0	0	4	40	60	100
CORE		AVIATION CALCULATION AND NUMERICAL	4	0	0	4	40	60	100
CORE		RADIO TELEPHONY	4	0	0	4	40	60	100
		Total	20	0	O	20			
SEMESTER II									
LANG		TAMIL II / HINDI / FRENCH	4	0	0	4	40	60	100
ENG		ENGLISH PAPER –II	4	0	0	4	40	60	100
CORE		THEORY OF FLIGHT (AERODYNAMICS)	4	1	0	4	40	60	100
CORE		FAMILIARIZATION OF AIRCRAFT	4	0	0	4	40	60	100
CORE		BASIC ELECTRICITY AND AIRCRAFT ELECTRICAL SYSTEMS	4	0	0	4	40	60	100
DSE		AVIATION HISTORY,INDIAN AND WORLD HISTORY	3	0	0	3	40	60	100
CORE		PRACTICAL- RADIO TELEPHONY WORKSHOP	0	0	4	2	40	60	100
		Total	23	1	4	25			

CA - Continuous Assessment

SEE - Semester End Examination

# **B.Sc. - AVIATION**

## **CURRICULUM**

Cata same Cada Na		G	I	Hours / W	Credits	Max	Marks		
Category	Code No.	Course	Lecture	Tutorial	Practical	Credits	CA	SEE	Total
SEMESTER	Ш								
CORE		AIR REGULATION - I	4	0	0	4	40	60	100
CORE		AIR NAVIGATION	4	0	0	4	40	60	100
CORE		METEOROLOGY - I	4	0	0	4	40	60	100
CORE		PISTON ENGINE AND PROPELLERS	5	0	0	5	40	60	100
CORE		HUMAN FACTORS	4	0	0	4	40	60	100
SEC		PRACTICAL – ATC COMMUNICATION AND ITS UNITS	0	0	4	2	40	60	100
		Total	21	o	4	23			
SEMESTER	IV								
CORE		AIR REGULATION - II	4	0	0	4	40	60	100
CORE		RADIO AIDS	5	0	0	5	40	60	100
CORE		AERO ENGINES	5	0	0	5	40	60	100
CORE		PRACTICAL – HANGAR WORKSHOP - I	0	0	4	2	40	60	100
CORE		ENVIRONMENTAL STUDIES	2	0	0	2	40	60	100
GE		QUANTITATIVE APTITUDE,LOGICAL REASONING AND DATA INTERPRETATION	4	0	0	4	40	60	100
		Total	20	o	4	22			

CA - Continuous Assessment SEE - Semester End Examination

# **B.Sc. - AVIATION**

## **CURRICULUM**

Colonia Colonia		C	Hours / Week			C 1'4	Maximum Marks		
Category	Code No.	Course	Lecture	Tutorial	Practical	Credits	CA	SEE	Total
SEMESTER	V								
CORE		AIRCRAT INSTRUMENTS	4	0	0	4	40	60	100
CORE		METEOROLOGY - II	4	0	0	4	40	60	100
CORE		AIRCRAFT SYSTEMS	4	0	0	4	40	60	100
CORE		CIVIL AVIATION REQUIREMENTS (CAR) AND SAFETY MANAGEMENT SYSTEMS	5	0	0	5	40	60	100
CORE		FLIGHT PERFORMANCE AND PLANNING	5	0	0	5	40	60	100
CORE		PRACTICAL – HANGAR WORKSHOP - II	0	0	4	2	40	60	100
		Total	22	O	4	24			
SEMESTER V	VI								
CORE		PRACTICAL – FLIGHT PLANNING	0	0	4	2	40	60	100
CORE		PRACTICAL – FLIGHT OPERATIONS	0	0	4	2	40	60	100
CORE		PRACTICAL – MAINTENANCE WORKSHOP	0	0	4	2	40	60	100
CORE		PRACTICAL – FLYING SYNTHETIC	0	0	6	3	40	60	100
CORE		PROJECT AND VIVA VOCE	0	0	12	11	40	60	100
		Total	0	0	30	20			

CA - Continuous Assessment SEE - Semester End Examination

## LIST OF DISCIPLINE SPECIFIC ELECTIVE COURSES

• AVIATION HISTORY, INDIAN AND WORLD HISTORY

## **LIST OF GENERIC ELECTIVE COURSES**

• QUANTITATIVE APTITUDE, LOGICAL REASONING AND DATA INTERPRETATION

## LIST OF ABILITY ENHANCEMENT COMPULSORY COURSES

- TAMIL PAPER I
- TAMIL PAPER II
- FRENCH PAPER-I
- FRENCH PAPER-II
- HINDI PAPER-I
- HINDI PAPER-II
- ENGLISH PAPER-I
- ENGLISH PAPER-II

## LIST OF SKILL ENHANCEMENT COURSES

• ENVIRONMENTAL SCIENCE

		FAMILIARIZATION OF AIRPORT	4004	
Course Objective:	_	Γο acquire basic understanding of the layout of an Airport; its buildings, facilitie nstallations and their functioning. Employability		
<b>Course Outcomes:</b>				
	CO-1	Basic knowledge of Airports and Aerodromes.		
	<b>CO-2</b>	To learn all Signals, Markings and Lightings.		
	CO-3	To understand the basic knowledge of Navigational aids.		
	CO-4	To learn the basic knowledge of Aeronautical Information Publication	n.	
	CO-5	To understand International Aviation Organization.		
UNIT I	Buildin	gs & Installations	12	
Terminals, Security,	Apron, H	angar, Taxiway, Runway, Fire Station, Airport Vehicles, Fuel depot.		
UNIT II	Markir	ngs& Lightings	12	
RWY & TWY marki Aerodrome Beacon,	0 . 0	ntings, Signboards, Declared distances, PCN, Lighting system, Lighting & Marking.		
UNIT III	Faciliti	es & Equipment	12	
		DB, DME; Surveillance equipment: Primary Radar, SSR, Surface		
Movement Radar, Al	DS; GPS,	VHF antennae, ILS.		

#### **UNIT IV Air Traffic Control**

12

ATC Units, Concept of FIR, Role of FIC, Roles of Tower & SMC Controllers, Flight Plan, Flight Dispatch, ATC briefing.

#### UNIT V **Important Organizations**

12

Ministry of Civil Aviation, ICAO, DGCA, AAI & its wings, BCAS, CISF, MLU

TOTAL 60 Hrs.

#### **References:**

- 1. ICAO Annex 14 Volume 1 Aerodrome Design and Operations
- 2. Civil Aviation Requirements Section-4, Aerodrome Standards & Air Traffic Services.

	AVIA	TION CALCULATION AND NUMERICAL	4004	
Course Objective:		To understand the importance of various calculations and the implementation of same in aviation industry. Employability		
<b>Course Outcomes:</b>				
	CO-1	To understand applications of Trigonometric and Pythagoras theorem	ns.	
	CO-2	To learn about the basic conversions.		
	CO-3	Basic understanding of Aviation Compass.		
	CO-4	To understand Flight operating time and its calculations.		
	CO-5	To understand Basic management of fuel and Time calculations.		
UNIT I	Basic T	Trigonometry Pythagoras theorem	12	
Trigonometric Ratio	s and the	ir applications		
UNIT II	Conve	rsions	12	
Metric Conversions,	temperat	ture Conversions and their applications		
UNIT III	Compa	ass	12	
Basic understanding and Heading Calcula		ass, Principle, Compass variation, magnetic deviation, True Heading		
UNIT IV	Relativ	ve Motion and Vertical Speed	12	
-	ROD &	on to speed, distance, time. Calculating ETA, ETD, EET. selection of Altitude according to the flight path, TOC & TOD, its ration.		
UNIT V	Time (	Calculation and Fuel Calculation	12	
Difference in longitu	ide, Diffe	ven place, longitude, latitude, meridians, rhumb line, UTC, IST, erence in latitude. Selection of alternate aerodrome, Fuel calculation equirement and payload.		
-		TOTAL	60 Hrs	
References:	1 4-	Con Made and Conford Del Produce		
		tion Mathematics, Oxford Publications		
		ord General navigation.  Ind Studies for Pilots(General Navigation)		
	J. 010t	ind Studies for 1 nots(Ocheral Navigation)		

4. General navigation by R.K. Bali

Course Objects	Procedures followed by different departments of Aviation.  Employability  To understand various aviation terminologies, Standard Universal Communication Procedures followed by different departments of Aviation.					
Course Outcon		uonky				
	CO-1	To learn basic regulations of Radio communications.				
	CO-2	To understand the basic knowledge of Radio waves and its Propagation	on.			
	CO-3	To learn Phraseologies used in Aviation sector.				
	CO-4	To learn about Aviation Code communications.				
	CO-5	To understand the Notices to Airmen.				
UNIT I	Regula	tions	12			
Duties of ITU, I	ICAO, AAI, Wraft Identificat	PC, ICAO Annexure, Spelling of Alphabets and Transmission of ion, Location Indicators, Flight Information Regions, Identification	12			
UNIT II	Radio I	Propagation	12			
(b) Frequer (c) Ionosph (d) Mode of (e) Operati (f) Operati (g) Diving (h) Skip Di (i) Choice UNIT III  Phraseology use Communication (a) Distress (b) Distress (c) Wrench (d) Direction (e) Flight S (f) Metrology	nery bands and an ere layers during fropagation for the foliation of Geostation of Polar orbustance of Frequencies Phrased in Aeronaut a Services.	ing day and night MF, HF and VHF & above conary Satellites citing Satellites s during Day & Night	12			
UNIT IV	'Q' Coo	des	12			
'Q' Codes used Flight Level	in Aeronautica	al Communication Services, QNH, QFE, Height, Elevation, Altitude,				
UNIT V	Comm	ınication	12			
Terminal Comn and Secondary		n-route Communication, NOTAM and SNOWTAM,Need of Primary  TOTAL	60 Hrs.			

1. Radio telephony by K.D. Tuli, 11<sup>th</sup> revised edition

**References:** 

RADIO TELEPHONY

4004

#### THEORY OF FLIGHT (AERODYNAMICS)

Course Objective: To Understand the principles of flying, application of theory in subsonic and transonic

operations. Employability

**Course Outcomes:** 

**CO-1** Basic understanding of airflow around the airframe.

**CO-2** To learn about forces acting on a/c.

**CO-3** To learn about Aircraft Stability and its controllability.

**CO-4** To understand the Aircraft flight controls.

**CO-5** To understand Basic Knowledge of Subsonic flight and Supersonic flight.

## UNIT I Aerodynamics

15

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

## UNIT II Theory of Flight

15

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.

#### **UNIT III** Flight Stability and Dynamics.

15

Longitudinal, lateral, and directional stability.

#### **UNIT IV** Aerodynamics and Flight Controls.

15

Operation and effect of:

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

Control using elevens, rudder, elevators; 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 antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels; Pressure measuring devices and systems; Pitot static systems, Altimeters; Vertical speed indicators; Airspeed indicators; Machmeter; Altitude reporting/alerting systems; Air data computers; rate of climb/vertical speed indicator, cabin pressure indicator.

#### UNIT V High Speed Flight

15

Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number, compressibility effect, buffet, shock wave, aerodynamic heating, area rule; Factors affecting airflow in engine intakes of high speed aircraft; Effects of sweepback on critical Mach number.

TOTAL 75 Hrs.

- 1. Air Pilots Manual, Trevor Thom.
- 2. Aerodynamics byClancey
- 3. Mechanics of Flight by A.C. Kermode
- 4. Aircraft instruments by E.H.J. Pallett
- 5. Aircraft Instruments by C.A. Williams

CO-1	Understanding basic fluid mechanisms	
CO-2	To understand the basic components of aircraft airframe.	
CO-3	To be familiar with aircraft controls.	
CO-4	To know the various purposes of landing gear.	
CO-5	Able to understand the basic working principles of Aircraft Engines.	
	•	15
r, Pressur amics, Cl ur locks, Gravity, pplication	re, Stress, Elasticity of Material, Principle of the Gyroscope; harles' and Boyle's laws, Heat Transfer, Heat & Energy conversion, Calorific values of fuels, Kinetic Theory of gases; Viscosity, Fluid Absolute and relative humidity, Pressure & Buoyancy in liquids, in Hydraulic press, Hydraulic and Pneumatic system, Bernoulli's	
Airfran	ne & systems	15
	ing Structures; Control Surfaces; Airframe carburetor, fuel system,	
Landin	g Gear, Wheel brakes	15
and diffe	rent types of Shock Strut; Brake System.	
Aircraf	t Engine (Piston)	15
Aircraf	t Engine (Jet)	15
e engine.	TOTAL	75 Hrs.
	CO-2 CO-3 CO-4 CO-5 Unders Mechan wton's la r, Pressur amics, Cl ur locks, Gravity, pplication ibe theory Airfran arious W System. Landin and diffe Aircraf onents: C Stroke en	CO-2 To understand the basic components of aircraft airframe.  CO-3 To be familiar with aircraft controls.  CO-4 To know the various purposes of landing gear.  CO-5 Able to understand the basic working principles of Aircraft Engines.  Understanding of Basic Mechanics, Thermodynamics and Fluid Mechanics  wton's laws of motion, Friction, Centre of Mass, Centre of Gravity, Torque, r, Pressure, Stress, Elasticity of Material, Principle of the Gyroscope; amics, Charles' and Boyle's laws, Heat Transfer, Heat & Energy conversion, ur locks, Calorific values of fuels, Kinetic Theory of gases; Viscosity, Fluid Gravity, Absolute and relative humidity, Pressure & Buoyancy in liquids, pplication in Hydraulic press, Hydraulic and Pneumatic system, Bernoulli's able theory, Streamline, Laminar and turbulent flow.  Airframe & systems  Tarious Wing Structures; Control Surfaces; Airframe carburetor, fuel system, System.  Landing Gear, Wheel brakes  and different types of Shock Strut; Brake System.  Aircraft Engine (Piston)  Onents: Crankcase, Crankshaft, Camshaft, Bearings, Connecting Rod, Piston, Stroke engine cycle, Engine Handling, Normally aspirated, Turbo charging,  Aircraft Engine (Jet)  Opeller, Types of Compressors: Axial, Centrifugal; Types of Combustion e engine.

**Shroff Publishers** 

**Shroff Publishers** 

3. Aeroplane Technical by Trevor Thom

1. Airframe and Power plant Mechanics Airframe Handbook (AC65 – 15A) by

2. Airframe and Power plant Mechanics Airframe Handbook (AC65 – 9A) by

**FAMILIARIZATION OF AIRCARFT** 

To know the various systems and their utilization / involvement in an aircraft.

**Course Objective:** 

Course Outcomes:

**References:** 

**Employability** 

4004

#### BASIC ELECRICITY& AIRCRAFT ELECTRICAL SYSTEM

<b>Course Objective:</b>	To understand the theory	, concepts and working	of AC and DC circuits
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**Employability** 

#### **Course Outcomes:**

- **CO-1** To understand Structure and distribution of electrical charges within: atoms, molecules, ions, compounds.
- **CO-2** To understand about the behavior of charge in various states of matter i.e. solid, liquid, gas and vacuum.
- **CO-3** To learn about the laws used for studying static charges.
- CO-4 To learn about the following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.
- CO-5 To learn about various laws and its applications- Ohms Law, Kirchhoff's Voltage and Current Laws. Calculations using the above laws to find resistance, voltage and current.

## **UNIT I** Static Electricity and Conduction

15

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 vacuum.

## **UNIT II** Electrical Terminologies

15

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

#### **UNIT III** DC Circuits

15

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

#### UNIT IV Resistance/Resistor

15

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

#### **UNIT V** AC Theories and Aircraft Electrical System

15

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.

TOTAL 75 Hrs.

- 1. Electrical Technology by B. L. Theraja
- 2. Aircraft Electrical System by E.H.J. Pallett

Course Objective:	To Understand the history behind the development of Aircrafts, their growth and recent Technological innovations. Employability				
<b>Course Outcomes:</b>					
	CO-1	To understand prehistory of flight.			
	CO-2	To understand Working for the generals, Knights of the Ai Bombers.	r, Zeppelin	s and	
	CO-3	To learn about the laws used for studying static charges.			
	CO-4	To learn about Command of the air, Battle of Britain.			
	CO-5	To learn about Jet passenger travel.			
UNIT I	Age of I	Pioneers		12	
The prehistory of flight	ht, Fight	to be first, Flying takes off.			
UNIT II	Aircraft	t go to War		12	
Working for the gener	rals, Knig	ghts of the Air, Zeppelins and Bombers			
UNIT III	The Gol	lden Age		12	
Blazing the trail, Pass	engers no	ow boarding, Flying boats and airships, The shadow of war			
UNIT IV	Battle fo	or the skies		12	
		Britain, Air war at sea, Death from the air			
UNIT V	Shrinki	ng World		12	
		ying, The future of flight			
			TOTAL	60 Hrs.	
References:					

Flight- The complete History of Aviation - R.G Grant
 A History of Aviation from kites to Space Age- Tom. D. Crouch

AVIATION HISTORY, INDIAN AND WORLD HISTORY

3003

			RADIO TELEPHONY WORKSHOP	0 0 42
			erstand various aviation terminologies, Standard Universal Communicates followed by different departments of Aviation.  /bility	ation
Course	utcomes.	CO-1	To learn basic regulations of Radio communications.	
			-	ion
		CO-2	To understand the basic knowledge of Radio waves and its Propagat	1011.
		CO-3	To learn Phraseologies used in Aviation sector.	
		CO-4	To learn about Aviation Code communications.	
		CO-5	To understand the Notices to Airmen.	
Regulatio	ns			12
	, Aircraft Ide		VPC, ICAO Annexure, Spelling of Alphabets and Transmission of ion, Location Indicators, Flight Information Regions, Identification	
Radio Pro	opagation			12
(a) R	elationship b	oetween	wavelength, frequency and speed of light	
	requency bar			
(c) Io	nosphere lay	yers dur	ing day and night	
	_	-	MF, HF and VHF & above	
	_		onary Satellites	
	_	Polar orl	biting Satellites	
-	iving			
	kip Distance			
(i) C	hoice of Fre	quencies	s during Day & Night	
Phraseolo	ogy			12
Phraseolo	gy used in A	eronaut	ical Communication Services, Abbreviations used in Aeronautical	
Communi	cation Servi	ces.		
(a) D	istress			
(b) D	istress Relay	/		
(c) W	rench			
	irection Find	ding		
	light Safety			
	letrological			
(g) Fl	ight regulate			
		'Q' Co		12
'Q' Codes	used in Aer	onautic	al Communication Services, QNH, QFE, Height, Elevation, Altitude,	

Terminal Communication & En-route Communication, NOTAM and SNOWTAM, Need of Primary

Flight Level

and Secondary Frequencies.

Communication

TOTAL 60 Hrs.

12

# AIR RGULATION-I

Course Objective:	To know the various systems and their utilization / involvement in an aircraft. Employability				
<b>Course Outcomes:</b>					
	CO-1	To learn about An Act to make better provision for the control of the manufacture, possession, use, operation, sale, import and export of air	rcraft.		
	CO-2	To learn about the Regulation relating to registration, license of perso airworthiness and log books	nnel,		
	CO-3	To understand the separation between two aircrafts of same and different category of aircrafts	ent		
	CO-4	To obtain knowledge about different markings and lights used in runv taxiways of the airport	vays and		
	CO-5	To develop the knowledge about regulations followed during visual a metrological conditions while flying.	nd		
UNIT I	Indian A	Aircraft Act, 1934	12		
Features of Indian Air	rcraft Act	t, 1934.			
UNIT II	Indian A	Aircraft Rules, 1937	12		
Features of Indian Air	rcraft Ru	les, 1937.			
UNIT III	Separat	ion minima	12		
Horizontal, Vertical a	nd Latera	al separations, wake turbulence category.			
UNIT IV	Runway	y Layouts	12		
Runway marking, thi lights.	reshold n	narkings, taxiway markings,runway lights, threshold lights, taxiway			
UNIT V	Rules of	f the air	12		
•		t Flight rules, Airspace classification, Flight information Centers, les, Restricted Areas, Prohibited Area, Instrument landing category			
		TOTAL	60 Hrs.		

- Indian Aviation Act 1934 by Ministry of Civil Aviation, Govt. of India.
   Indian Aircraft Manual by Ministry of Civil aviation, Govt. of India.
   Air Regulation Part 1 by R.K Bali.

#### AIR NAVIGATION

**Course Objective:** To learn the art of navigating an aircraft from any given points, understand the geographical positions, their relation and effects in navigation. Employability

#### **Course Outcomes:**

- **CO-1** To know the process of determining the determining the geographical position on the surface of the earth.
- **CO-2** To learn the Aviation speed calculations.
- **CO-3** To understand different types of projections of Maps and charts.
- **CO-4** To learn the fuel management and navigational calculations.
- **CO-5** To know the calculations of PNR.

#### **UNIT I** The Earth

12

The cardinal Points, The Earth Graticule, Great Circles, Meridians and Anti Meridians, Small Circles, The Equator, Latitude, Longitude, The Prime Meridian, Difference in Latitude and Longitude, Great Circle Tracks, Rhumb Line Tracks.,360 degree notation, True Direction, Magnetic Direction and Variation, Isogonals, Magnetic Direction, Compass Direction and Deviation, Convergency, Grid Direction and Grivation, Isogrivs.

# **UNIT II** Speed Conversions

12

Statute Mile, Nautical Mile, Kilometre, Conversion between Units, Departure, Metres and Feet, Basic principles of Circular Slide Rule., units of Speed, Knots, Miles per Hour, Kilometers per Hour, Indicated Airspeed, Rectified Airspeed, True Airspeed, Equivalent Airspeed, Ground Speed, Mach Number, Calibrated Airspeed, Correct Outside Air Temperature, Conversion of Rectified Airspeed to True Airspeed, Conversion of Mach number to True Airspeed, Distance and Time; Relationships and Calculations.

### **UNIT III** Triangle of Velocities

12

The Three basic velocity vectors- Drift- The Basic Vector Triangle Problems, Geometrical Solution and Solutions on the Navigation Computer, Finding the wind Velocity at a turning point, Head and Crosswind on a Runway, 1 in 60 Rule.

#### UNIT IV Maps and Charts

12

Mercator projection, Lambert Conical, Polar stereographic projection, Orthomorphism, Scale, The Reduced Earth, Topographical Maps.

## UNIT V Fuel and Navigational Emergency Data

12

Imperial Gallons and US Gall, Conversion factors, specific gravity, fuel flow and fuel consumption, selecting the most economical cruising level, Payload

TOTAL 60 Hrs.

- 1. Ground studies for pilot-Navigation 6th edition royunderdown& tony palmer.
- 2. Navigation for pilots by J.E.Hitchcock.

**Course Objective:** To understand the various aspects of weather in aviation. Employability

#### **Course Outcomes:**

- CO-1 Understand the basic composition and arrangements of layers of earth's atmosphere
- **CO-2** To familiarize with the heating of earth's surface and atmosphere
- CO-3 To understand the influencing factors of density and how it affects the performance of aircraft
- **CO-4** To understand the basic flow patern of winds
- CO-5 To understand the importance of visibility in aviation and factors which affects

## **UNIT I** The Atmosphere

12

Composition, extent, vertical division, physical properties of air, atmosphere, pressure, temperature, density, humidity, Newton law of motion, Bernoulli's principles.

## **UNIT II** Temperature

12

Vertical distribution of temperature, Transfer of heat. solar and terrestrial Radiation, Conduction, convection, Advection and Turbulence, Lapse rate, stability, and instability, inversions, type inversions, temperature Development of near the earth's surface.Surfaceeffects, Diurnal variation, Effect of clouds, Effect of wind.

# **UNIT III** Atmospheric Density and Wind

12

Inter-relationship of pressure, Temperature and Density, International Standard Atmosphere, Altimetry Pressure, True Altitude, Height, Altitude, Flight Level, Altimeter settings,QNH,QFE,QNE.Definition and measurement of Wind, Primary cause of Wind, Pressure Gradient, Coriolis Force, Gradient Wind,General circulation of Wind, Turbulence,gustiness,type of turbulence,Origin and Location of Turbulence,Variation of Wind with height, Variation of wind in the friction layer, Variation of the wind caused by fronts.

#### UNIT IV Winds

12

Local winds, Anabatic and Catabatic, Land and sea breezes, Vertical movements, Mountain waves, Windshear, Turbulence, Ice Accretion.

#### UNIT V Visibility

12

Visibility, Visibility reducing phenomenon, Reduction and visibility caused by mist, smoke, dust, sand and precipitation, Reduction of visibility caused by low drifting and blowing snow.

TOTAL 60 Hrs.

- 1. Meteorology for Pilots by Mike Wickson.
- 2. Weather by R.S.Scorer.
- 3. Ground studies for pilots by R.B underdown& john Standan

#### PISTON ENGINE AND PROPELLERS

**Course Objective:** Understand Basic working of piston engines and propellers, effects on performance. Employability

#### **Course Outcomes:**

**CO-1** Able to understand the Basic knowledge of Piston Engine working.

**CO-2** To understand Basic Components of Piston Engine.

**CO-3** To learn the purpose of Carburettor and fuel injector in piston engines.

**CO-4** To understand the terminologies of super charging and turbo charging engines.

**CO-5** To achieve knowledge of propellers and its purpose.

## **UNIT I** Piston Engine

15

Fundamentals,Mechanical,thermal and volumetric efficiencies operating principles – 2 stroke, 4 stroke, Otto and Diesel, Piston displacement and Compression ratio, Engine configuration and firing order.

## **UNIT II Engine Construction and Performance**

15

Crank case, Crank shaft, Cam shafts, Sumps, Accessory gearbox, cylinder and piston assemblies, connecting rods, inlet and exhaust manifolds, valve mechanism, power calculation measurement, factors affecting engine power, mixture rich-lean, pre-ignition.

## **UNIT III** Supercharging and Turbo charging

15

Principle and purpose of supercharging and its effects on engine parameters, construction and operation of supercharging / turbo charging systems terminology, control system, system protection.

## UNIT IV Lubricants and Fuel and Powerplant Installation

15

Properties and Specifications, fuel additives, safety precautions, 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.

## UNIT V Propeller

15

Fundamentals, blade element theory, high-low blade angels, reverse angel , angle of attack , rotational speed, propeller slip, aerodynamic, centrifugal and thrust forces, torque, relative airflow on blade angle of attack , vibrations and resonance, Propeller construction methods and materials used in wooden, composite and metal propellers, bladestation, bladephase, bladeshank, blade back and hub assembly, fixed pitch control pitch, constant speeding propeller, Propeller pitch control, propeller ice protection

TOTAL 75 Hrs.

- 1. Airframe and power plant mechanics power plant hand FAA
- 2. Aircraft piston engines by Herschel smit

#### **HUMAN FACTORS**

#### **Course Objective:**

To know, study and bring out the human's inherent quality and also the human behaviour both at domestic and work places. Also understand the working capabilities to employ a suitable person for the correct job in order to obtain aerospace safety in dealing emergency procedures both on ground as well in Air. Employability

#### **Course Outcomes:**

- **CO-1** To study about human memory, error, perception, interpretation of visual picture and auditory signals.
- **CO-2** To learn Individual and group motivations, responsibilities and qualities of leadership and communications.
- **CO-3** To know about one's physical condition and knowledge on subject work to culminate the assigned tasks.
- **CO-4** To know how cognition in air maintenance and errors attributing incidents/accidents.
- **CO-5** To enhance human sensation memory, mental models both short and long term memory skills.

# UNIT I Basic Physiology

12

The need to take human factors into account; Incidents attributable to human factors/human error; 'Murphy's Law .Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access.Hyperventilation, Hypoxia, Decompression Sickness anatomy & physiology of the ear, Vision.

## UNIT II Social Psychology

12

Responsibility: individual and group; Motivation and de-motivation; Peer pressure; 'Culture' issues; Team working; Management, supervision and leadership, Interacting with ATC, Cabin Crew, Passengers.

## **UNIT III** Factors Affecting Performance

12

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.

### **UNIT IV** Cognition in Aviation

12

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

#### **UNIT V Human Information Processing**

12

Introduction, Basic plan, Sensation & Sensory memory, perception & mental models, working of long term memory, motor memory (Skills).

TOTAL 60Hrs.

#### References:

1. Human Factors for Pilots, Roger G Green, Helen Muir et al., Ash gate Publishing Limited.

Course Objective: Understand the Air Traffic control operations, their role in maintaining safety and easy

flow of traffic, different units that work closely with ATC. Employability

**Course Outcomes:** 

CO-1 To be familiarized with different ATC units for communication
 CO-2 Understand the functions of ground, tower, area and approach

**CO-3** To understand the boundaries of FIR

**CO-4** Know the functions of **RCC** 

CO-5 To decode meteorology briefing

- 1. Functioning of ATS Reporting Office (ATC Briefing), booking of Flight Plan (FPL)/ Repetitive Flight Plan (RPL), Joint Regional CoordinationCentre(JRCC), Non-scheduled Bill generation, NOTAM bulletin broadcasting.
- 2. Communication Briefing/ Meteorological Briefing
- 3. NOTAM office/ Aeronautical Information Service (AIS) office
- 4. Automation in ATC
- 5. Aerodrome Control Unit and its functioning (TOWER & GROUND controller)
- 6. Advanced Surface Movement and Guidance Control System (ASMGCS)
- 7. Approach Control Unit
- 8. Area Control Centre
- 9. Flight Information Centre (FIC)
- 10. Rescue And Coordination Centre (RCC)
- 11. Radar Control
- 12. Military Liaison Unit (MLU)
- 13. Oceanic Control Centre (OCC)

TOTAL 60Hrs.

Course Objective:	Get an insight into the various laws and rules applicable during flight, airspace restrictions and terminologies associated therewith. Employability									
<b>Course Outcomes:</b>										
	CO-1	To understand the rules followed by aircraft to avoid collision in the a	ir							
CO-2 To learn the procedures followed by aircraft when intercept aircraft										
	CO-3 To develop the knowledge about different features of aerodrome									
	CO-4	To develop the skill about regulations and limitations followed in an a	an airspace							
	CO-5	To improve the skill related to various documents and terms used in a	viation's.							
UNIT I	Rules o	f the Air	12							
		approaching head-on, overtaking, converging, right of way, flight in ght on aircraft, low flying regulations.								
UNIT II	Interce	ptions of Civil Aircraft	12							
_	_	procedure, signals from intercepting aircraft, signals from intercepted, signals from the ground, restricted area, prohibited area, danger								
UNIT III	Aerodr	omes	12							
Aeronautical light beacon, right of way on the ground, water on the runway, wind direction indicator, runway markings, taxiway markings, runway threshold and wingbar lights, aerodrome signal and markings, displaced threshold marking, light signals and marshalling signals.										
UNIT IV	Airspac	e	12							
FIR, controlled airsp advisory routes, aerod		sification of airspace, crossing an airway, uncontrolled air space, ffic zones								
UNIT V	ICAO A	annexure Terminology	12							
Various definitions, te	erminolog	gies used in aviation.								

1. Air Pilot's Manual, Vol 2, Aviation Laws by Peter. D. Godwin

**References:** 

AIR REGULATION II

4004

TOTAL 60Hrs.

RADIO AIDS	500	-

Course Objective:	Understand the functioning of various Nav aids that are made available inflight, on ground, principle behind their operation. Employability									
<b>Course Outcomes:</b>										
	CO-1 To develop the knowledge about navigational ground equipm direction of aircraft									
	CO-2									
	CO-3	CO-3 To understand the functions and importance of airborne weather								
	CO-4	To develop the skill is secondary radar system and the usage of measuring equipment	distance							
	CO-5 To improve the knowledge of surveillance radar used in aviation developments.									
UNIT I	Directi	on Finding Aids	15							
ADF/NDB-Types of RBI, Errors (ADF and	NDB, pr l NDB), a ANGE)-F ctors affe	Principle of operation, Airborne equipment, frequency range, Factors ecting range.								
UNIT II	Basic F	RADAR	15							
	AR princ	siples, Terminology, RADAR parameters, use of RADAR, Types of Surveillance RADAR, Types of radar approaches.								
UNIT III	Airbor	ne Weather RADAR and Cockpit Displays	15							
		D Head-up display, Principle of operation and functions of airborne ys, Mapping display, hazard detections.								
UNIT IV	Seconda	ary RADAR Theory and DME	15							
	•	adar principle, Transponder, airborne equipment, slant range, coaired DME, Use of the equipment.								
UNIT V	Seconda	ary Surveillance RADAR	15							
Principle, current mod	des and o	codes, Mode 'C' and 'S' interrogation, SQUAWK codes, advantages								

## **References:**

and disadvantages of SSR

1. Ground studies for Pilots, Radio Aids (R.B Underdown and David Cockburn)

TOTAL 75 Hrs.

#### **Course Objective:**

To provide basic knowledge about Turbo Jet/Propeller Aero engine. From this one can understand that how pressure and velocity of air varies with design of different parts of engine particularly air intake, compressor, turbine blades & Jet nozzle and finally achieve the object of Newton's third law. Employability

#### **Course Outcomes:**

- **CO-1** To understand various engine parts and also the airflow in & out of aero engine.
- **CO-2** To know how to obtain optimum air velocity at the mouth of engine by design.
- **CO-3** To Learn the Principle factors, basic requirements and smooth air pressure rise by compressor.
- **CO-4** To know how ignited air fuel mixer is converted into heat energy in different types of combustion chambers.
- **CO-5** To enhance how heat and kinetic energy is converted to mechanical energy and smooth exit of burnt gases to atmosphere in order to achieve forward motion.

## **UNIT I** Gas turbine theory

15

Introduction, Jet engine types, principle of jet thrust, engine efficiency, factors affecting thrust, internal engine parameter change, The gas turbine cycle, effects of Ram, density, and Temperature.

## **UNIT II** Gas turbine engine structures

15

Intake design, Intakes for supersonic flight, Intake shapes, Types of inlet, Critical conditions, and Variable intakes.

## **UNIT III** Compressors

15

Introduction, design, Centrifugal compressor airflow, Compressor design variations, diffuser system, multi stage centrifugal compressor, Axial flow compressor, Compressor rotor, Airflow through an axial compressor, Reverse flow compressor, The main features of axial flow compressors, compressor surging, axial compressor surging, effects of compressor surge, variable position guide vanes, air release valves (Bleed valves), multi spool engines, compressor icing, comparison of axial flow and centrifugal flow compressor engines, TU.

#### **UNIT IV** Combustion systems

15

Introduction, Basic types of combustion chambers, multiple combustion chambers, The direct flow type combustion chamber, The annular combustion chamber, Cannular combustion chamber, Fuel injection and vaporization, Atomization of fuel, Burners.

#### UNIT V Turbines

15

Introduction, turbine principle of operation, turbine losses, construction, reduction in loss efficiency, compressor and turbine machine, turbine blade creep, free turbines, turbine blades, nozzle guide vanes (NGV), exhaust nozzles, basic exhaust systems, Turbofan Engines: Turbofan engine layout, Bypass ratio, Turbofan engine performance, TurbopropEngines: principle of operation, types of turboprop engines, turboprop reduction gearing, propeller and engine control, turboprop performance, Introduction, TurboProp aircraft, principle of operation.

TOTAL 75 Hrs.

- 1. The Professional Pilot Study Guide Series, Mike Burton.
- 2. Aerodynamics, Engines and Airframe Systems for Air Transport Pilot, A Trevor Thom Manual.

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0042

**Course Objective:** To familiarize with the general tools used in aircraft maintenance.

**Employability** 

#### **Course Outcomes:**

- **CO-1** Know the importance of general safety precautions on different shop floors.
- **CO-2** Identify the basics of tools and equipments used in fitting, carpentry, sheet metal, machine, welding and smithy.
- **CO-3** Fabrication of wooden joints and understand joining of metals.
- **CO-4** Make metal joints and sheet metal work.
- **CO-5** Understand the basics of removal of material from workpiece surface to attain specific shape.

## I Familiarization of general hand tools

30

General Purpose Tools, Hummers and Mallets, Screwdrivers, Pilers and Plier-Type Cutting Tools. Punches Wrenches, Special Wrenches, Torque Wrench, Strap Wrenches. Impact Drivers, Metal Cutting Tools. Hand Snips, Hacksaws, Chisels, Vices, Files, Files—care and Use, Most Commonly Used Files, Care of files. Drills. Twist Drills, Reamers, Countersink, Taps and Dies, Layout and Measuring Tools, Rules. Combination Sets, Scribe, Dividers and Pencil Compasses, Calipers, Micrometer Calipers, Micrometer Parts. Reading a Micrometer, Vernier Scale, Using a Micrometer, Calipers.

# II Fire Training.

30

- a. Different Types & class of fire.
- b. Different types of fire-extinguishers.
- c. Procedure of use of fire extinguishers, fire-alarm bell.

TOTAL 60Hrs.

- 1. Shop Theory.
- 2. Airframe and Power plant Mechanics Airframe Handbook (Ac65- 9A) by Shroff Publishers.
- 3. Airframe and Power Plant mechanics Airframe handbook (Ac65- 15A) by Shroff Publishers

15

15

#### **ENVIRONMENTAL SCIENCE**

**Course Objective:** To understand the environmental resources, their prevention and efficient usage of natural resources. Employability

#### Course Outcomes:

- **CO-1** To understand core concepts and methods from ecological and physical sciences.
- **CO-2** To understand the transnational character of Environmental problems across local and global scale.
- **CO-3** To learn about how to conserve our Environment that degrade natural resources and ecosystems.
- **CO-4** To learn the ideas for how we can prevent environmental destruction.
- **CO-5** Understanding how we can develop sustainable strategies to protect the environment.

# UNIT I Introduction to environmental studies and Ecosystems 15

Multidisciplinary nature of environmental studies, Scope and importance, Concept of sustainability and sustainable development. What is an ecosystem? Structure and function of ecosystem, Energy flow in an ecosystem, Food chains, food webs and ecological succession Case studies of the following ecosystems:

- a) Forest ecosystem
- b) Grassland ecosystem
- c) Desert ecosystem
- d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

## UNIT II Natural Resources, Renewable, and Non-renewable Resources 15

Land resources and land use change, Land degradation, soil erosion and desertification, Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.

Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).

Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

## **UNIT III Biodiversity and Conservation**

Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones ofIndia; Biodiversity patterns and global biodiversity hot spots, India as a mega-biodiversity nation; Endangered and endemic species of India, Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological Invasions; Conservation of biodiversity: In-Situ and Ex-Situ conservation of biodiversity. Ecosystem and biodiversity services:ecological,economic,social,ethical,aesthetic, and Informational value.

#### UNIT IV Environmental Pollution

Environmental pollution: types, causes, effects and controls; Air, water, Soil and noise pollution. Nuclear hazards and human health risksSolid waste management: Control measures of urban and industrial waste.10Pollution case studies.

#### **UNIT V** Environmental Policies & Practices

Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD) Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

TOTAL 75 Hrs.

#### **References:**

- 1. Text book of Environment studies for UG-ErachBharucha
- 2. Text Book of Environmental Studies by D. K. Asthana

15

#### **QUANTITATIVE APTITUDE, LOGICAL REASONING & DATA INTERPRETATION** 4 0 0 4

#### **Course Objective:**

An aptitude test represents a systematic way to judge a candidate's mental capability as how he/she performs certain tasks and reacts to different scenarios. Logical reasoning is the ability to think logically to formulate fair judgements and justify a position. The objective of this course is to enhance abstract reasoning, manual deftness, verbal and numerical skills, clerical work, mechanical ability and speed. Employability

#### **Course Outcomes:**

- **CO-1** To obtain the capability to do various numerical calculations manually and easily in error free manner.
- **CO-2** To learn about the basic concepts of aptitude like numerical computation ability, analytical abilities.
- **CO-3** To develop ability of doing computation, logical reasoning and data interpretation in a time bound manner.
- **CO-4** To understand and develop the ability of analyzing and verifying available facts, and either changing or justifying and explanation based on given information.
- CO-5 To learn and understand the use of various types of graphs and charts and its practical application.

# UNIT I Quantitative Aptitude-1

12

Number Systems, Basic Formulae of Algebra, Percentages, Profit and Loss, Interests, Trigonometry, Speed, Time and Distance, Time and Work, Averages, Mixture and Allegation, Ratio and Proportion.

## **UNIT II Quantitative Aptitude-2**

12

Linear Equations, Quadratic Equations, Progressions, Functions, Binomial Theorem, Indices and Surds, Inequalities, Logarithms, Permutation & Combination, Probability.

## **UNIT III Quantitative Aptitude-3**

12

Geometry Basics, Triangles, Quadrilateral, Circles, Mensuration

#### UNIT IV Logical Reasoning

12

Number and Letter Series, Calendars, Clocks, Cubes, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Sequence, Logical Matching, Logical Connectives, Syllogism, Blood Relations.

## **UNIT V** Data Interpretation

12

Data, Variables, Tables, Bar Charts, X-Y Charts, Pie Chart, Cases

TOTAL 60Hrs.

- 1. Quantitative Aptitude by R. S. Aggarwal
- 2. Data Interpretation and Logical Reasoning by Arun Sharma

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TOTAL 60Hrs.

# AIRCRAFT INSTRUMENTS

<b>Course Objective:</b>	To understand the various principles and functions of pressure instruments and gyro instruments. Employability								
<b>Course Outcomes:</b>									
	CO-1 To learn about the importance of pressure and instruments us aircraft.								
	<b>CO-2</b> To improve the knowledge about airspeed indicator and different in aircraft operation.								
	CO-3	To develop the skill about the rate of climb and descent indicator.							
	CO-4	To learn about gyroscope and instruments using gyroscope.							
	CO-5	To understand the functions of different gyroscopic instruments aircraft.	used in						
UNIT I	Pressu	re Instruments	12						
Pressure altimeter, s working, altimeter err	imple al	timeter, sensitive altimeter, servo-assisted altimeter- its principle,							
UNIT II	Airspe	ed Indicators	12						
Principle, working, co Mach meter errors.	-	n, error, tolerance. Mach meter, its principle, Mach/TAS calculations,							
UNIT III	Vertica	al speed indicator	12						
Principle, working a		of Vertical speed indicator							
•	ıtals, typo	opic Instruments and Compasses. es of gyros, drift and topple, gyro drives, Working, Horizontality, g error, acceleration error, variation and deviation.	12						
UNIT V Gyro Instruments  Directional gyro-Principle of operation, adjustment procedure, erection system, gimbal error, Drift calculation, Drift compensation Attitude Indicator- Principle and construction, erection mechanism, acceleration errors, turning errors, electrically driven attitude indicator and its errors Turn and bank Indicator- Principle and construction, bank indication, turn coordinator.									

1. GSP – Flight instruments by David Harris

4004

**Course Objective:** To know the various aspects of weather. Employability

#### **Course Outcomes:**

- **CO-1** Understand the basic composition and arrangements of layers of earth's atmosphere
- **CO-2** To familiarize with the heating of earth's surface and atmosphere
- CO-3 To understand the influencing factors of density and how it affects the performance of aircraft
- **CO-4** To understand the basic flow pattern of winds
- **CO-5** To understand the importance of visibility in aviation and factors which affects it

UNIT I Clouds 12

Types of clouds, Precipitation, Humidity, Dew point temperature, Adiabatic process, the Fohn wind effect, Precipitation associated with cloud.

## **UNIT II** Thunderstorm and Air Masses

12

Necessary conditions for thunderstorm, life cycle of a thunderstorm, the danger of thunderstorm Air masses, the origin of an air mass, its path, divergence and convergence, the warm front, observation from the ground, observation from the air, the cold front, observation from the ground, observation from the air, the occluded front, depressions, weather associated with it, trough of low pressure, the wave of frontal depression, the cyclone storm, anti-cyclone, weather associated with it, a ridge of high pressure.

## UNIT III Icing

12

The dangers of icing, the formation of ice, super-cooled water drops, clear ice, Rime ice, cloudy ice, hoar frost, structural icing and cloud type, carburetor icing, pitot static system icing.

#### **UNIT IV** Weather Forecast and Reports

12

Dissemination of weather information, AIR MET service, types of weather information, meteorological forecast, special forecast, aerodrome forecast, TAF, METAR, TRENDS, Cloud base, VFR- in flight weather report, ATIS.

#### **UNIT V** Symbols and Abbreviations

12

Symbols for significant weather on MET charts, weather abbreviations (Cloud Type), Cloud amount, CB amount, common MET abbreviations, CAVOK, TEMPO, lasting change, Synoptic charts, wind symbols, visibility.

TOTAL 60Hrs.

#### **References:**

1. The Air Pilot's Manual, Vol 2, Peter. D. Godwin

#### **AIRCRAFT SYSTEMS**

**Course Objective:** To obtain a basic understanding on the various aircraft systems, the components used in that system. Employability

#### Course Outcomes:

- **CO-1** To learn about the basic aircraft mechanical systems.
- **CO-2** To understand about the components and working of the same.
- **CO-3** To learn about how the controlling, indication, warning systems of various aircraft systems functions.
- **CO-4** To learn about the interface of one system with another and to gain knowledge about the redundancy in various aircraft systems.
- CO-5 To obtain knowledge about the basic safety precautions while dealing with these aircraft systems.

## **UNIT I** Air Conditioning and Cabin Pressurization

12

Air Supply-sources of air supply including engine bleed, APU and ground cart; Air conditioning systems; Air cycle and vapor cycle machines distribution systems; Flow, temperature and humidity control system. Pressurization- Pressurization systems; control and indication including control and safety valves; cabin pressure controllers, safety and warning devices; protection and warning devices

#### UNIT II Pneumatic/Vacuum

12

System lay-out; sources: engine/APU, compressors, reservoirs, ground supply, pressure control; distribution, indications and warnings, interface with other systems.

## **UNIT III** Fuel Systems

12

System lay-out, fuel tanks, supply systems, dumping, venting and draining, cross-feed and transfer, indications and warnings, refueling and defueling, longitudinal balance fuel systems.

## UNIT IV Landing Gear

12

Construction, shock absorbing, extension and retraction systems, normal and emergency, Indications and warning, wheels, brakes, antiskid and auto braking, tyres, steering, air-ground sensing, skids, floats.

#### UNIT V Engine Fuel Systems

12

Carburetor types, construction and principles of operation, icing and heating, Types of fuel system, construction and principle of operation, Starting systems, pre-heat systems, Magneto types, construction and principles of operation, ignition harness, spark plugs, low and high tension systems.

Out and components.

TOTAL 60Hrs.

#### References:

1. Professional Pilot Study Guide (Mike Burton)

CIVIL AVIATION	REQUI	REMENTS (CAR) AND SAFETY MANAGEMENT SYSTEMS	5005							
Course Objective:	Understanding the various laws and regulations pertaining to aviation sa standards. Employability									
<b>Course Outcomes:</b>										
	<b>CO-1</b>	To learn about what is Civil Aviation Requirement and Safety massystem in Indian Civil Aviation and its purpose.	nagement							
	<b>CO-2</b> To understand about the various regulations in place to monitor and environmental impact.									
	CO-3 To understand about the sections pertaining to various operations field.									
	<b>CO-4</b> To understand in detail the various series and parts in CAR.									
	CO-5	To understand about the need of Safety management system in industry.	ı aviation							
UNIT I	Introdu	uction	15							
Purpose of CAR, pertaining to various of	•	of safety management systems, applications, circulars, sections is.								
UNIT II	Aviatio	on Environmental Protection	15							
Noise management of quality monitoring in		aircraft operations at airport, climate change initiatives and local air ation.								
UNIT III Civil Aviation Requirements (CAR) Section 1 to Section 11										
UNIT IV Safety Management System (SMS) Indian safety policy, Indian safety plan, SMS, SSP, ICAO ANNEX 19- Safety management, establishment of safety management system, applicability of SMS, safety policy and objective, coordination of emergency response planning, documentation, safety management system manual, safety risk management, safety assurance, safety promotions, quality policy.										
UNIT V Case Studies 15										

TOTAL 75 Hrs.

Description, error, cause and solution for different case studies

2. AIP

**References:** 

1. DGCA website for latest CAR updates.

ŭ	and its e	effects. Employability	
<b>Course Outcomes:</b>			
	CO-1	To develop the skill in analysing different data to perform efficient ta	ke-off
	CO-2	5	
	CO-3	To understand the importance of runway length and its availability fo performance	
	CO-4	To learn about different parameters used to improve the efficiency of	aircraft
	CO-5	To develop the ability to do load and trim sheet to keep the aircra operational weight.	aft in safe
UNIT I	Take-C	Off Performance	15
0 1	ors affec	ts of weight and altitude, Take- Off performance, wind factors, Taketing take-off performance, recommended safety factor for take-off, narts.	
UNIT II	Landin	ng Performance	15
wind factors, runway	surface,	ctors affecting landing performance, effects of weight and altitude, runway slope, flap setting, recommended safety factors for landing, arts, approach speeds, performance considerations.	
UNIT III	Runwa	y Characteristics	15
	ailable (	ΓODA), Take-Off run available (TORA), clearway, rejected Take- o way, landing distance available (LDA).	
-	power av	te Performance railable curves, range and endurance, best -range speed, maximum- need, en route performance charts.	15
UNIT V	Weight	t and Balance	15
handling, movement	of CG p	weight of fuel, weight restrictions, effect of CG position on airplane osition, mathematical approaches to weight and balance, graphical e, dangerous goods, baggage and cargo restraint.	
		TOTAL	75 Hrs.

1. Aeroplane Technical, by Trevor Thom.

2. AIP

FLIGHT PERFORMANCE AND PLANNING

To understand, infer and interpret performance charts, weight and balance restrictions

**Course Objective:** 

**References:** 

5005

	<b>Employ</b>	<mark>rability</mark>	
Course O	utcomes:		
	CO-1	Able to Identify the airframe structure of Cessna 152	
	<b>CO-2</b>	Able to understand the engine performance of Cessna 152	
	<b>CO-3</b>	Able to understand the electrical, hydraulic and landing gear of Cessn	a 152
	<b>CO-4</b>	Able to classify Different Types & class of fire.	
	CO-5	Able to understand the procedure to use fire extinguishers and fire-ala	ırm bell.
I	Famili	arization on Cessna 152	30
a.	Airframe familia	nrization	
b.	Engine familiari	zation	
c.	Cessna 152 Elec	trical system	
d.	Cessna 152 Hyd	lraulic system	
e.	Cessna 152 Lan	ding gear system	
f.	Cessna 152 Airc	raft Instrument system	
II	Fire T	raining.	30
a	. Different Types	s & class of fire.	
b	. Different types	of fire-extinguishers.	
c	. Procedure of us	e of fire extinguishers, fire-alarm bell.	
D 6		TOTAL	60Hrs.
Reference	1.	Cessna 152 Aircraft Service manual by Cessna Aircraft Company Cessna 172 Aircraft Maintenance manual by Cessna Aircraft Company	ý

PRACTICAL HANGAR WORKSHOP- II

To Familiarize with the Cessna 152 and Cessna 172 aircraft and their systems.

**Course Objective:** 

0042

#### PRACTICAL - FLIGHT PLANNING

0 0 42

Course Objective: Flight planning aims to produce a flight plan to describe a proposed aircraft

flight. Employability

**Course Outcomes:** 

- CO-1 To be familiarized with different agencies involved in flight planning
   CO-2 To understand filling flight plan form as per ICAO prescribed procedure
- CO-3 To know the procedure & necessity of obtaining FIC & ADC
- **CO-4** Interpret NOTAMS and understand its importance for a flight operation
- CO-5 To know the procedure to obtain departure, Enroute and destination weather report and forecast

60

- 1. Understanding, Coordination with different agencies.
- 2. Filling of Flight Plan
- 3. Mode of submissions of flight plan
- 4. Obtaining FIC and ADC
- 5. Study of NOTAM
- 6. ATIS
- 7. Weather obtaining procedures.

TOTAL 60Hrs.

- 1. Ground Studies for Pilots: Flight Planning by Peter J. Swatton
- 2. Flight Plan: The Real Secret of Success by Brian Tracy

#### PRACTICAL - FLIGHT OPERATIONS

0.042

**Course Objective:** Flight operationsaims to provide high-quality and thorough day-to-day operations with safety and standards. **Employability** 

**Course Outcomes:** 

**CO-1** To choose appropriate type of aircraft engine for a particular purpose

CO-2 To understand the working principle of various aircraft systems

CO-3 To choose the correct grade of fuel and oil for a particular type of aircraft

**CO-4** To make the students outline the electrical systems in an aircraft

**CO-5** Explain the working principle of hydraulic systems

60

- 1. Types of engine
- 2. Systems
- 3. Type of fuels
- 4. Electrical system
- 5. Pneumatic systems
- 6. **Hydraulics**
- 7. Avionics
- 8. Battery

TOTAL 60Hrs.

- 1. Airport Development Reference Manual (ADRM)IATA
- 2. Ground Operations Manual (IGOM)Airport Handling Manual (AHM)

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0 0 42

**Course Objective:** 

It aims to provide a comprehensive maintenance approach that minimizes the upkeep time during an airplane's administration life. Employability

**Course Outcomes:** 

**CO-1** Familiarize the students with general tools used in aircraft hanger

CO-2 Clearly understand the classes of fire and types of fire extinguisher to be used

CO-3 Differentiate between primary and secondary control surface and its functions

**CO-4** Understand and follow the rules laid by ICAO during refueling procedure

CO-5 Understand the different marshalling signals from ground to cockpit

60

- 1. Familiarization of general hand tools
- 2. Fire Training
- 3. Primary and Auxiliary control surfaces
- 4. General Maintenance of the aircraft
- 5. Refueling Procedures
- 6. General handling of aircraft
- 7. Marshalling Signals

TOTAL 60Hrs.

- 1. Aircraft Mechanic Logbook: AMT technician log book for airplane and helicopter repairs and Maintenance by Abatron Logbooks.
- 2. Aircraft Repair Manual by By Larry Reithmaier

#### PRACTICAL - FLYING SYNTHETIC

0 0 63

#### **Course Objective:**

It aims to understand how aircraft fly, how the trainee react to applications of flight controls, the effects of other aircraft systems, and how the aircraft reacts to external factors such as air density, turbulence, wind shear, cloud, precipitation, etc. with the help of Flight simulation. Employability

#### **Course Outcomes:**

- **CO-1** To be familiarized with the correct starting procedure
- CO-2 To understand what are the hazards possible when correct starting procedure is not followed
- **CO-3** To be familiarized with essential instrument in cockpit
- **CO-4** To practice take off as per procedure
- **CO-5** To understand the main difference between synthetic flying and actual flying.

60

- 1. Starting procedure
- 2. Taxing
- 3. Take Off
- 4. Landing
- 5. Instrument Identification
- 6. Understanding the synthetic procedures

TOTAL 60Hrs.