



VELS



INSTITUTE OF SCIENCE, TECHNOLOGY
& ADVANCED STUDIES (VISTAS)
(Deemed to be University under section 3 of UGC Act, 1956)
NAAC ACCREDITED WITH 'A' GRADE

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,

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Chennai.

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Assistant professor,

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Madras flying club

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Department of Aviation

Bishop Heber College,

Trichy

Industry Member

: Capt. Jacob Selvaraj

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		
			Lecture	Tutorial	Practical		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	0	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

Category	Code No.	Course	Hours / Week			Credits	Maximum Marks		
			Lecture	Tutorial	Practical		CA	SEE	Total
SEMESTER III									
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	0	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	0	4	22			

CA - Continuous Assessment

SEE - Semester End Examination

B.Sc. - AVIATION

CURRICULUM

Category	Code No.	Course	Hours / Week			Credits	Maximum Marks		
			Lecture	Tutorial	Practical		CA	SEE	Total
SEMESTER V									
CORE		AIRCRAFT 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	0	4	24			
SEMESTER 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

4 0 0 4

Course Objective: To acquire basic understanding of the layout of an Airport; its buildings, facilities, installations and their functioning. **Employability**

Course Outcomes:

- CO-1** Basic knowledge of Airports and Aerodromes.
- CO-2** 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.
- CO-5** To understand International Aviation Organization.

UNIT I Buildings & Installations 12

Terminals, Security, Apron, Hangar, Taxiway, Runway, Fire Station, Airport Vehicles, Fuel depot.

UNIT II Markings & Lightings 12

RWY & TWY markings, Lightings, Signboards, Declared distances, PCN, Lighting system, Aerodrome Beacon, Obstacle Lighting & Marking.

UNIT III Facilities & Equipment 12

Navigational facilities: OR, NDB, DME; Surveillance equipment: Primary Radar, SSR, Surface Movement Radar, ADS; 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.

AVIATION CALCULATION AND NUMERICAL

4 0 0 4

Course Objective: To understand the importance of various calculations and the implementation of the same in aviation industry. **Employability**

Course Outcomes:

- CO-1** To understand applications of Trigonometric and Pythagoras theorems.
- 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 Trigonometry Pythagoras theorem 12
Trigonometric Ratios and their applications

UNIT II Conversions 12
Metric Conversions, temperature Conversions and their applications

UNIT III Compass 12
Basic understanding of Compass, Principle, Compass variation, magnetic deviation, True Heading and Heading Calculation

UNIT IV Relative Motion and Vertical Speed 12
Calculation of Speed in relation to speed, distance, time. Calculating ETA, ETD, EET.
Calculation of ROC, ROD & selection of Altitude according to the flight path, TOC & TOD, its understanding and Implementation.

UNIT V Time Calculation and Fuel Calculation 12
Calculation of LMT at any given place, longitude, latitude, meridians, rhumb line, UTC, IST, Difference in longitude, Difference in latitude. Selection of alternate aerodrome, Fuel calculation for the flight, minimum fuel requirement and payload.

TOTAL 60 Hrs.

References :

1. Aviation Mathematics, Oxford Publications
2. Oxford General navigation.
3. Ground Studies for Pilots(General Navigation)
4. General navigation by R.K. Bali

RADIO TELEPHONY

4 0 0 4

Course Objective: To understand various aviation terminologies, Standard Universal Communication Procedures followed by different departments of Aviation.

Employability

Course Outcomes:

- CO-1** To learn basic regulations of Radio communications.
- CO-2** To understand the basic knowledge of Radio waves and its Propagation.
- 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 Regulations 12

Duties of ITU, ICAO, AAI, WPC, ICAO Annexure, Spelling of Alphabets and Transmission of numerical, Aircraft Identification, Location Indicators, Flight Information Regions, Identification of Ground Services.

UNIT II Radio Propagation 12

- (a) Relationship between wavelength, frequency and speed of light
- (b) Frequency bands and ranges
- (c) Ionosphere layers during day and night
- (d) Mode of Propagation MF, HF and VHF & above
- (e) Operation of Geostationary Satellites
- (f) Operation of Polar orbiting Satellites
- (g) Diving
- (h) Skip Distance
- (i) Choice of Frequencies during Day & Night

UNIT III Phraseology 12

Phraseology used in Aeronautical Communication Services, Abbreviations used in Aeronautical Communication Services.

- (a) Distress
- (b) Distress Relay
- (c) Wrench
- (d) Direction Finding
- (e) Flight Safety
- (f) Metrological
- (g) Flight regulatory

UNIT IV 'Q' Codes 12

'Q' Codes used in Aeronautical Communication Services, QNH, QFE, Height, Elevation, Altitude, Flight Level

UNIT V Communication 12

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

TOTAL 60 Hrs.

References :

1. Radio telephony by K.D. Tuli, 11th revised edition

4 1 0 4

References :

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

FAMILIARIZATION OF AIRCRAFT

4004

Course Objective: To know the various systems and their utilization / involvement in an aircraft.
Employability

Course Outcomes:

- 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.

UNIT I Understanding of Basic Mechanics, Thermodynamics and Fluid Mechanics 15

Speed, Velocity, Newton's laws of motion, Friction, Centre of Mass, Centre of Gravity, Torque, Work, Energy, Power, Pressure, Stress, Elasticity of Material, Principle of the Gyroscope; Laws of Thermodynamics, Charles' and Boyle's laws, Heat Transfer, Heat & Energy conversion, Specific Heat, Vapour locks, Calorific values of fuels, Kinetic Theory of gases; Viscosity, Fluid Resistance, Specific Gravity, Absolute and relative humidity, Pressure & Buoyancy in liquids, Pascal's law & its application in Hydraulic press, Hydraulic and Pneumatic system, Bernoulli's Theorem, Venturi's tube theory, Streamline, Laminar and turbulent flow.

UNIT II Airframe & systems 15

Types of Fuselage; Various Wing Structures; Control Surfaces; Airframe carburetor, fuel system, Oil System, Cooling System.

UNIT III Landing Gear, Wheel brakes 15

Main Landing Gears and different types of Shock Strut; Brake System.

UNIT IV Aircraft Engine (Piston) 15

Piston engine components: Crankcase, Crankshaft, Camshaft, Bearings, Connecting Rod, Piston, Piston Rings, Four-Stroke engine cycle, Engine Handling, Normally aspirated, Turbo charging, Supercharging.

UNIT V Aircraft Engine (Jet) 15

Propeller, Parts of Propeller, Types of Compressors: Axial, Centrifugal; Types of Combustion Chambers, gas turbine engine.

TOTAL 75 Hrs.

References :

1. Airframe and Power plant Mechanics Airframe Handbook (AC65 – 15A) by Shroff Publishers
2. Airframe and Power plant Mechanics Airframe Handbook (AC65 – 9A) by Shroff Publishers
3. Aeroplane Technical by Trevor Thom

BASIC ELECTRICITY & AIRCRAFT ELECTRICAL SYSTEM

4 0 0 4

Course Objective: To understand the theory, concepts and working of AC and DC circuits.
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.

References :

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

RADIO TELEPHONY WORKSHOP

0 0 42

Course Objective: To understand various aviation terminologies, Standard Universal Communication Procedures followed by different departments of Aviation.

Employability

Course Outcomes:

- CO-1** To learn basic regulations of Radio communications.
- CO-2** To understand the basic knowledge of Radio waves and its Propagation.
- 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.

Regulations

12

Duties of ITU, ICAO, AAI, WPC, ICAO Annexure, Spelling of Alphabets and Transmission of numerical, Aircraft Identification, Location Indicators, Flight Information Regions, Identification of Ground Services.

Radio Propagation

12

- (a) Relationship between wavelength, frequency and speed of light
- (b) Frequency bands and ranges
- (c) Ionosphere layers during day and night
- (d) Mode of Propagation MF, HF and VHF & above
- (e) Operation of Geostationary Satellites
- (f) Operation of Polar orbiting Satellites
- (g) Diving
- (h) Skip Distance
- (i) Choice of Frequencies during Day & Night

Phraseology

12

Phraseology used in Aeronautical Communication Services, Abbreviations used in Aeronautical Communication Services.

- (a) Distress
- (b) Distress Relay
- (c) Wrench
- (d) Direction Finding
- (e) Flight Safety
- (f) Metrological
- (g) Flight regulatory

'Q' Codes

12

'Q' Codes used in Aeronautical Communication Services, QNH, QFE, Height, Elevation, Altitude, Flight Level

Communication

12

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

TOTAL 60 Hrs.

AIR REGULATION-I

Course Objective: To know the various systems and their utilization / involvement in an aircraft.
Employability

Course Outcomes:

- 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 aircraft.
- CO-2** To learn about the Regulation relating to registration, license of personnel, airworthiness and log books
- CO-3** To understand the separation between two aircrafts of same and different category of aircrafts
- CO-4** To obtain knowledge about different markings and lights used in runways and taxiways of the airport
- CO-5** To develop the knowledge about regulations followed during visual and metrological conditions while flying.

UNIT I	Indian Aircraft Act, 1934	12
Features of Indian Aircraft Act, 1934.		
UNIT II	Indian Aircraft Rules, 1937	12
Features of Indian Aircraft Rules, 1937.		
UNIT III	Separation minima	12
Horizontal, Vertical and Lateral separations, wake turbulence category.		
UNIT IV	Runway Layouts	12
Runway marking, threshold markings, taxiway markings, runway lights, threshold lights, taxiway lights.		
UNIT V	Rules of the air	12
Visual Flight Rules, Instrument Flight rules, Airspace classification, Flight information Centers, Air Defense Identification Zones, Restricted Areas, Prohibited Area, Instrument landing category		
TOTAL		60 Hrs.

References :

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

HUMAN FACTORS

4 0 0 4

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.

PRACTICAL – ATC COMMUNICATION AND ITS UNITS

0 0 4 2

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 Coordination Centre (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.

AIR REGULATION II

4 0 0 4

Course Objective: Get an insight into the various laws and rules applicable during flight, airspace restrictions and terminologies associated therewith. **Employability**

Course Outcomes:

- CO-1** To understand the rules followed by aircraft to avoid collision in the air
- CO-2** To learn the procedures followed by aircraft when intercepted by another 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 airspace
- CO-5** To improve the skill related to various documents and terms used in aviation's.

UNIT I Rules of the Air 12

Collision avoidance in the air, approaching head-on, overtaking, converging, right of way, flight in the vicinity of an aerodrome, light on aircraft, low flying regulations.

UNIT II Interceptions of Civil Aircraft 12

Interceptions of civil aircraft, procedure, signals from intercepting aircraft, signals from intercepted aircraft, radio communication, signals from the ground, restricted area, prohibited area, danger area.

UNIT III Aerodromes 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 Airspace 12

FIR, controlled airspace, classification of airspace, crossing an airway, uncontrolled air space, advisory routes, aerodrome traffic zones

UNIT V ICAO Annexure Terminology 12

Various definitions, terminologies used in aviation.

TOTAL 60Hrs.

References :

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

RADIO AIDS

5 0 0 5

Course Objective: Understand the functioning of various Nav aids that are made available inflight, on ground, principle behind their operation. **Employability**

Course Outcomes:

- CO-1** To develop the knowledge about navigational ground equipment used to find direction of aircraft
- CO-2** To learn the use of RADARs in aviation
- CO-3** To understand the functions and importance of airborne weather radar
- CO-4** To develop the skill is secondary radar system and the usage of distance measuring equipment
- CO-5** To improve the knowledge of surveillance radar used in aviation and its developments.

UNIT I Direction Finding Aids 15

VDF-Principles, Factors affecting range (D), Factors affecting accuracy, VHF let-down service.
ADF/NDB-Types of NDB, principles of airborne D/F, frequency range, ADF, RBI, RMI, uses of RBI, Errors (ADF and NDB), and Accuracy.
VOR (VHF OMNIRANGE)-Principle of operation, Airborne equipment, frequency range, Factors affecting accuracy, factors affecting range.
RMI- Advantages and use of RMI, HSI.

UNIT II Basic RADAR 15

Introduction to RADAR principles, Terminology, RADAR parameters, use of RADAR, Types of ground radar services, Use of Surveillance RADAR, Types of radar approaches.

UNIT III Airborne Weather RADAR and Cockpit Displays 15

Introduction to CRT and LCD Head-up display, Principle of operation and functions of airborne weather Radar, weather displays, Mapping display, hazard detections.

UNIT IV Secondary RADAR Theory and DME 15

Introduction to Secondary Radar principle, Transponder, airborne equipment, slant range, co-located VOR and DME, ILS paired DME, Use of the equipment.

UNIT V Secondary Surveillance RADAR 15

Principle, current modes and codes, Mode 'C' and 'S' interrogation, SQUAWK codes, advantages and disadvantages of SSR

TOTAL 75 Hrs.

References :

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

AERO ENGINES

5 0 0 5

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, Turboprop Engines: 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.

References :

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

PRACTICAL HANGAR WORKSHOP- I

0 0 4 2

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, Hammers 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, 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.

References :

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

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 15

Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; 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 15

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

UNIT V Environmental Policies & Practices

15

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

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.

References :

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

AIRCRAFT SYSTEMS

4 0 0 4

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 REQUIREMENTS (CAR) AND SAFETY MANAGEMENT SYSTEMS 5 0 0 5

Course Objective: Understanding the various laws and regulations pertaining to aviation safety and standards. **Employability**

Course Outcomes:

- CO-1** To learn about what is Civil Aviation Requirement and Safety management system in Indian Civil Aviation and its purpose.
- CO-2** To understand about the various regulations in place to monitor and control the environmental impact.
- CO-3** To understand about the sections pertaining to various operations in aviation field.
- CO-4** To understand in detail the various series and parts in CAR.
- CO-5** To understand about the need of Safety management system in aviation industry.

UNIT I Introduction 15

Purpose of CAR, purpose of safety management systems, applications, circulars, sections pertaining to various operations.

UNIT II Aviation Environmental Protection 15

Noise management of aircraft, aircraft operations at airport, climate change initiatives and local air quality monitoring in civil aviation.

UNIT III Civil Aviation Requirements (CAR) 15

Section 1 to Section 11

UNIT IV Safety Management System (SMS) 15

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

Description, error, cause and solution for different case studies

TOTAL 75 Hrs.

References :

1. DGCA website for latest CAR updates.
2. AIP

PRACTICAL HANGAR WORKSHOP- II

0 0 4 2

Course Objective: To Familiarize with the Cessna 152 and Cessna 172 aircraft and their systems.
Employability

Course Outcomes:

- CO-1** Able to Identify the airframe structure of Cessna 152
- CO-2** Able to understand the engine performance of Cessna 152
- CO-3** Able to understand the electrical, hydraulic and landing gear of Cessna 152
- CO-4** Able to classify Different Types & class of fire.
- CO-5** Able to understand the procedure to use fire extinguishers and fire-alarm bell.

I	Familiarization on Cessna 152	30
	a. Airframe familiarization	
	b. Engine familiarization	
	c. Cessna 152 Electrical system	
	d. Cessna 152 Hydraulic system	
	e. Cessna 152 Landing gear system	
	f. Cessna 152 Aircraft Instrument system	
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.

References :

1. Cessna 152 Aircraft Service manual by Cessna Aircraft Company
2. Cessna 172 Aircraft Maintenance manual by Cessna Aircraft Company

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.

References :

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 0 42

Course Objective: Flight operations aims 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 engine.
- 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.

References :

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

PRACTICAL – MAINTENANCE WORKSHOP

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.

References :

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