

Bachelor of Science (B.Sc.) Aviation

SYLLABUS

OUTCOME-BASED EDUCATION BASED ON

REVISED BLOOM'S TAXONOMY

(Under Choice Based Credit System)

For the Students Admitted in the Academic Year 2023-24



DEPARTMENT OF AVIATION

BISHOP HEBER COLLEGE (Autonomous)

(Affiliated to Bharathidasan University)

(Reaccredited with 'A' Grade (CGPA – 3.58/4.0) by the NAAC &
Identified as College of Excellence by the UGC)

DST – FIST Sponsored College & DBT Star College

**TIRUCHIRAPPALLI – 620 017
TAMIL NADU, INDIA**

VISION

Our vision is to uphold and advance the standard of aviation training thereby producing graduates who can increase the safety and profitability of aviation and to make our students professional aviation personnel in global aviation industry.

MISSION

- By consistently elevate our training programs to be at par with international requirements in aviation industry.
- By inculcate professional discipline through academic experience to boost practical skills enhanced by intensive yet friendly learning environment.
- By inculcating everyday discipline and values.
- By keeping the students updated by training them in latest invention in aviation

PROGRAM OUTCOMES – B.Sc. - AVIATION

On Successful completion of the Program the under grandaunt of aviation will beableto,

KNOWLEDGE

PO1 Exhibit knowledge on difference element used together for sale conduct of flight.

PO2 Comprehend knowledge on working principles of aviation tools, instruments and equipment's.

PO3 Exhibit advanced knowledge of functions and importance of various aviation department such as meteorology department and air traffic service department in streamlined flow of airline business

SKILLS

PO4 Demonstrate skill in handling & operating various aviation tools, instruments & equipment's.

PO5 Exhibit intra and interpersonal skills including wide knowledge of Indian and international air law.

PO6 Demonstrates soft communication skill that uplifts passenger handling.

ATTITUDES

PO7 Demonstrate importance teamwork decision making and crew coordination.

ETHICAL AND SOCIAL VALUES

PO8 Practice airmanship and work together for the safety and well-being of coworker, uphold ethical and social values in personal and in work environment

PO9 Practice and exhibit time management and quick decision making thereby reducing unwanted delays as a byproduct reducing carbon emission and helping to make a green environment

PROGRAM SPECIFIC OUTCOMES Knowledge &Skills

- PSO1** Advanced knowledge about the various equipment's and instruments used in and around airport.
- PSO2** Interpret aviation phraseology markings, difference lightings signage used in airport and decode meteorological reports and importance coded aviation information's.
- PSO3** Evaluate plan construct a flight plan, gather all necessary information and convey it to the concerned person for successful conduct of flight from departure to destination.
- PSO4** Get a clear knowledge to choose their field of interest in aviation sector.

For Students admitted from 2023-2024 Batch Onwards

Bachelor of Science (B.Sc.) Aviation

SEMESTER I

Part	Course	Course Title	Course Code	Hours/ Week	Credits	Marks		
						CIA	ESE	Total
I	Language I	Language I	U23TM1L1	6	3	25	75	100
II	English I	Prose and Short Stories	U23EG1L1	6	3	25	75	100
III	Core I	Familiarization Of Airport	U23AV101	4	4	25	75	100
	Core II	Familiarization Of Aircraft	U23AV102	4	4	25	75	100
	Core III	Introduction To Aviation	U23AV103	3	3	25	75	100
	Allied I	Introduction To Physics	U23AV1Y1	3	2	25	75	100
IV	SEC – I	Introduction To Aviation	U23AV1E1	2	2	25	75	100
	FC	Basic Electricity and Aircraft Electrical System	U23AV1N1	2	2	100	--	100
CREDITS				30	23			

SEMESTER II

Part	Course	Course Title	Course Code	Hours/ Week	Credits	Marks		
						CIA	ESE	Total
I	Language II	Language II	U23TM2L2	6	3	25	75	100
II	English II	Poetry and Shakespeare	U23EG2L2	6	3	25	75	100
III	Core IV	Theory Of Flight (Aerodynamics)	U23AV204	4	4	25	75	100
	Core V	Radio Telephony	U23AV205	4	4	25	75	100
	Core VI	Air Navigation	U23AV206	3	3	25	75	100
	Allied II	Aviation Calculation and Numerical	U23AV2Y2	3	2	25	75	100
IV	SEC II	Radio Telephony	U23AV2E2	2	2	25	75	100
	SEC III	Airline Passenger Handling	U23AV2S3	2	2	25	75	100
CREDITS				30	23			

SEMESTER III								
Part	Course	Course Title	Course Code	Hours/Week	Credits	Marks		
						CIA	ESE	Total
I	Language III	Language III	U23TM3L3	6	3	25	75	100
II	English III	One Act Plays And Abridged Novel	U23EG3L3	6	3	25	75	100
III	Core VII	Piston Engines and Propellers	U23AV307	4	4	25	75	100
	Core VIII	Meteorology-1	U23AV 308	3	3	25	75	100
	Core Practical I	ATC Communication and Its Units (Practical)	U23AV3P1	3	3	40	60	100
	Allied III	Air Regulation-1	U23AV3Y3	4	3	25	75	100
IV	SEC IV	Ticketing and visa	U23AV3S4	1	1	100	--	100
	SEC V	Human Factors	U23AV3S5	2	2	25	75	100
	EVS	Environmental Studies	U23EST41	1	--	--	--	--
CREDITS				30	22			

SEMESTER IV								
Part	Course	Course Title	Course Code	Hours/Week	Credits	Marks		
						CIA	ESE	Total
I	Language IV	□□□□□□□□□□ IV	U23TM4L4	6	3	25	75	100
II	English IV	Language through Literature	U23EG4L4	6	3	25	75	100
III	CORE PAPER IX	Aero Engines	U23AV409	4	4	25	75	100
	CORE PAPER X	Air Regulation II	U23AV410	3	3	25	75	100

	Core Practical II	Practical Hangar Workshop- I	U23AV4P2	3	3	40	60	100
	ALLIED VI	Principle of Management	U23AV4Y2	3	3	25	75	100
IV	SEC VI	Life Skills	U23AV4S6	2	2	100	--	100
	SEC VII	Service Learning Outcome (SLO)	U23AV4S7	2	2	100	--	100
	EVS II	Environmental Studies	U23EST41	1	2	25	75	100
CREDITS					30	25		

SEMESTER V								
Part	Course	Course Title	Course Code	Hours/Week	Credits	Marks		
						CIA	ESE	Total
III	CORE PAPER XI	Aircraft Systems	U23AV511	5	4	25	75	100
	CORE PAPER XII	Flight Performance and Planning	U23AV512	5	4	25	75	100
	CORE PRACTICAL III	Practical Hangar Workshop II	U23AV5P3	6	3	40	60	100
	CORE PROJECT	CORE PROJECT WITH VIVA VOICE	U23AV5PJ	4	4	40	60	100
	ELECTIVE I	Meteorology – II	U23AV5:A	4	4	25	75	100
IV	ELECTIVE II	Aviation Security	U23AV5:B	4	3	25	75	100
	VLO	Abundant Life	U23VLO51	2	2	100	--	100
		Human Value	U23VLO52	2	2	100	--	100
	Internship	Internship / Industrial Training Programme	U23AV511	--	2	100	--	100
CREDITS					30	26		

SEMESTER VI

Part	Course	Course Title	Course Code	Hours/ Week	Credits	Marks		
						CIA	ESE	Total
III	CORE XIII	Aircraft Instruments	U23AV613	6	4	25	75	100
	CORE XIV	Radio Aids	U23AV614	6	4	25	75	100
	CORE PRACTICAL IV	Flight Synthetic Practical	U23AV6P4	6	4	40	60	100
	ELECTIVE III	Civil Aviation Requirements (Car) And Safety Management systems	U23AV6:A	5	3	25	75	100
	ELECTIVE IV	Flight Planning Practical	U23AV6:P	5	3	25	75	100
IV	Extension Activity	Extension Activities	U23ETA61	--	1	--	--	--
	PCS	Airport Ground Handling	U23AVPG1	2	2	100	--	100
CREDITS					30	21		
Total						140		

OTHER LANGUAGES:

	Hindi	Sanskrit	French		Hindi	Sanskrit	French
Semester I	U23HD1L1	U23SK1 L1	U23FR1L 1	Semester III	U23HD3L 3	U23SK3L 3	U23FR3L 3
Semester II	U23HD2L2	U23SK2 L2	U23FR2L 2	Semester IV	U23HD4L 4	U23SK4L 4	U23FR4L 4

PROGRAMME ARTICULATION MATRIX - B.SC AVIATION

Course Name	Course code	Correlation with Programme outcomes and Programme specific outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	
Familiarization Of Airport	U23AV101	H	M	H	M	M	L	M	H	M	H	H	M	M	
Familiarization Of Aircraft	U23AV102	H	M	L	H	L	L	L	L	M	H	M	H	H	
Introduction To Aviation	U23AV103	H	H	H	H	H	H	H	H	M	H	H	H	H	
Introduction To Physics	U23AV2Y1	H	H	L	H	M	L	M	M	H	H	M	M	H	
Introduction To Aviation	U23AV1E1	H	H	M	H	M	L	M	M	H	H	M	H	H	
Basic Electricity and Aircraft Electrical System	U23AV1N1	M	H	M	H	M	L	L	M	L	H	L	L	M	
Theory Of Flight (Aerodynamics)	U23AV204	H	H	H	M	M	H	H	H	H	H	H	M	H	
Radio Telephony	U23AV205	H	L	M	L	H	L	M	M	L	L	H	H	M	
Air Navigation	U23AV206	H	H	M	H	M	L	M	M	H	H	H	H	H	
Aviation Calculation and Numerical	U23AV2Y2	H	H	H	H	M	M	M	L	H	H	H	M	H	
Radio Telephony	U23AV2E2	H	H	H	H	H	H	H	H	H	H	H	H	H	
Airline Passenger Handling	U23AV2S3	H	H	L	H	L	L	M	M	M	H	L	M	H	

Piston Engines and Propellers	U23AV307	L	L	M	L	H	H	H	H	H	L	L	M	L
Meteorology-1	U23AV 308	H	M	H	M	M	L	M	H	M	H	H	M	M
ATC Communication and Its Units (Practical)	U23AV3P1	H	L	M	L	H	L	M	M	L	L	H	H	M
Air Regulation-1	U23AV3Y3	H	H	H	H	M	L	M	H	H	H	H	H	H
Ticketing and visa	U23AV3S4	S												
Human Factors	U23AV3S5	H	H	L	H	L	L	M	M	M	H	H	L	M
Environmental Studies	U23EST41	H	H	H	H	H	H	H	H	M	H	H	H	H
Air Regulation II	U23AV410	H	L	M	L	H	L	M	M	L	L	H	H	M
Practical Hangar Workshop- I	U23AV4P2	M	H	M	H	M	L	M	M	M	H	H	M	H
Aircraft Sysyems	U23AV511	M	H	L	H	L	L	H	H	M	H	H	L	M
Flight Performance and Planning	U23AV512	M	M	M	M	L	L	H	H	M	H	H	M	H
Practical Hangar Workshop - II	U23AV5P3	M	H	M	H	M	L	M	M	M	H	H	M	H
Meteorology – II	U23AV5:A	H	H	H	H	M	M	M	L	H	H	H	M	H
Aviation Security	U23AV5:B	H	H	H	M	M	M	H	H	H	H	M	L	M
Aircraft Instruments	U23AV613	M	H	L	H	M	L	M	M	M	H	M	L	H

Radio Aids	U23AV614	H	H	H	H	M	L	M	H	H	H	H	H	H
Civil Aviation Requirements (Car) And Safety Management systems	U23AV6:A	H	H	H	M	M	M	H	H	H	H	M	L	M
Flight Planning Practical	U23AV6:P	H	H	H	M	H	L	L	M	H	H	H	H	H

SEMESTER-I

S. No	Course Title	Course Code
1.	Language I	U23TM1L1
2.	Prose and Short Stories	U23EG1L1
3.	Familiarization Of Airport	U23AV101
4.	Familiarization Of Aircraft	U23AV102
5.	Introduction To Aviation	U23AV103

6.	Introduction To Physics	U23AV2Y1
7.	Introduction To Aviation	U23AV1E1
8.	Basic Electricity and Aircraft Electrical System	U23AV1N1

COURE I: FAMILIARIZATION OF AIRPORT

SEMESTER: I

CODE: U23AV101

TOTAL HOURS: 4

CREDITS: 4

COURSE OUTCOMES:

On Completion of this course, the student will be able to,

S. No	Course Outcomes	Level	Unit Covered
1	Explain the different areas in airport and its functions	K2	I
2	Interpret the meaning of markings and lightings in airport	K2	II
3	Categorize the different navigation and communication equipment used in Airport	K4	III
4	Compare the different Air Traffic Control Unit and its functions	K4	IV
5	Outline the different Important organization for safe and efficient conduct of flight	K2	V
6	Explain the basic about RADAR principle	K2	III

COURSE OBJECTIVE:

To acquire basic understanding of the layout at airport its building facilities installation and their functioning.

COURSE CONTENT:

UNIT 1: BUILDINGS & INSTALLATIONS

Basic definitions and understanding of Terminals, Security, Apron, Hangar, Taxiway, Runway, Fire Station, Airport Vehicles, Fuel depot. Regulations related to each of airport services. Purpose hanger, apron, aircraft stand, taxiway and runway.

UNIT 2: MARKINGS& LIGHTINGS

Difference between markings, Lightings and Signboards, Apron markings- aerobridge movement area markings, stand lead in line, Apron edge marking, Aircraft stand identification marking, Taxiway centerline and edge marking & lighting, Runway centerline and edge line marking & lighting, Threshold, aiming point, touch down zone marking & lighting Declared distances, PCN, Lighting system, Aerodrome Beacon, Obstacle Lighting & Marking. Location, Direction & Destination signboard.

UNIT 3: FACILITIES&EQUIPMENT’S

Basic understanding of Navigational facilities. Basic radio principle, frequency used and introduction about various navigational equipment’s VOR, NDB/ADF, DME; Basic radar principle, Primary and secondary radar, Surveillance equipment’s: Primary Radar, SSR, Surface Movement Radar, ADS; GPS, VHF antennae, ILS

UNIT 4: AIR TRAFFIC CONTROL

Different Air Traffic Control Units, Concept of Flight Information Region, Role of Flight Information Centre, five different Flight information region in India, Roles and responsibilities of Various air traffic control units- Ground control, Tower, Approach, Area control, Flight Plan briefing and filling, Flight Dispatch, ATC briefing

UNIT 5: IMPORTANT ORGANIZATIONS

Roles and Responsibility of International Air Transport Association (IATA), International Civil Aviation Organization (ICAO), Director General Civil Aviation (DGCA), Airport Authority of India (AAI)& its wings, Ministry of Civil Aviation, Bureau of Civil Aviation Security, Central Industrial Security Force. Important convention with these organization

FOR SELF STUDY

S. No	Topics	Web Links
1	Airport Marking Aids and Signs	https://www.faa.gov/air_traffic/publications/atpubs/a m_html/chap2_section_3.html
2	Air traffic control position	https://mediawiki.ivao.aero/index.php?title=Air traffi c_control_position
3	Important Aviation organization	https://www.civilaviation.gov.in/en/aboutus/orgsetup

REFERENCE BOOKS

1. ICAO Annex 14 Volume 1 Aerodrome Design and Operations
2. Civil Aviation Requirements Section-4, Aerodrome Standards & Air Traffic Services.
3. R.K. Bali Air Regulations.
4. Airport council international (Second Edition)

LEARNING OUTCOMES:

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Buildings & Installations		
1.1	Basic definitions and understanding of Terminals, Apron, Hangar, Taxiway, Runway, Fire Station, Airport Vehicles, Fuel depot	Explain the definitions of Terminals, Security, Apron, Hangar, Taxiway, Runway, Fire Station, Airport Vehicles, Fuel depot	K2
1.2	Regulations related to each of airport services	Identify the relevant air regulations related to a particular airport service	K3
1.3	Purpose hanger, apron, aircraft stand, taxiway and runway	Analyse the work done in a particular area in an airport	K4
II	Markings & Lightings		
2.1.0	Difference between markings, Lightings and Signboards	Distinguish the purpose of marking, lighting and signage	K4
2.1.1	Apron markings- movement area markings, stand lead in line, Apron edge marking, Aircraft stand identification marking, Taxiway centreline and edge marking & lighting, Runway marking & lighting	Interpret apron, Taxiway, Runway marling and lightings	K2
2.1.2	Declared distances	Identify the different declared distances	K3
2.1.3	PCN	Solve PCN calculations	K3
2.1.4	Lighting system, Aerodrome Beacon, Obstacle Lighting & Marking.	Distinguish different lights used in and around airport	K4
2.1.5	Location, Direction & Destination signboard.	Interpret the meaning of different sign board	K2
III	Facilities & Equipment's		
3.1.0	Basic understanding of Navigational facilities	Outline the purpose and uses of navigation facilities	K2
3.1.1	Basic radio principle	Explain the basic principle of radio aids	K2

3.1.2	Frequency used	Choose the appropriate Radio frequency	K5
3.1.3	introduction about various navigational equipment VOR, NDB/ADF, DME	Explain the functions of various Navigation Equipment's	K2
3.1.4	Basic radar principle	Summarize the basic Principle of RADAR	K2
3.1.5	Primary and secondary radar	List out the principle, advantages and disadvantages of primary and secondary RADAR	K4
3.1.6	SSR, Surface Movement Radar, ADS; GPS, VHF antennae, ILS	Make use of different Navigation Instrument for safe and efficient conduct of flight	K3
IV	Air Traffic Control		
4.1.0	Different Air Traffic Control Units	Compare the different air traffic control unit	K4
4.1.1	Concept of FIR	List out the boundaries and functions of FIR	K4
4.1.2	Role of FIC	Identify a particular FIC to obtain Information service	K3
4.1.3	Five different Flight information region in India	Identify a particular region comes under which FIR	K3
4.1.4	Roles and responsibilities of Various air traffic control units- Ground control, Tower, Approach, Area control	List out the roles and responsibilities of various ATC control unit	K3
4.1.5	Flight Plan briefing and filling	Built a fully filled flight plan	K3
4.1.6	Flight Dispatch	Explain the functions of flight Dispatch	K2
4.1.7	ATC briefing	Interpret ATC briefing	K2
V	Important Organizations		
5.1.0	Roles and Responsibility of International Air Transport Association (IATA)	List out the Roles and Responsibilities of IATA	K4
5.1.1	International Civil Aviation Organization (ICAO)	Explain the various functions of ICAO	K2
5.1.2	DGCA	Categorize the roles and functions of DGCA	K4

5.1.3	AAI and its wings	Explain the functions of AAI and its Units	K2
5.1.4	Ministry of Civil Aviation	Outline the functions of civil Aviation ministry	K2
5.1.5	BCAS	Analyse how security is maintained in Aviation	K4
5.1.6	CISF	Summarize the function of CISF under the guidance of BCAS	K2
5.1.7	Important convention with these organization	List out the important convention made by the important organization	K4

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	M	-	-	-	-	L	L	-	M	-	-	H
CO2	L	H	M	-	-	-	-	-	-	M	H	-	M
CO3	M	H	H	M	-	L	M	H	H	H	L	M	-
CO4	H	M	H	M	L	M	H	H	H	L	-	L	M
CO5	L	-	H	L	H	H	H	M	H	-	-	L	H
CO6	-	H	M	L	-	-	M	M	M	M	-	L	L

COURSE ASSESSMENT METHODS:

Direct
<ol style="list-style-type: none"> 1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
<ol style="list-style-type: none"> 1. course – end survey feed back

CORE II: FAMILIARIZATION OF AIRCRAFT

SEMESTER: I

CODE: U23AV102

TOTAL HOURS: 4

CREDITS: 4

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Understanding basic fluid mechanisms	K2	I
2	To understand the basic components of aircraft airframe	K2	II
3	To be familiar with aircraft controls	K4	III
4	To know the various purposes of landing gear	K2	III
5	Able to understand the basic working principles of aircraft engines. (piston)	K1	IV
6	Able to understand the basic working principles of aircraft engines. (piston)	K1	V

COURSE OBJECTIVE:

To know the various system and their utilization / involvement in a aircraft.

COURSE CONTENT:

UNIT1: UNDERSTANDING OF BASIC MECHANICS, THERMODYNAMICS AND FLUID MECHANICS

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, Heat Transfer, Specific Heat, Calorific values of fuels; Viscosity, Fluid Resistance, Specific Gravity, Absolute and relative humidity, 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 2: AIRFRAME & SYSTEMS

Types of Fuselages, Load transfer technique, Various Wing Structures- Rectangular, Elliptical, Swept back, Swept forward, Anhedral, Dihedral; Definition of Control Surfaces, Primary control surface, Secondary control Surface, Working Of Aileron, Elevator, Rudder, Flaperons; Airframe, fuel system, Cooling System

UNIT 3: LANDING GEAR, WHEEL BRAKES

Purpose of landing gear, Types of Landing Gear- Retractable and Non-Retractable landing gear, Tri cycle type, Tail Dragger Landing Gear, Main Landing Gears and different types of Shock Strut- Rigid struts, Spring Steel Struts, Bungee cords, Shock struts, oleo struts; Brake System.

UNIT 4: AIRCRAFT ENGINE (PISTON)

Basic understanding of Piston engine components: Crankcase, Crankshaft, Camshaft, Bearings, Connecting Rod, Piston, Piston Rings, Four-Stroke engine cycle, carburetor, Engine Handling, normally aspirated, Turbo charging, Supercharging.

UNIT5: AIRCRAFT ENGINE (JET)

Basic understanding of Jet engines, Propeller, Parts of Propeller, Difference between jet engine and piston engine, Types of Compressors: Axial, Centrifugal, Fuel injection, Types of Combustion Chambers, gas turbine engine.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Basic Mechanics, Thermodynamics and Fluid Mechanics	https://iubtgedu.org.com
2	Airframe & systems	https://www.aircraftsystemstech.com
3	Aircraft Engine	https://www.sciencedirect.com

Reference Books

1. Oxford – Aircraft General Knowledge 1(Airframe and systems)
2. Oxford – Aircraft General Knowledge 3(powerplant)
3. Aero plane Technical by Trevor Thom

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Understanding of Basic Mechanics, Thermodynamics and Fluid Mechanics		
1.1	Speed, Velocity	What is Speed, Velocity	K1
1.2	Newton's laws of motion	Explain Newton's laws of motion	K3
1.3	Centre of Mass Centre of Gravity	Comparisons of Centre of Mass Centre of Gravity	K2
1.4	Torque, Work, Energy, Power, Pressure, Stress, Elasticity of Material	Define	K1
1.5	Principle of the Gyroscope	Explain the working	K3
1.6	Laws of Thermodynamics	Define	K3
1.7	Heat Transfer, Specific Heat	What	K1
1.8	values of fuels; Viscosity, Fluid Resistance, Specific Gravity	What	K2
1.9	Pascal's law & its application	Hydraulic press, Hydraulic and Pneumatic system	K3
1.10	Bernoulli's Theorem	Explain	K3
1.11	Venturi's tube theory	Define	K2
1.12	Laminar and turbulent flow. Streamline,	Compare	K2
II	Airframe & systems		
2.1	Types of Fuselages	Load transfer technique in Fuselages	K1
2.2	Various Wing Structures	Rectangular, Elliptical, Swept back, Swept forward, Anhedral, Dihedral	K2
2.3	Control Surfaces	Primary control surface, Secondary control Surface	K1

2.4	Aileron, Elevator, Rudder	Working Of Aileron, Elevator, Rudder	K2
2.5	fuel system	What is Fuel system	K1
2.6	Cooling System	Define Cooling System	K1
III	Landing Gear, Wheel brakes		
3.1.0	Types of Landing Gear	Retractable and Non-Retractable landing gear	K2
3.1.1	landing gear	Purpose of landing gear	K1
3.1.2	Types of Landing Gear	Tri cycle type	K2
.1.3	Types of Landing Gear	Tail Dragger Landing Gear, Main Landing Gears	K4
3.1.4	Shock Strut	Define Shock Strut	K1
3.1.5	types of Shock Strut	Rigid struts, Spring Steel Struts	K2
3.1.6	Brake System	Define Brake System	K1
IV	Aircraft Engine (Piston)		
4.1.0	Basic Piston engine components:	Crankcase, Crankshaft, Camshaft, Bearings, Connecting Rod, Piston, Piston Rings	K2
4.1.1	Four-Stroke engine	Explain Four-Stroke engine	K4
4.1.2	Engine components	Define engine Handling	K4
	charging	Compare Turbo charging, Supercharging	K1
V	Aircraft Engine (Jet)		
5.1.0	Basic Jet engines	Propeller, Parts of Propeller	K2
5.1.1	Comparisons of Jet engines, piston engine	Difference between Jet engines, piston engine	K2
5.1.2	Types of Compressors	Compare Axial, Centrifugal	K2
5.1.3	Fuel injection	Define Fuel injection	K1

5.1.4	Types of Combustion Chambers	Types of Combustion Chambers	K2
5.1.5	gas turbine engine	What is gas turbine engine	K1

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	M	L	M	-	-	L	L	L	H	L	L	L
CO2	M	M	L	M	-	-	-	L	-	M	L	-	L
CO3	H	H	M	M	-	-	L	-	-	H	L	L	L
CO4	H	H	M	M	-	-	-	L	L	H	M	L	M
CO5	H	H	M	M	-	L	L	L	L	H	M	M	H
CO6	H	H	M	M	-	-	-	L	M	H	M	-	-

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1. course – end survey feed back

CORE III: INTRODUCTION TO AVIATION

SEMESTER: 1

CODE: U23AV103

TOTAL HOURS: 3

CREDITS: 3

COURSE OUTCOMES:

On Completion of this course, the student will be able to,

S. No	Course Outcomes	Level	Unit Covered
1	Outline the evaluation of aviation industry	K2	I
2	Categorize the organization responsible for safe operation of aircraft	K4	II
3	Compare the time zones & time difference between different parts of globe	K2	III
4	Inspect the aircraft before departure	K4	IV
5	Explain the procedures of aborted t/o	K2	V
6	List the functions of different emergency equipment's	K4	III

COURSE OBJECTIVE:

The aim of the course is to

- Study about the history of aviation and know about the World wars.
- Have good knowledge about the basics of aviation and parts of an aircraft.
- Learn about the different time zones, names of airports and cities with 3 letter codes.
- Inculcate the pre-flight procedures to be followed and basic knowledge in different checking procedures in the aircraft.
- Understand the diverse concepts like airline meals, kitchens, aborted take-off and emergency landings etc.

COURSE CONTENT:

UNIT: I – HISTORY OF AVIATION

Introduction – The Basics of Aviation - Early scientific theories – Lighter-than-air flights – Gliders – Airships the internal combustion engine - Heavier-than-Air flight – The world's first Airmail service – The first World War – The inter-war years — Other long-distance flight – The decline of the Airships – The second world war – The Prop jets – The Jet liners – The wide-bodied Jets.

UNIT: II – THE BASICS OF AVIATION

The theory of Flight – Parts of an Aircraft – General Aviation terms – Terms relating to flights and schedules – Government departments and Civil Aviation Organizations.

UNIT: III – PLANE TALK

Time – Midnight – Time zones – Daylight saving time – Indian Standard Time – Names of Airports and cities with 3-letter code.

UNIT: IV – PRE-FLIGHT PROCEDURE

On reaching the departure terminal — For crew layover flights – Pre-flight emergency equipment checks – Passenger address system check – Cockpit checks –.

UNIT: V – MISCELLANEOUS

Aborted take-off and emergency landings – Cabin chimes and overhead bin panel lights – Cockpit Voice Recorder (CVR) -and Flight Data Recorder (FDR) – Evacuation slide – Window Exits – Over wing Exits.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	HISTORY OF AVIATION	https://www.spartan.edu/news/history-of-aviation/#:~:text=The%20history%20of%20aviation%20dates,four%20pairs%20of%20glider%20wings.
2	THE BASICS OF AVIATION	https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/airplane_handbook/media/05_afh_ch3.pdf
3	PRE-FLIGHT PROCEDURE	https://www.firstflight.com/private-pilot-course/preflighting-the-aircraft/

REFERENCES:

- R.K. Bali- Air Regulation
- Oxford – Navigation
- Oxford – Aircraft general knowledge

SPECIFIC LEARNING OUTCOMES (SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Buildings & Installations		
1.1	Introduction	Recall the previous related chapter	K1
1.2	The Basics of Aviation	Interpret the basics of Aviation	K2
1.3	Early scientific theories	Analyse the early Aviation theories	K4
1.4	Lighter-than-air flights – Gliders – Airships	Outline the principles of lighter than air a/c Gliders & Airships	K2
1.5	internal combustion engine	Illustrate the Functions of Internal combustion Eng.	K2
1.6	world's first Airmail service	Make use of the concept laid by initial Aviators in Cargo handling	K3
1.7	The first World War	Summarize Aviation Innovations in Aviation during I st world war	K2
1.8	Other long-distance flight	Solve the problems faced by long dust flights	K3
1.9	The decline of the Airships	Explain the reason for the decline of airship	K2
1.10	The second world war	Summarise the innovations in Aviation during II nd world war	K2
1.11	The Prop jets	Explain the developments of prop jet engines	K2
1.12	The Jet liners	Analyse the growth of jet liners	K4
1.13	The wide-bodied Jets.	List out the pros & cons of wide-bodied jet	K4
II	The basics of Aviation		
2.1	The theory of flight	Recall the theory of Flight chapter	K1
2.2	Parts of an a/c	Categorize the parts of an a/c	K4
2.3	General Aviation Terms	List out the specific of an a/c	K4
2.4	Terms related to flights and schedule	Recall the terms related to flights & schedule	P1, K1
2.5	Government Department and aviation organisation	Pr the Government bodies	K5

III	Plane Talk		
3.1	Time Midnight, Time zones	Compare the time Difference between different time zones	K5
3.2	Day light saving time	Choose the working hours for day light savings	K5
3.3	Indian standard time	Compare the IST with UTC	K5
3.4	Name of Airports and cities with 3 letter codes	Compare the IST with UTC	K5
IV	Pre-flight procedures		
4.1	On reaching the dep terminal	List out the procedures for pre-flight departure	K4
4.2	For crew lay over flights	Discuss with crew related to the layover flights	K6
4.3	Pre-flight emergency equipment check	Organize & check the emergency equipment	K3
4.4	Passenger address system check	Analyse the quality of P.A. S	K4
4.5	Cockpit check	List out the checks to be carried cockpit pre-flight	K4
V	Miscellaneous		
5.1	Aborted T/O & emergency ldg	Explain the safes procedure for above T/O & energy leg	K2
5.2	Cabin chimes and overhead bin panel lights	Explain the meaning of diff. chimes & O/H lights in cabin	K2
5.3	Cockpit voice recorder & Flight Data Recorder	Inspect the functions of CVR & FDR	K4
5.4	Evacuation Slide	Summarize the working principle of Evacuation slide	K2
5.5	Window exits & over wing exits	Illustrate the energy evacuation through window exits & over wing exits	K2

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	-	M	-	L	-	-	L	L	M	L	L	M
CO2	M	L	M	L	-	-	L	L	L	L	L	-	M
CO3	H	M	-	M	-	-	L	L	L	M	M	-	L
CO4	M	M	M	M	-	-	L	L	L	L	L	L	L
CO5	M	-	L	-	L	M	M	M	M	L	M	L	M
CO6	H	H	L	H	L	L	M	L	L	M	M	M	H

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1. course – end survey feed back

Allied I INTRODUCTION TO PHYSICS

SEMESTER: 1

CODE: U23AV1Y1

TOTAL HOURS: 3

CREDITS: 2

CO1	Apply concept of vectors to understand concepts of Physics and solve problems
CO2	Appreciate different forces present in nature while learning about phenomena related to these different forces.
CO3	Quantify energy in different process and relate momentum, velocity and energy
CO4	Differentiate different types of motions they would encounter in various courses and understand their basis
CO5	Relate various properties of matter with their behaviour and connect them with different physical parameters involved.

UNIT I: MEASUREMENTS

Vectors, scalars –examples for scalars and vectors from physical quantities – addition, subtraction of vectors – resolution and resultant of vectors – units and dimensions– standard physics constants

UNIT II: FORCE

Different types of forces–gravitational, electrostatic, magnetic, electromagnetic, nuclear –mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces

UNIT III: ENERGY

Different forms of energy– conservation laws of momentum, energy – types of collisions –angular momentum– alternate energy sources–real life examples

UNIT IV: MOTION

Types of motion– linear, projectile, circular, angular, simple harmonic motions – satellite motion – banking of a curved roads – stream line and turbulent motions – wave motion – comparison of light and sound waves – free, forced, damped oscillations

UNIT V: SURFACE TENSION

Surface tension – shape of liquid drop – angle of contact – viscosity –lubricants – capillary flow – diffusion – real life examples– properties and types of materials in daily use- conductors, insulators – thermal and electric

TEXT BOOKS

1. D.S. Mathur, 2010, Elements of Properties of Matter, S.Chand and Co
2. Brijlal and N. Subrahmanyam, 2003, Properties of Matter, S.Chand and Co.

REFERENCEBOOKS

1. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition, S.Chand and Co.

WEB RESOURCES

<http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html>
<https://science.nasa.gov/ems/>
https://eesc.columbia.edu/courses/eesc/climate/lectures/radiation_hays/

SEC I: INTRODUCTION TO AVIATION

SEMESTER: 1

CODE: U23AV1E1

TOTAL HOURS: 2

CREDITS: 2

COURSE OUTCOMES:

On Completion of this course, the student will be able to,

S. No	Course Outcomes	Level	Unit Covered
1	Outline the evaluation of aviation industry	K2	I
2	Categorize the organization responsible for safe operation of aircraft	K4	II
3	Compare the time zones & time difference between different parts of globe	K2	III
4	Inspect the aircraft before departure	K4	IV
5	Explain the procedures of aborted t/o	K2	V
6	List the functions of different emergency equipment's	K4	III

COURSE OBJECTIVE:

The aim of the course is to

- Study about the history of aviation and know about the World wars.
- Have good knowledge about the basics of aviation and parts of an aircraft.
- Learn about the different time zones, names of airports and cities with 3 letter codes.
- Inculcate the pre-flight procedures to be followed and basic knowledge in different checking procedures in the aircraft.
- Understand the diverse concepts like airline meals, kitchens, aborted take-off and emergency landings etc.

COURSE CONTENT:

UNIT: I – HISTORY OF AVIATION

Introduction – The Basics of Aviation - Early scientific theories – Lighter-than-air flights – Gliders – Airships the internal combustion engine - Heavier-than-Air flight – The world's first Airmail service – The first World War – The inter-war years — Other long-distance flight – The decline of the Airships – The second world war – The Prop jets – The Jet liners – The wide-bodied Jets.

UNIT: II – THE BASICS OF AVIATION

The theory of Flight – Parts of an Aircraft – General Aviation terms – Terms relating to flights and schedules – Government departments and Civil Aviation Organizations.

UNIT: III – PLANE TALK

Time – Midnight – Time zones – Daylight saving time – Indian Standard Time – Names of Airports and cities with 3-letter code.

UNIT: IV – PRE-FLIGHT PROCEDURE

On reaching the departure terminal — For crew layover flights – Pre-flight emergency equipment checks – Passenger address system check – Cockpit checks –.

UNIT: V – MISCELLANEOUS

Aborted take-off and emergency landings – Cabin chimes and overhead bin panel lights – Cockpit Voice Recorder (CVR) -and Flight Data Recorder (FDR) – Evacuation slide – Window Exits – Over wing Exits.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	HISTORY OF AVIATION	https://www.spartan.edu/news/history-of-aviation/#:~:text=The%20history%20of%20aviation%20dates,four%20pairs%20of%20glider%20wings.
2	THE BASICS OF AVIATION	https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/airplane_handbook/media/05_afh_ch3.pdf
3	PRE-FLIGHT PROCEDURE	https://www.firstflight.com/private-pilot-course/preflighting-the-aircraft/

REFERENCES:

- R.K. Bali- Air Regulation
- Oxford – Navigation
- Oxford – Aircraft general knowledge

SPECIFIC LEARNING OUTCOMES (SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Buildings & Installations		
1.1	Introduction	Recall the previous related chapter	K1
1.2	The Basics of Aviation	Interpret the basics of Aviation	K2
1.3	Early scientific theories	Analyse the early Aviation theories	K4
1.4	Lighter-than-air flights – Gliders – Airships	Outline the principles of lighter than air a/c Gliders & Airships	K2
1.5	internal combustion engine	Illustrate the Functions of Internal combustion Eng.	K2
1.6	world's first Airmail service	Make use of the concept laid by initial Aviators in Cargo handling	K3
1.7	The first World War	Summarize Aviation Innovations in Aviation during I st world war	K2
1.8	Other long-distance flight	Solve the problems faced by long dust flights	K3
1.9	The decline of the Airships	Explain the reason for the decline of airship	K2
1.10	The second world war	Summarise the innovations in Aviation during II nd world war	K2
1.11	The Prop jets	Explain the developments of prop jet engines	K2
1.12	The Jet liners	Analyse the growth of jet liners	K4
1.13	The wide-bodied Jets.	List out the pros & cons of wide- bodied jet	K4

II			
The basics of Aviation			
2.1	The theory of flight	Recall the theory of Flight chapter	K1
2.2	Parts of an a/c	Categorize the parts of an a/c	K4
2.3	General Aviation Terms	List out the specific of an a/c	K4
2.4	Terms related to flights and schedule	Recall the terms related to flights & schedule	P1, K1
2.5	Government Department and aviation organisation	Pr the Government bodies	K5
III			
Plane Talk			
3.1	Time Midnight, Time zones	Compare the time Difference between different time zones	K5
3.2	Day light saving time	Choose the working hours for day light savings	K5
3.3	Indian standard time	Compare the IST with UTC	K5
3.4	Name of Airports and cities with 3 letter codes	Compare the IST with UTC	K5
IV			
Pre-flight procedures			
4.1	On reaching the dep terminal	List out the procedures for pre-flight departure	K4
4.2	For crew lay over flights	Discuss with crew related to the layover flights	K6
4.3	Pre-flight emergency equipment check	Organize & check the emergency equipment	K3
4.4	Passenger address system check	Analyse the quality of P.A. S	K4
4.5	Cockpit check	List out the checks to be carried cockpit pre-flight	K4
V			
Miscellaneous			
5.1	Aborted T/O & emergency ldg	Explain the safes procedure for above T/O & energy leg	K2
5.2	Cabin chimes and overhead bin panel lights	Explain the meaning of diff. chimes & O/H lights in cabin	K2
5.3	Cockpit voice recorder & Flight Data Recorder	Inspect the functions of CVR & FDR	K4
5.4	Evacuation Slide	Summarize the working principle of Evacuation slide	K2

5.5	Window exits & over wing exits	Illustrate the energy evacuation through window exits & over wing exits	K2
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MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	-	M	-	L	-	-	L	L	M	L	L	M
CO2	M	L	M	L	-	-	L	L	L	L	L	-	M
CO3	H	M	-	M	-	-	L	L	L	M	M	-	L
CO4	M	M	M	M	-	-	L	L	L	L	L	L	L
CO5	M	-	L	-	L	M	M	M	M	L	M	L	M
CO6	H	H	L	H	L	L	M	L	L	M	M	M	H

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
2. course – end survey feed back

ALLIED IV: BASIC ELECTRICITY AND AIRCRAFT ELECTRICAL SYSTEM

SEMESTER: I
TOTAL HOURS: 2

CODE: U23AV1N1
CREDITS: 2

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	To understand structure and distribution of electrical charges within atoms molecules ions compounds	K3	I
2	To understand about the behavior of charge in various states of matter i.e., solid liquid gas and vacuum	K2	II
3	To learn about the following terms their units and factors affecting them potential difference electromotive force conventional current flow electron flow	K4	III
4	To learn about the laws used for studying static charges	K3	IV
5	To learn about various laws and its application ohms law Kirchoff's voltage and current laws	K3	V
6	Calculation using the above laws to find resistance voltage and current	K5	V

COURSE OBJECTIVE:

To understand the theory concepts and working of ac and dc circuit.

COURSE CONTENT:

UNIT 1: STATIC ELECTRICITY AND CONDUCTION

Distribution of electrostatic charges; Unit of charge; Polarity of a charge; Electric Field of Static Charge; Electrostatic laws of attraction and repulsion- Coulomb's Law; Electrostatic induction; Conduction of electricity through Solid, liquid and gas.

UNIT 2: ELECTRICAL TERMINOLOGIES

The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, Power, Work, conventional current flow, electron flow, Sources of Electricity, Meters used for measurement; Direct Current and Alternating Current.

UNIT 3: RESISTANCE/RESISTOR

Ohm's law, Resistors in series and parallel; Calculation of total resistance using series, parallel and series parallel combinations; Conductance in series and parallel; Open and short circuits; Operation of Wheatstone Bridge. Fixed resistors, Variable resistors, stability, tolerance and limitations, methods of construction; Construction and operation of potentiometers and rheostats.

UNIT 4: DC CIRCUITS AND CIRCUIT PROTECTION

Electric circuit terminologies; 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; Electrical faults; Circuit protection devices.

UNIT 5: AC THEORIES AND AIRCRAFT ELECTRICAL SYSTEM

Capacitance; Inductance; Electromagnetic induction; 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, Single/3 phase principles.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Static Electricity and Conduction	https://stickmanphysics.com
2	Resistance/Resistor DC Circuits and Circuit Protection	https://ecstudiosystems.com
3	AC Theories and Aircraft Electrical System	https://aerotoolbox.com > electrical

REFERENCE BOOKS

1. Basic Electronics- BernadGrob
2. Electrical systems- BL Thereja
3. Oxford ATPL ground training series- Electrics

SPECIFIC LEARNING OUTCOMES (SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Static Electricity and Conduction		
1.1	electrostatic charges	Distribution of electrostatic charges	K3
1.2	Unit of charge	Define Polarity of a charge	K2
1.3	Electric Field	Define Electric Field of electronic charger	K3
1.4	Electrostatic laws	Electrostatic laws of attraction and repulsion	K3
1.5	Coulomb's Law	Explain Coulomb's Law	K3
1.6	Conduction of electricity	What Conduction of electricity through Solid	K1
II	Electrical Terminologies		
2.1	terms, their units	potential difference, electromotive force, voltage, current, resistance, conductance, charge, Power, Work,	K2
2.2	factors affecting	conventional current flow	K1
2.3	Sources of Electricity	Define Sources of Electricity	K2
2.4	Types of Current	Direct Current and Alternating Current.	K3
III	Resistance/Resistor		
3.1.0	Ohm's law	Define Ohm's law	K3
3.1.1	Resistors in series and parallel	Explain Resistors in series and parallel	K1
3.1.2	resistance	Calculation of total resistance using series	K4
3.1.3	Conductance	Conductance in series and parallel	K2
3.1.4	Open and short circuits	Define Open and short circuits	K1
3.1.5	operation of wheat shone bridge	Explain wheat shone bridge	K3

3.1.6	Types of rheostats.	Variable resistors, stability, tolerance and limitations	K2
3.1.7	Potentiometers and rheostats.	Construction and operation of potentiometers and rheostats.	K3
IV	DC Circuits and Circuit Protection³		
4.1.0	Electric circuit terminologies	Kirchhoff's Voltage and Current Laws	K3
4.1.1	Kirchhoff's Voltage and Current Laws	Calculations using the laws to find resistance and voltage	K4
4.1.2	internal resistance	Significance of the internal resistance of a supply	K1
	Circuit protection	Circuit protection; Electrical faults	K1
V	AC Theories and Aircraft Electrical System		
5.1.0	Capacitance; Inductance; Electromagnetic induction	Define Capacitance; Inductance; Electromagnetic induction	K1
5.1.1	Sinusoidal waveform	Define Sinusoidal waveform: phase, period, frequency, cycle	K1
5.1.2	Instantaneous, average, root mean square	Explain Instantaneous, average, root mean square	K2
5.1.3	peak, peak to peak current values and calculations	Explain peak, peak to peak current values and calculations	K2

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	L	M	M	M	-	-	-	-	-	L	M	-	L
CO2	L	L	H	L	-	L	-	-	L	L	M	-	L
CO3	M	M	H	M	-	L	L	-	M	H	M	M	M
CO4	-	L	M	L	-	L	-	-	L	L	M	L	-
CO5	M	M	M	M	-	-	-	L	L	L	L	L	-
CO6	M	L	L	L	-	-	-	-	-	-	M	H	-

COURSE ASSESSMENT METHODS

Direct
<p>1. Continuous Assessment Test I, II</p> <p>2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation</p> <p>3. End Semester Examination</p>
Indirect
<p>1. course – end survey feed back</p>

SEMESTER II

S. No	Course Title	Course Code
1.	Language II	U23TM2L2
2.	Poetry and Shakespeare	U23EG2L2
3.	Theory Of Flight (Aerodynamics)	U23AV204
4.	Radio Telephony	U23AV205
5.	Air Navigation	U23AV206
6	Aviation Calculation and Numerical	U23AV2Y2
7	Radio Telephony	U23AV2E2
8	Airline Passenger Handling	U23AV2S3

CORE IV: THEORY OF FLIGHT (AERODYNAMICS)

SEMESTER: II

CODE: U23AV204

TOTAL HOURS: 4

CREDITS: 4

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Basic understanding of airflow around the airframe	K1	I
2	To understand the aircraft flight controls	K3	II
3	To learn about aircraft stability and its controllability	K3	III
4	To learn about aircraft ability and dynamics	K4	IV
5	To learn about aircraft stability and dynamics	K4	IV
6	To understand basic knowledge of subsonic flight and supersonic	K1	V

COURSE OBJECTIVE:

Under The Principles of Flying Application at Theory Is Subsonic and Transonic Operation

COURSE CONTENT:

UNIT 1: AERODYNAMICS

Airflow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, up wash and downwash, vortices, stagnation; stagnation aerodynamic chord, aerodynamic center, center of pressure, stagnation point, profile (parasite) drag, induced drag, wash in and wash out, fineness ratio, wing shape and aspect ratio; Thrust, Weight, Aerodynamic Resultant; Generation of Lift and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall.

UNIT 2: AERODYNAMICS AND FLIGHT CONTROLS.

Operation and effect of:roll control: ailerons and spoilerspitch control: elevators, stabilators, variable incidence stabilizers and canards;yaw control, rudder limiters;Control using elevons, 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 anti-balance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels; Pressure measuring devices and systems

UNIT 3: THEORY OF FLIGHT

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 4: FLIGHT STABILITY AND DYNAMICS.

Definition of Stability, Different type of Stability- Static stability, Dynamic Stability, Positive, Neutral and Negative stability, Longitudinal, lateral, and directional stability, Explanation of Controllability, Relationship between stability and Controllability

UNIT 5: HIGH SPEED FLIGHT

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

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Aerodynamics & flight controls	https://en.wikipedia.org
2	Theory of flight	https://web.mit.edu
3	High speed flight	https://en.wikipedia.org

REFERENCE BOOKS

1. Oxford – Principles of flight
2. The professional pilot study guide 01series by mike burton

SPECIFIC LEARNING OUTCOMES (SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Aerodynamics		
1.1	Airflow around a body	Define Boundary layer, laminar and turbulent flow, free stream flow, relative airflow	K1
1.2	The terms	Define camber, chord mean aerodynamic chord, aerodynamic center	K4
1.3	pressure	centre of pressure, stagnation point, profile (parasite) drags, induced drag, wash in and wash out	K2
1.4	ratio	incenses ratio, wing shape and aspect ratio	K1
1.5	Aerodynamic Resultant	Thrust, Weight, Lift and Drag	K2
1.6	Lift and Drag	Lift coefficient, Drag coefficient, polar curve, stall Angle of Attack	K3
II	Aerodynamics and Flight Controls.		
2.1	Operation and effect	roll controlpitch controlyaw control	K2
2.2	Flight Controls	Working principal of elevons, rudder, elevators	K2
2.3	Effects of wing fences	Explain effects of wing fences, saw tooth leading edges	K2
2.4	Operation and effect of trim tabs	Define trim tabs, balance and anti-balance spring tabs, mass balance	K1
2.5	aerodynamic balance panels	Explain Pressure measuring devices and systems	K4
III	Theory of Flight		
3.1.0	lift, weight, thrust drag	Relationship between lift, weight, thrust and drag	K2
3.1.1	Glide ratio	Steady state flights, performance	K3

3.1.2	Theory of the turn	Explain Influence of load factor	K3
3.1.3	Influence of load factor	Stall, flight envelope and structural limitations;	K2
3.1.4	Lift.	What is Lift augmentation.	K1
IV	Flight Stability and Dynamics.		
4.1.0	Stability	Definition of Stability	K1
4.1.1	type of Stability	Static stability, Dynamic Stability	K2
4.1.2	types of Stability	Positive, Neutral and Negative stability, Longitudinal, lateral, and directional stability	K2
4.1.3	Controllability	Explain of Controllability	K3
4.1.4	stability and Controllability	Relationship between stability and Controllability	K2
V	High Speed Flight		
5.1.0	Speed of sound	Define Speed of sound	K3
5.1.1	Types of flight,	subsonic flight, transonic flight, supersonic flight	K2
5.1.2	Mach number	Define Mach number, critical Mach number	K1
5.1.3	compressibility effect	buffet, shock wave, aerodynamic heating	K1
5.1.4	Factors affecting	Factors affecting airflow in engine intakes of high-speed	K3
5.1.5	sweepback	Effects of sweepback on critical Mach number.	K2

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	L	M	-	-	-	-	L	-	-	-	L	-	-
CO2	M		H	-	H	-	L	-	-	M	-	-	-
CO3	L	L	-	L	-	-	-	L	-	M	L	-	-
CO4	L	-	L	-	-	L	-	L	L	-	L	-	-
CO5	M	L	-	L	-	-	-	-	L	L	L	M	-
CO6	L	L	L	-	-	-	-	-	L	L	L	-	-

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1. course – end survey feed back

CORE V: RADIO TELEPHONY (THEORY)

SEMESTER: II

CODE: U23AV205

TOTAL HOURS:4

CREDITS: 4

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Explain the duties of different bodies in aviation and the rules made by them.	K2	I
2	Outlines the modes of radio propagation and its application.	K2	II
3	Interprets the appropriate phraseology as per the situations.	K5	III
4	Assess the pressure value and appropriate solves the Q – codes problems associated with Px difference	K5	IV
5	Analyze basic commercial between aircrafts ATC & Aircraft	K4	V
6	Gain the knowledge about ATC to aircraft cockpit radio communication.	K4	V

COURSE OBJECTIVE:

Understand Various Aviation Terminologies Standard Universal Communication Procedures Followed by Different Department of Aviation.

CONTENT:

UNIT 1: REGULATIONS

Duties of International Telecommunication Union (ITU), International Civil Aviation Organization (ICAO), Airport Authority of India (AAI), Wireless Planning and Coordinating Wing (WPC), ICAO Annexure, Spelling of Alphabets and Transmission of numerical, Aircraft Identification, Location Indicators, Flight Information Regions (FIR), Identification of Ground Services.

UNIT 2: RADIO PROPAGATION

- Relationship between wavelength, frequency and speed of light
- Frequency bands and ranges
- Ionosphere layers during day and night
- Mode of Propagation MF, HF and VHF & above
- Operation of Geostationary Satellites
- Operation of Polar orbiting Satellites
- Skip Distance
- Choice of Frequencies during Day & Night

UNIT 3: PHRASEOLOGY

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

- Distress
- Distress Relay
- Direction Finding
- Flight Safety
- Metrological Information
- Flight regulatory

UNIT 4: 'Q' CODES

'Q' Codes used in Aeronautical Communication Services, Basic Understanding of atmospheric pressure, QNH, QFE, QFF, QNE, Understanding difference between Height, Elevation, Altitude and Flight Level, QDR, QDM, QUJ, QTE, Relative bearing, Radial, Magnetic Heading, Compass Heading, True Heading, Variation & Deviation

UNIT 5: COMMUNICATION

Introduction to radio call format, Radio strength check call, Startup clearance and pushback clearance call, Taxi clearance call, ATC clearance call.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Regulations ICAO, AAI, WPC ICAO	https://www.aai.aero
2	Phraseology	https://www.phraseexpress.com
3	'Q' Codes, Communication	https://en.wikipedia.org

REFERENCE BOOKS

1. Radio telephony, K.D. Tuli
2. Radio telephony manual by R.K. Bali
3. Air Regulation by R.K Bali

SPECIFIC LEARNING OUTCOMES (SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Regulations		
1.1	Duties of ITU	Analysis's duties of ITU	K4
1.2	ICAO	Develops and understanding of their rules & regulation	K3
1.3	AAI	Develops and understanding of their rules & regulation	K3
1.4	WPC	Develops and understanding of their rules & regulation	K3
1.5	ICAO annexure	Classifies contents of difference annexure	K2
1.6	Spelling of alphabets & transmission of numerical	Demonstrates the pronunciation of alphabet & numerical	K2
1.7	Aircraft ident	Interprets basic ident	K2
1.8	Location indicators	Interprets basic ident	K2
1.9	FIR	Analyses difference FIR & ground services	K4
1.10	Identification of ground services	Analyses difference FIR & ground services	K4
II	Radio Propagation		
2.1	wavelength, frequency and speed of light	Analyses the relationship between wavelength, frequency, & speed of light	K4
2.2	Frequency bands and ranges	Compares the bonds & ranges	K2
2.3	Ionosphere layers	Explains the ionosphere layer during day & night	K2

2.4	Mode of Propagation	Compares MF, HF, VHF & above	K4
2.5	Operation of Geostationary Satellites	Analyses the OPS of geostationary	K4
2.6	Polar orbiting Satellites	Analyses the OPS of polar	K4
2.7	Skip Distance	Explain about skip distance	K2
2.8	Frequencies during Day & Night	Summarizes about the frequency used at night	K2
III	Phraseology		
3.1.0	Phraseology abbreviations	Choose appropriate phrases	K3
3.1.1	Aeronautical Communication Services.	Outlines the type of call to be given during emergency	K2
3.1.2	Distress Distress Relay	Explains about type of commercial during RCF unable for each ATC	K2
3.1.3	Direction Finding	Identifies the methods of direction finding from station	K2
3.1.4	Flight Safety	Examines the safety on board	K4
3.1.5	Metrological Information	Analyses met condition	K4
3.1.6	Flight regulatory	Develops basic regulation & rules of fit	K3
IV	'Q' Codes		
4.1.0	Q- Codes	Illustrates the difference types of Q codes	K2
4.1.1	atmospheric pressure	Understanding of atmospheric pressure	K2
4.1.2	Height, Elevation, Flight Level, Altitude	Classifies the difference between Altitude Elevation, Height, Flight Level	K4
4.1.3	QDR, QDM, QUJ, QTE	Classifies the variation of QDR, QDM, QUJ, QTE	K4

4.1.4	Relative bearing, Radial, Magnetic Heading, Compass Heading, True Heading, Variation & Deviation	What the Relative bearing, Radial, Magnetic Heading, Compass Heading, True Heading, Variation & Deviation	K3
V	Communication		
5.1.0	Intro to radio call format	Explains basic RT	K2
5.1.1	Radio strength check	Demonstrates how to check quality of call	K3
5.1.2	S/UP clearance	Outlines the type of call for S/U & pushback based on aircraft cat	K2
5.1.3	P/B clearance	Outlines the type of call for S/U & pushback based on aircraft cat	K2
5.1.4	Taxi clearance	Explains RT call	K2
5.1.5	ATC clearance	Explains RT call	K2

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M		H	L	M	L	-	-	-	-	-	L	M
CO2	M	L	L	L	L	L	L	-	-	L	-	-	L
CO3	-	-	-	-	L	M	M	-	-	-	L	L	-
CO4	M	M	M	M	-	-	-	-	-	M	L	L	-
CO5	M	L	M	L	L	M	M	M	M	L	-	L	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-

COURSEASSESSMENTMETHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1. course – end survey feed back

CORE VI: AIR NAVIGATION

SEMESTER: II

CODE: U23AV206

TOTAL HOURS: 3

CREDITS: 3

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Explain various terms of imagination line over globe	K2	I
2	Solve the problem related to speed conversion	K4	II
3	Explain the different measurement of airspeed	K3	II
4	explain the triangle of velocity	K4	III
5	Select a particular chart for a particular region	K2	IV
6	Choose the efficient fuel and detail at the navigation emergency data	K2	V

COURSE OBJECTIVE:

To gain the knowledge about the art of navigation an aircraft from any given points understands the geographical positions their relation and effects in navigation

COURSE CONTENT:

UNIT 1: THE EARTH

The cardinal Points, The Earth Graticule, Great Circles, Rhumb Line, 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, Isogonal, Agonal, Magnetic Direction, Compass Direction and Deviation, Convergence angle, Convergency, Grid Direction and Grivation, Isogrivs.

UNIT 2: SPEED CONVERSIONS

Statute Mile, Nautical Mile, Kilometer, Conversion between Units, Departure, Meters 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, Speed, Distance and Time; Relationships and Calculations.

UNIT 3: TRIANGLE OF VELOCITIES

The Three basic velocity vectors- Drift- The Basic Vector Triangle Problems, Introduction to Flight Computer, 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. Top Of Climb (TOC), Top Of descent (TOD), Track Error, Track, Tack Made Good (TMG), Aircraft Air Velocity, Aircraft Ground Velocity.

UNIT 4: MAPS AND CHARTS

Definition and differences about Maps and Charts, Types of charts on the basis of placement of paper and placement of light in reduced earth, Different types of projection, Mercator projection, Lambert Conical, Polar stereographic projection, Orthomorphism, Scale, Representation of Scale factor, The Reduced Earth, Topographical Maps

UNIT 5: FUEL AND NAVIGATIONAL EMERGENCY DATA

Different Units of Measurements, Liters, Imperial Gallons and US Gallons, Conversion factors, specific gravity, fuel flow and fuel consumption, Endurance, Still Air Range (SAR), Fuel economy, selecting the most economical cruising level, Payload

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Latitudes and longitudes	https://www.techtarget.com/whatis/definition/latitude-and-longitude
2	Different measurements at airspeed	https://commons.erau.edu/cgi/viewcontent.cgi?article=1178&context=bollinger-rosado
3	Comparison between different chart & maps and its properties	http://www.differencebetween.net/miscellaneous/geography-miscellaneous/difference-between-maps-and-charts/

REFERENCE BOOKS

1. Air Navigation by R.K. Bali
2. Oxford – Navigation 1(General Navigation)

SPECIFIC LEARNING OUTCOMES (SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	The Earth		
1.1	Cardinal points	List out the cardinal directions	K4
1.2	The earth graticule	Illustrate graticule	K2
1.3	Great circle	Explain great circle	K2
1.4	Meridian & anti-meridian	Classify meridian and anti-meridian	K4
1.5	Small circle	Define small circle	K1
1.6	Great direction	Classification Great direction	K2
1.7	Grivation,	Classification Grivation,	K1
1.8	Isogrivs.	Classification Isogrivs.	K1
II	Speed Conversions		
2.1	Statute mile	Define statute mile	K1
2.2	Nautical mile	Define nautical mile	K1
2.3	Kilometer	Recall the definition of kilometer	K1
2.4	Conversion between units	Solve the problem of unit conversion	K6
2.5	Departure	Define departure	K1
2.6	Basic principle of semi circular rule	Outline the principle of semi circular rule	K2
2.7	IAS, TAS, EAS, Ground Speed, Mach. No, CAS	Explain the different methods of measurement of air speed	K2
2.8	Corrected outside air temperature	Explain the purpose of measuring outside air temperature	K2
2.9	Conversion of RAS to TAS, Mach to TAS	Solve the air speed conversion	K6
2.10	Speed, Distance, Time, Relationship & calculation	Compare the relationship between speed, distance and time	K2
III	Triangle of Velocities		

3.1.0	Three basic velocity vectors-	Define Three basic velocity vectors	K2
3.1.1	Vector Triangle	Solve Vector Triangle	K4
3.1.2	Introduction to Flight Computer	Explain Introduction to Flight Computer	K2
3.1.3	Navigation Computer	Explain Geometrical Solution and Solutions on the Navigation Computer,	K2
3.1.4	wind Velocity	Finding the wind Velocity at a turning point	K2
3.1.5	Head and Crosswind	Find the Head and Crosswind on a Runway	K1
3.1.6	TOC, TOD, TMG Aircraft Air Velocity	Explain Aircraft Air Velocity	K1
IV	Maps and Charts		
4.1.0	Mercator projection	Elaborate Mercator projection	K4
4.1.1	Lambert's conical	Explain the places where LCC can be used	K2
4.1.2	Polar stereographic	Choose the appropriate chart for appropriate area	K4
	Orthomorphisms scale	Explain orthomorphisms scale	K2
	Reduced earth	Construct reduced earth	K4
	Topographical maps	Explain topographical maps	K2
V	Fuel and Navigational Emergency Data		
5.1.0	Imperial and US gallons	Distinguish between Imperial and US gallons	K4
5.1.1	Conversion factor	Solve the problems related to unit conversion	K4
5.1.2	Specific gravity	Explain specific gravity	K2
5.1.3	Fuel flow and fuel consumption	Compare flow of fuel and consumption of fuel	K4
5.1.4	Select the most economical cruising level	Choose the economical cruising level	K4
5.1.5	Payload	Explain Payload	K2
	Imperial and US gallons	Distinguish between Imperial and US gallons	K4

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	L	-	L	L	-	-	-	-	-	-	L	-	L
CO2	M	L	L	L	-	-	L	-	-	-	-	L	L
CO3	M	M	-	M	-	-	-	-	-	-	-	-	-
CO4	L	M	-	M	-	-	-	-	-	-	-	L	-
CO5	M	M	M	M	-	-	M	L	L-	-	M	L	M
CO6	M	L	L	L	-	-	L	L	L	-	-	-	L

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1. Course – end survey feed back

ALLIED II: AVIATION CALCULATION AND NUMERICALS

SEMESTER: II
TOTAL HOURS: 3

CODE: U23AV2Y2
CREDITS: 2

COURSE OUTCOMES:

On Completion of this course, the student will be able to,

T. No	Course Outcomes	Level	Unit Covered
1	Construct and analyzing graphs of Trigonometric functions and their inverse	K4	I
2	Distinguish the different metric units and understand how to convert from one metric unit to another	K2	II
3	Demonstrate the ability to use the Compass rose to indicate directions, create and use map symbols	K2	III
4	Basic understanding of calculating speed, distance, time, Rate of climb (ROC), Rate of descent (ROD)	K4	IV
5	Explanation about fuel and Time management	K3	V
6	Develop a basic fuel management to track all aspects of fuel consumption	K1	V

COURSE OBJECTIVE:

To understand the importance of various calculation and the implementation of the same in aviation industry.

COURSE CONTENT:

Unit 1: Linear Algebra

9 Hours

Rank of a Matrix- Simultaneous linear equations - Consistency of a system of linear equations- Cayley Hamilton Theorem – Eigen values and Eigen vectors – Diagonalization of a real symmetric matrix by orthogonal transformation

Unit 2: Applications of Differential Calculus

9 Hours

Curvature – Cartesian and polar co-ordinates – Radius of curvature – Circle of curvature – Evolutes – Envelopes - Evolute as envelope of normals

Unit 3: Functions of Several Variables

9 Hours

Partial derivatives – Total derivatives - Higher order partial derivatives- Euler's theorem for homogenous functions – Taylor's expansion – Jacobians – Maxima and Minima – Constrained maxima and minima by Lagrangian multiplier method

Unit 4: Multiple Integrals

9 Hours

Double integration – Cartesian and polar coordinates – change of order of integration – change of variables between Cartesian and Polar – Area as double integral – Triple integration in Cartesian, Cylindrical and Spherical polar coordinates – Volume as triple integral

Unit 5: Vector Calculus

9 Hours

Gradient- Directional derivative- Divergence and Curl — Irrotational and Solenoidal vectors – Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proof) – Simple applications

TOPICS FOR SELF STUDY:

S. No	Topics	Web Links
1	Study about Algebraic equation	https://en.m.wikipedia.org/wiki/Algebraic_equation
2	Study about CDMVT and wind corrections	https://youtu.be/-Hlx7i5eEwQ
3	Study about importance of fuel cost index in aviation	https://youtu.be/6GBf1keuwhY

REFERENCE BOOKS:

Text Book(s):

1. Arumugam, S., Thangapandi Isaac, A., Somasundaram, A., Mathematics for Engineers, Scitech Publications (India) Pvt. Ltd., 2008.
2. Grewal, B.S., Grewal, J.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 42nd Edition., 2012

Reference(s):

1. Kreyszig, E, Advanced Engineering Mathematics, John Wiley and Sons (Asia) Limited, Singapore, 10th Edn., 2001.
2. Venkataraman, M. K., Engineering Mathematics, First Year, The National Publishing Company, Chennai, 2nd Edition., Reprint 2001

LEARNING OUTCOMES:

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Basic Trigonometry & Pythagoras theorem		

1.1	Trigonometric Ratios	To find the measure of an angle of a right triangle	K2
1.2	Pythagoras theorem	Learn to use the Pythagoras Theorem to identify right triangles.	K2
1.3	BODMAS Rule	How to break down a calculation using the order of operations	K3
1.4	Algebra calculation	Be able to read and write expressions, and to be skilled in computations and manipulations of algebraic expressions	K5
1.5	Percentage calculation	Convert the percentage into a decimal. convert the percentage into a fraction	K4
II	Conversions		
2.1	Conversions between units	Identify the metric system, Know the basic prefixes associated with metric units and understand how to convert from one metric unit to another	K4
2.2	Basic definitions of Kilometre, Statute mile, Nautical Mile, feet, metre and conversion between each other	Understand the basic units for distance calculations and how to convert the units	K5
2.3	Temperature Conversions and its importance in aviation	Definition of different types of Temperature Measurement	K3
2.4	Conversion of Kelvin to Celsius, Celsius to Kelvin, Fahrenheit to Celsius	Calculations of Temperature Conversions from one unit to another	K2
III	Compass		
3.1	Basic understanding of Compass it's working Principle	Explained the Compass and its working in detail	K3
3.2	Basic understanding about magnetism	Basic law of magnetism	K2
3.3	Earth magnetism	Understand the earth magnetic field determine the location of a magnet's poles.	K2
3.4	Understanding Compass errors	How Compass errors affect the Compass readings and make difference for flying aircraft	K1
3.5	Variation and deviation	Define and calculate the Compass Errors	K2

3.6	Calculating Aircraft direction	Understand the directions and bearing	K1
3.7	Relative heading	Calculations for finding Aircraft Relative bearing in relation to station	K4
3.8	True Heading magnetic heading, compass heading	Different types of Norths and Calculation of their respective headings	K1
IV	Relative Motion and Vertical Speed		
4.1	Calculation of Speed in relation to speed, distance, time	Basic calculations of speed, distance and time	K6
4.2	Calculating Estimated Time of Arrival (ETA), Estimated Time of Departure (ETD), Estimated Elapsed Time (EET)	Understanding the Calculations of Estimated Time for different phases of Flight	K3
4.3	Calculating Endurance and Still Air Range (SAR)	Basic calculations of time and range	K3
4.4	Calculation of Rate of Climb (ROC)	Analyse the fastest and steepest climbing Rate	K3
4.5	Calculation of Rate of descent (ROD)	Calculate at what rate aircraft can descent with time	K3
4.6	Selection of Altitude according to the flight path	Understanding optimal cruising altitude range that is the best trade-off of speed and fuel efficiency	K3
4.7	Top Of Climb (TOC) & Top of Descent (TOD)	Calculations of TOC & TOD	K3
V	Time Calculation and Fuel Calculation		
5.1	Understanding Coordinated Universal Time (UTC)	Basic time standard used in aviation	K3
5.2	Definition of Longitude, latitude, meridians, Standard meridian	Understanding the geographic coordinate system of earth spheroid	K6

5.3	Rhumb lines	To compare the lengths of different paths connecting two points on the Earth's surface.	K6
5.4	Difference in longitude and Difference in latitude	Calculate the Dlat and DeLong of different positions	K6
5.5	Calculating IST and LMT from GMT	Conversions of different time zones	K6
5.6	Selection of alternate aerodrome	Importance of Alternate aerodrome	K3
5.7	Different alternate, Take off alternate, Enroute Alternate, Destination Alternate, Fuel calculation for the flight plan	Fuel calculations for different phases of Flight path	K5
5.8	Minimum fuel requirement and payload	Detailed information of payload	K6

MAPPING:

	PROGRAMMEOUTCOMES									PROGRAMMESPECIFICOUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	L	L	-	-	-	-	-	-	-	-	-	H	-
CO2	L	M	L	L	-	-	-	-	-	-	-	M	-
CO3	M	H	M	M	L	L	L	-	-	H	-	L	-
CO4	L	-	-	L	-	-	L	-	-	-	-	L	L
CO5	H	L	-	L	-	L	L	L	M	-	L	M	-
CO6	M	L	-	-	-	-	-	L	-	-	-	M	-

COURSE ASSESSMENT METHODS:

Direct

1. Continuous Assessment Test I, II

2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation

3. End Semester Examination

Indirect

1. course – end survey feed back

SEC II : RADIO TELEPHONY (THEORY)

SEMESTER: II

CODE: U23AV2E2

TOTAL HOURS: 2

CREDITS: 2

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Explain the duties of different bodies in aviation and the rules made by them.	K2	I
2	Outlines the modes of radio propagation and its application.	K2	II
3	Interprets the appropriate phraseology as per the situations.	K5	III
4	Assess the pressure value and appropriate solves the Q – codes problems associated with Px difference	K5	IV
5	Analyze basic commercial between aircrafts ATC & Aircraft	K4	V
6	Gain the knowledge about ATC to aircraft cockpit radio communication.	K4	V

COURSE OBJECTIVE:

Understand Various Aviation Terminologies Standard Universal Communication Procedures Followed by Different Department of Aviation.

CONTENT:

UNIT 1: REGULATIONS

Duties of International Telecommunication Union (ITU), International Civil Aviation Organization (ICAO), Airport Authority of India (AAI), Wireless Planning and Coordinating Wing (WPC), ICAO Annexure, Spelling of Alphabets and Transmission of numerical, Aircraft Identification, Location Indicators, Flight Information Regions (FIR), Identification of Ground Services.

UNIT 2: RADIO PROPAGATION

- Relationship between wavelength, frequency and speed of light
- Frequency bands and ranges
- Ionosphere layers during day and night
- Mode of Propagation MF, HF and VHF & above

- Operation of Geostationary Satellites
- Operation of Polar orbiting Satellites
- Skip Distance
- Choice of Frequencies during Day & Night

UNIT 3: PHRASEOLOGY

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

- Distress
- Distress Relay
- Direction Finding
- Flight Safety
- Metrological Information
- Flight regulatory

UNIT 4: ‘Q’ CODES

Q’ Codes used in Aeronautical Communication Services, Basic Understanding of atmospheric pressure, QNH, QFE, QFF, QNE, Understanding difference between Height, Elevation, Altitude and Flight Level, QDR, QDM, QUJ, QTE, Relative bearing, Radial, Magnetic Heading, Compass Heading, True Heading, Variation & Deviation

UNIT 5: COMMUNICATION

Introduction to radio call format, Radio strength check call, Startup clearance and pushback clearance call, Taxi clearance call, ATC clearance call.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Regulations ICAO, AAI, WPC ICAO	https://www.aai.aero
2	Phraseology	https://www.phraseexpress.com
3	‘Q’ Codes, Communication	https://en.wikipedia.org

REFERENCE BOOKS

4. Radio telephony, K.D. Tuli
5. Radio telephony manual by R.K. Bali
6. Air Regulation by R.K Bali

SPECIFIC LEARNING OUTCOMES (SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Regulations		
1.1	Duties of ITU	Analysis's duties of ITU	K4
1.2	ICAO	Develops and understanding of their rules & regulation	K3
1.3	AAI	Develops and understanding of their rules & regulation	K3
1.4	WPC	Develops and understanding of their rules & regulation	K3
1.5	ICAO annexure	Classifies contents of difference annexure	K2
1.6	Spelling of alphabets & transmission of numerical	Demonstrates the pronunciation of alphabet & numerical	K2
1.7	Aircraft ident	Interprets basic ident	K2
1.8	Location indicators	Interprets basic ident	K2
1.9	FIR	Analyses difference FIR & ground services	K4
1.10	Identification of ground services	Analyses difference FIR & ground services	K4
II	Radio Propagation		
2.1	wavelength, frequency and speed of light	Analyses the relationship between wavelength, frequency, & speed of light	K4
2.2	Frequency bands and ranges	Compares the bonds & ranges	K2
2.3	Ionosphere layers	Explains the ionosphere layer during day & night	K2
2.4	Mode of Propagation	Compares MF, HF, VHF & above	K4
2.5	Operation of Geostationary Satellites	Analyses the OPS of geostationary	K4
2.6	Polar orbiting Satellites	Analyses the OPS of polar	K4
2.7	Skip Distance	Explain about skip distance	K2
2.8	Frequencies during Day & Night	Summarizes about the frequency used at night	K2

III	Phraseology		
3.1.0	Phraseology abbreviations	Choose appropriate phrases	K3
3.1.1	Aeronautical Communication Services.	Outlines the type of call to be given during emergency	K2
3.1.2	Distress Distress Relay	Explains about type of commercial during RCF unable for each ATC	K2
3.1.3	Direction Finding	Identifies the methods of direction finding from station	K2
3.1.4	Flight Safety	Examines the safety on board	K4
3.1.5	Metrological Information	Analyses met condition	K4
3.1.6	Flight regulatory	Develops basic regulation & rules of fit	K3
IV	‘Q’ Codes		
4.1.0	Q- Codes	Illustrates the difference types of Q codes	K2
4.1.1	atmospheric pressure	Understanding of atmospheric pressure	K2
4.1.2	Height, Elevation, Flight Level, Altitude	Classifies the difference between Altitude Elevation, Height, Flight Level	K4
4.1.3	QDR, QDM, QUJ, QTE	Classifies the variation of QDR, QDM, QUJ, QTE	K4
4.1.4	Relative bearing, Radial, Magnetic Heading, Compass Heading, True Heading, Variation & Deviation	What the Relative bearing, Radial, Magnetic Heading, Compass Heading, True Heading, Variation & Deviation	K3
V	Communication		
5.1.0	Intro to radio call format	Explains basic RT	K2
5.1.1	Radio strength check	Demonstrates how to check quality of call	K3

5.1.2	S/UP clearance	Outlines the type of call for S/U & pushback based on aircraft cat	K2
5.1.3	P/B clearance	Outlines the type of call for S/U & pushback based on aircraft cat	K2
5.1.4	Taxi clearance	Explains RT call	K2
5.1.5	ATC clearance	Explains RT call	K2

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M		H	L	M	L	-	-	-	-	-	L	M
CO2	M	L	L	L	L	L	L	-	-	L	-	-	L
CO3	-	-	-	-	L	M	M	-	-	-	L	L	-
CO4	M	M	M	M	-	-	-	-	-	M	L	L	-
CO5	M	L	M	L	L	M	M	M	M	L	-	L	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1. course – end survey feed back

SEC III: AIRLINE PASSENGER HANDLING

SEMESTER: II

CODE: U23AV2S3

TOTAL HOURS: 2

CREDITS: 2

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Gain relevant knowledge and understanding in passenger handling and requirement	K1	I
2	Familiarize with check in procedure in airport carry the process in handling the baggage ticketing monitor track illegal immigration in order to promote security	K2	II
3	To gain the relevant knowledge of the situation handling in crew and passenger	K2	III
4	To gain the knowledge of situation handling in regulatory and procedure in emergency situation	K4	III
5	To gain the relevant knowledge and understanding of the crew person such as cabin and cockpit crew to get better understanding between crew through communication	K4	IV
6	Manage irregular operation and passenger required special handling	K2	V

COURSE OBJECTIVE:

The aim of course is to:

Gain relevant knowledge understanding and practical skills for passenger handling standards and requirement

Provide information of the passenger handling standards and requirement

Help standards gain compliance with current requirement and recommendation

Familiarize with check in gate and arrival service procedures

Manage irregular operation and passengers requiring special handling

COURSE CONTENT:

UNIT 1: ROLES OF CSA

Passenger reception at check in desk – luggage at ticket checks in – delay and irregularity management – airline services management – passenger boarding and disembark at the gate – management of passenger with difficulty – escort service for unaccompanied minors.

UNIT 2 : CHECK IN PROCEDURE, BAGGAGE AND TICKETING

Why passenger has to check in? – where to check in? – passenger identity registration – baggage registration – seating arrangements - Responsibilities & duties of ticketing officer – how does ticketing work? – checking baggage inside airport – baggage sorting

oversize baggage - Understanding of immigration – purpose of immigration – laws and ethics – impact of undocumented immigrants – impact on the sending countries

UNIT 3: SITUATION HANDLING

Comprehend the probability and severity of emergency situations - take action to deal with emergencies, incidents or accidents in line with the organization's procedures and regulatory

guidelines - consider the needs of others when taking action - get help from the appropriate sources in situation that are outside your own authority or ability - document all actions taken to mitigate risks/emergencies in line with organization procedures and regulatory guidelines

UNIT 4 : MULTI CREW COORDINATION (MCC)

Enhance the level of assistance offered to colleagues - meet all reasonable requests for assistance within acceptable workplace timeframes - seek assistance when difficulties arise - use questioning techniques to clarify instructions or responsibilities - identify and display a non-discriminatory attitude in all contacts with customers and other staff members.

UNIT 5: PERSONALITY DEVELOPMENT

Communication – confidence – leadership – group discussion – presentation – personal hygiene and grooming – hair and skin care – motivation – interview techniques – resume writing

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Airport CSA	⁶⁹ https://www.collegedekho.com

2	Check In Procedure Multi Crew Coordination	https://www.cae.com
3	Personality Development	https://www.artofliving.org

REFERENCE BOOKS

- A Practical Guide to Airline Customer Service: From Airline Operations to Passenger Services by Collin c Law.
- ICAO annex 9

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	ROLES OF CSA		
1.1	Passenger reception	Define check in desk – luggage at ticket checks	K1
1.2	Passenger management	Aircraft delay and irregularity management	K2
1.3	airline services management	Define airline services management	K1
1.4	Passenger management	passenger boarding and disembark at the gate and passenger difficulty	K3
1.5	escort service	escort service for unaccompanied minors.	K1
II	CHECK IN PROCEDURE, BAGGAGE AND TICKETING		
2.1	CHECK IN PROCEDURE	Why passenger has to check in	K1
2.2	Passenger identity	What is passenger identity registration baggage registration	K1
2.3	Responsibilities & duties of ticketing officer	Define Responsibilities & duties of ticketing officer	K2
2.4	Baggage details	Explain ticketing checking baggage inside airport baggage sorting over size baggage	K3
2.5	Understanding of immigration	purpose of immigration – laws and ethics	K3
2.6	Understanding	impact of undocumented immigrants	K2
2.7	Impact on the sending countries.	Define Impact on the sending countries.	K2
III	SITUATION HANDLING		

3.1.0	Comprehend the probability	Comprehend the probability and severity of emergency situations	K1
3.1.1	Emergency & guide lines	take action to deal with emergencies, incidents or accidents in line with the organization's procedures and regulatory	K3
3.1.2	Action plan	consider the needs of others when taking action	K2
3.1.3	sources in situation	How to get help from the appropriate sources in situation	K1
3.1.4	Document emergencies and guidelines	actions taken to mitigate risks/emergencies in line with organization procedures and regulatory guidelines	K2
IV	MULTI CREW COORDINATION (MCC)		
4.1.0	the level of assistance offered to colleagues	Enhance the level of assistance offered to colleagues	K1
4.1.1	reasonable acceptable	meet all reasonable requests for assistance within acceptable workplace timeframes -	K2
4.1.2	instructions or responsibilities	use questioning techniques to clarify instructions or responsibilities	K2
4.1.3	identify and display	identify and display a non-discriminatory attitude in all contacts with customers and other staff members	K4
V	PERSONALITY DEVELOPMENT		
5.1.0	Personality Development	How to Communication who must confidence level	K1
5.1.1	leadership	explain leadership quality	K3
5.1.2	presentation	How to presentation your self	K4
5.1.3	personal things	Define personal hygiene and grooming – hair and skin care	K2
5.1.4	Personal motivation	How to motivate your self and prepare for – interview techniques – resume writing	K3

MAPPING:

	PROGRAMMEOUTCOMES									PROGRAMMESPECIFICOUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	L	L	-	L	H	H	H	M	M	L	L	H
CO2	H	M	M	-	M	H	M	M	M	M	-	M	M
CO3	M	L	-	-	-	M	M	M	M	-	-	M	H
CO4	L	L	M	-	L	H	H	H	M	L	L	H	L
CO5	L	-	L	L	-	H	H	H	H	M	-	-	H
CO6	M	-	-	-	-	H	H	H	H	-	-	H	H

COURSEASSESSMENTMETHODS

Direct
<ol style="list-style-type: none"> 1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
<ol style="list-style-type: none"> 1. course – end survey feed back

SEMESTER III

S. No	Course Title	Course Code
1.	Language III	U23TM3L3
2.	One Act Plays And Abridged Novel	U23EG3L3
3.	Piston Engines and Propellers	U23AV307
4.	Meteorology-1	U23AV 308
5.	ATC Communication and Its Units (Practical)	U23AV3P1
6	Air Regulation-1	U23AV3Y3
7	Ticketing and visa	U23AV3S4
8	Human Factors	U23AV3S5
9	Environmental Studies	U23EST41

CORE VII : PISTON ENGINES AND PROPELLERS

SEMESTER: III

CODE: U23AV307

TOTAL HOURS: 4

CREDITS: 4

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	DETAIL about the fundamentals and working principle at piston engines	K4	I
2	Explain the working principle of 2 stroke 4 stroke otto and diesel engine	K3	I
3	Define engine construction and performance	K3	II
4	Study the carburetor and lubrication	K2	III
5	Explain about chargers	K4	IV
6	Explain briefly about propeller	K3	V

COURSE OBJECTIVE:

Understand basic working of piston engines and propellers effects on performance

COURSE CONTENT:

UNIT 1: PISTON ENGINE

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 2 ENGINE CONSTRUCTION AND PERFORMANCE

Crank case, Crank shaft, Cam shafts, Sumps, 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 3: CARBURETOR AND LUBRICATIONS

Working principle simple Carburetor, Advantages and Disadvantages of Carburetor, Introduction to Fuel injector, Wet sump and dry lubrication, properties of Lubrication Liquid

UNIT 4: SUPERCHARGING AND TURBO CHARGING

Principle and Purpose of Super Charging and it's Effect on Engine Parameters, Construction and Operation of Super charging/ Turbo charging Systems Terminology,

UNIT 5: PROPELLER

Fundamentals, high-low blade angle, reverse angle, Angle of attack, Rotational speed, Propeller slip, Aerodynamic, Centrifugal and Thrust Forces, Torque, Relative airflow on Blade angle of attack, Blade phase, Blade shank, Blade back and Hub assembly, fixed pitch, Control pitch, Constant speeding Propeller, Propeller Pitch Control, Propeller ice Protection.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Piston Engine	https://en.wikipedia.org/wiki/Piston
2	Carburetor and Lubrications	https://en.wikipedia.org/wiki/Carburetor
3	Propeller	https://en.wikipedia.org/wiki/Propeller

Reference Books

1. Oxford – General knowledge 3 (power plant)
2. Airframe and power plant mechanics – power plant hand FAA

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	PISTON ENGINE		
1.1	Fundamentals, Mechanical, thermal and Volumetric efficiencies	Explain About 2 stroke	K3
1.2	Fundamentals, Mechanical, thermal and Volumetric efficiencies	Explain About 4 stroke,	K3
1.3	Fundamentals, Mechanical, thermal and Volumetric efficiencies	Explain About Otto and Diesel	K3
1.4	Piston displacement and Compression ratio	Define Piston displacement and Compression ratio	K2

1.5	Engine configuration and firing order	What is Engine configuration and firing order	K2
II	ENGINE CONSTRUCTION AND PERFORMANCE		
2.1	Crank case	What is Crank case	K2
2.2	Crank shaft	What is Crank shaft	K2
2.3	Cam shafts	What is Cam shafts	K2
2.4	Sumps, Cylinder and piston assemblies	Define Sumps, Cylinder and piston assemblies	K2
2.5	connecting rods,	Define connecting rods	K2
2.6	inlet and exhaust manifolds	Define inlet and exhaust manifolds	K2
2.7	valve mechanism	Explain valve mechanism	K3
2.8	power calculation measurement	Explain power calculation measurement	K4
2.9	factors affecting engine power	Explain factors affecting engine power	K3
2.10	mixture rich-lean, pre-ignition.	Define mixture rich-lean, pre-ignition.	K2
III	CARBURETOR AND LUBRICATIONS		
3.1.0	Carburetor	Working principle simple Carburetor	K3
3.1.1	Carburetor	Advantages and Disadvantages of Carburetor	K2
3.1.2	Introduction to Fuel injector	Introduction to Fuel injector	K1
3.1.3	Wet sump and dry lubrication	Explain Wet sump and dry lubrication	K3
3.1.4	Lubrication Liquid	properties of Lubrication Liquid	K2
IV	SUPERCHARGING AND TURBO CHARGING		
4.1.0	Super Charging	What is Principle and Purpose of Super Charging	K3
4.1.1	Super Charging	Explain it's Effect on Engine Parameters, Construction and Operation	K3
4.1.2	Turbo charging	What is Principle and Purpose of Turbo Charging	K3
4.1.3	Turbo charging	Explain it's Effect on Engine Parameters, Construction and Operation, Terminology	K3

CO2	L	M	-	M	-	-	-	-	-	-	-	-	M
CO3	-	M	-	M	-	-	-	-	-	-	L	-	M
CO4	-	M	-	M	-	-	-	-	-	-	-	-	L
CO5	-	M	-	M	-	-	-	-	-	-	-	-	L
CO6	L	M	-	M	-	-	-	-	-	-	-	-	L

COURSEASSESSMENTMETHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1 course – end survey feed back

CORE VIII : METEOROLOGY-1

SEMESTER: III

CODE:U23AV308

TOTAL HOURS: 3

CREDITS: 3

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Study about different types of layers in atmospheres	K3	I
2	Study about temperature reduction on earth surface	K4	II
3	To understand the knowledge about aoid effect	K2	II
4	To understand the atmospheric density and pressure	K3	III
5	To understand the knowledge about want	K3	IV
6	To understand the aircraft visibility and runway visual	K4	V

COURSE OBJECTIVE:

To understand the various aspects of weather in aviation.

COURSE CONTENT:

UNIT 1: THE ATMOSPHERE

Different Layers of Atmosphere, Composition of gases in atmosphere, Vertical extent of atmosphere, vertical classification of atmosphere, Properties of each layer of atmosphere, physical properties of air, atmosphere, pressure, temperature, density, humidity, Newton law of motion, Bernoulli's principles

UNIT 2: TEMPERATURE

Definition of temperature, different units of measurements, Vertical distribution of temperature, Different mode of transfer of heat, solar and terrestrial Radiation, Nocturnal cooling, Conduction, convection, Advection and Turbulence, Lapse rate, stability and instability, Development of inversions, type of inversions, temperature near the earth's surface, Surface effects, Diurnal variation, Effect of clouds, Effect of wind.

UNIT 3: ATMOSPHERIC DENSITY AND PRESSURE

Inter-relationship of pressure, Temperature and Density, International Standard Atmosphere, Altimetry Pressure, True Altitude, Height, Altitude, Flight Level, Altimeter settings, QNH, QFE, QNE, QFF, Density affecting the performance of aircraft, Low Pressure system, High pressure system, cold, Difference in wind pattern, visibility and weather in different pressure system, Density altitude.

UNIT4: WINDS

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, Wind related to pressure system, Local winds, Anabatic and Katabatic, Land and sea breezes, Vertical movements, Mountain waves, Windshear, Turbulence.

UNIT5: VISIBILITY

Definition of Visibility, Visibility reducing phenomenon, Reduction and visibility caused by mist, smoke, dust, sand, Haze and precipitation, Reduction of visibility caused by low drifting and blowing snow, Difference between mist, fog and haze, dust storm, Runway Visual Range (RVR), Horizontal Visibility, Vertical Visibility, Slant Visibility.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Meteorology	https://mausam.imd.gov.in/imd_latest/contents/pdf/aviation_sop.pdf
2	Layers of atmosphere	https://climate.nasa.gov/news/2919/earths-atmosphere-a-multi-layered-cake/#:~:text=Earth's%20atmosphere%20has%20five%20major,%2C%20mesosphere%2C%20thermosphere%20and%20exosphere.
3	Detail of winds	https://education.nationalgeographic.org/resource/wind

REFERENCE BOOKS

1. Aviation meteorology by I.C Joshi
2. Ground studies for pilots – Aviation Meteorology
3. Oxford - Meteorology

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
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I	The Atmosphere		
1.1	Different layers of atmosphere	Demonstrate the layer of atmosphere	K2
1.2	Composition of gases in atmosphere	Categorize the gases present in atmosphere.	K4
1.3	Vertical extent of atmosphere	Illustrate the vertical of Atmos four.	K2
1.4	Vertical clarification atmosphere	Classify the vertical layers of Atm.	K4
1.5	Properties of each layer's atmosphere	Explained the properties of each layer of atm.	K2
1.6	Physical properties of air, atmosphere, P_x , T_{amp} , excellently	Summarise the properties of atm. P_x , temp, density	K2
1.7	Newton law of motion	Define all the newtons laws of motion.	K1
1.8	Baronially springless	Explained Baronially forma in detail	K2
II	Temperature		
2.1	Different of temp	Explained the temp in detail	K2
2.2	Different units of measurement.	Classify different units of measurement for temp	K4
2.3	Vertical distribution of temp.	Categorise the distribution of temp with vertical enter	K4
2.4	Different mode of transfer of heat	Illustrate the modes of heat transfer in ATM	K2
2.5	Solar & radiation	Define the solar radiation & Ter rad.	K1
2.6	Nocturnal cooling	Explained in detail	K2
2.7	Condition, convection, advection & to, laps late & instability	Desti different types of heat transfer methods	K4
2.8	Development of Inver of inversion	Types	K2
2.9	Temp mean the earth's surface, surface effect	Explained the temp metre earth surface	K5
2.10	Effect of clouds	Evaluate the effect of clouds	K5
2.11	Effect of wind	Evaluate the effect of wind	K5
III	Atmospheric Density and Pressure		
3.1.0	Enter – relationship of p_x , temp & density	Analyse the inter relationship p_x temp	K4

3.1.1	International standard atmosphere	List out the standard atmosphere used international	K4
3.1.2	Altimetry pressure, true altitude, height altitude fl altimetry settings	Determine altimetry px system & altimeter settings	K5
3.1.3	QNH, QFE, QNE, QFF	Explained all the Q-words used in altimetric system	K2
3.1.4	Density affects the performance & aircraft	Demonstrated affects a/c performance	K2
3.1.5	Low px system, high px system	Composition of L system	K2
3.1.6	Col, difference in wind pattern visibility & weather in different & x system	The weather in different px system	K4
IV	Winds		
4.1.0	Definition & measurement of wind	Explained about wind of instruments used to measure	K2
4.1.1	Primary cause of wind	Demonstrated the causes of wind	K2
4.1.2	Pressure gradient	Explained detailed information about pressure gradient	K5
4.1.3	Coriolis force	Define & explanation of corolisforce formation	K1
4.1.5	Gradient wind	What is gradient wind? Explained	K1
4.1.6	Types Of wind	Illustrated general circulation of wind	K2
4.1.7	Turbul, gust, type of origin & location of turbule	Categorized the types of turbulence with its origin location	K4
4.1.8	Variation of wind with height	Analyse the variation of winds with height	K2
4.1.9	Variation of wind in the friction layer	Distinguish the variation winds in the friction layer	K4
4.1.10	Variation of wind caused by fronts	Classify the variation of winds caused by fronts	K4
4.1.11	Wind related to px system	Demonstrated wind related to Px system	K2

4.1.12	Local wind, anabatic & kalabatic wind. Land & sea breeze	List out & explained about difference typed of winds present in the atmosphere	K4
4.1.13	Vertical movements, mout waves	Functions of mountain waves	K4
4.1.14	Wend she, turbulence	Define wire shear & Turbulence	K2
V	Visibility		
5.1.0	Definition of visibility	Explained about mountain waves	K5
5.1.1	Reducing phenomenon	Demonstrated the phenomenon of visual reduction	K2
5.1.2	Reduction vis used by mist smoke dust, sand, haze & par	Illustrated the reduction of visual due to must smoke dust etc	K2
5.1.3	Red action of vis used by low drifting & blowing snow	Explained reduction of visual by low	K3
5.1.4	Difference between must, fog & dust storm	Summarize the difference between must, fog, haze & dust storm	K2
5.1.5	Runway visual range, horizontal visual recital visual, visual	Explained RUR in detail	K2

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	-	H	-	-	-	L	-	-	-	M	L	H
CO2	M	-	H	-	-	-	- 83	-	-	-	M	L	H

CO3	H	L	H	L	-	-	L	L	-	-	H	-	H
CO4	L	L	H	L	-	-	-	-	-	-	M	-	H
CO5	M	L	H	L	-	-	-	-	-	-	H	-	H
CO6	H	L	H	L	-	-	-	-	-	L	H	-	H

COURSEASSESSMENTMETHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1. course – end survey feed back

CORE PRACTICAL I: ATC COMMUNICATION AND ITS UNITS (PRACTICAL)

SEMESTER: III

CODE: U23AV3P1

TOTAL HOURS: 3

CREDITS: 3

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Study of regulation	K4	I
2	Outline of radio propagation	K2	II
3	Explain phraseology used in aeronautical communication service	K3	III
4	Q codes used in aeronautical communication service	K3	IV
5	Outline the communication and frequencies	K2	V
6	Outline the ATC communication	K3	I

COURSE OBJECTIVE

The aim of course is to:

- Understand basic aviation RT phonetics
- Understand different phraseology in RT communication
- Make students familiarize with different aviation charts
- Introduce to various radio equipment's.

COURSE CONTENT:

UNIT-1: REGULATIONS

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 2: RADIO PROPAGATION

- Relationship between wavelength, frequency and speed of light
- Frequency bands and ranges
- Ionosphere layers during day and night
- Mode of Propagation MF, HF and VHF & above
- Operation of Geostationary Satellites
- Operation of Polar orbiting Satellites

- (h) Skip Distance
- (i) Choice of Frequencies during Day & amp; amp; Night 12

UNIT 3: PHRASEOLOGY

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

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

UNIT 4: ‘Q’ CODES

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

UNIT 5: COMMUNICATION

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

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	ATC communication	https://www.aerospace-technology.com/contractors/training/atc-comm/#:~:text=ATC%2DCommunication%20is%20provider%20of,flight%20including%20vision%20and%20sounds.
2	Radio Propagation	https://en.wikipedia.org/wiki/Radio_propagation
3	Phraseology & Q codes	https://en.wikipedia.org/wiki/Q_code

REFERENCE BOOKS

- Radio telephony by K.D. Tuli

SPECIFIC LEARNING OUTCOMES (SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
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I	Regulations		
1.1	Duties of ITU	Analysis's duties of ITU	K4
1.2	ICAO	Develops and understanding of their rules & regulation	K3
1.3	AAI	Develops and understanding of their rules & regulation	K3
1.4	WPC	Develops and understanding of their rules & regulation	K3
1.5	ICAO annexure	Classifies contents of difference annexure	K2
1.6	Spelling of alphabets & transmission of numerical	Demonstrates the pronunciation of alphabet & numerical	K2
1.7	Aircraft ident	Interprets basic ident	K2
1.8	Location indicators	Interprets basic ident	K2
1.9	FIR	Analyses difference FIR & ground services	K4
1.10	Identification of ground services	Analyses difference FIR & ground services	K4
II	Radio Propagation		
2.1	wavelength, frequency and speed of light	Analyses the relationship between wavelength, frequency, & speed of light	K4
2.2	Frequency bands and ranges	Compares the bonds & ranges	K2
2.3	Ionosphere layers	Explains the ionosphere layer during day & night	K2
2.4	Mode of Propagation	Compares MF, HF, VHF & above	K4
2.5	Operation of Geostationary Satellites	Analyses the OPS of geostationary	K4
2.6	Polar orbiting Satellites	Analyses the OPS of polar	K4
	Skip Distance	Explain about skip distance	K2
	Frequencies during Day & Night	Summarizes about the frequency used at night	K2
III	Phraseology		

3.1.0	Phraseology abbreviations	Choose appropriate phrases	K3
3.1.1	Aeronautical Communication Services.	Outlines the type of call to be given during emergency	K2
3.1.2	Distress Distress Relay	Explains about type of commercial during RCF unable for each ATC	K2
3.1.3	Direction Finding	Identifies the methods of direction finding from station	K2
3.1.4	Flight Safety	Examines the safety on board	K4
3.1.5	Metrological Information	Analyses met condition	K4
3.1.6	Flight regulatory	Develops basic regulation & rules of fit	K3
IV	‘Q’ Codes		
4.1.0	Q- Codes	Illustrates the difference types of Q codes	K2
4.1.1	atmospheric pressure	Understanding of atmospheric pressure	K2
4.1.2	Height, Elevation, Flight Level, Altitude	Classifies the difference between Altitude Elevation, Height, Flight Level	K4
4.1.3	QDR, QDM, QUJ, QTE	Classifies the variation of QDR, QDM, QUJ, QTE	K4
4.1.4	Relative bearing, Radial, Magnetic Heading, Compass Heading, True Heading, Variation & Deviation	What the Relative bearing, Radial, Magnetic Heading, Compass Heading, True Heading, Variation & Deviation	K3
V	Communication		
5.1.0	Intro to radio call format	Explains basic RT	K2
5.1.1	Radio strength check	Demonstrates how to check quality of call	K3
5.1.2	S/UP clearance	Outlines the type of call for S/U & pushback based on aircraft cat	K2
5.1.3	P/B clearance	Outlines the type of call for S/U & pushback based on aircraft cat	K2
5.1.4	Taxi clearance	Explains RT call	K2
5.1.5	ATC clearance	Explains RT call	K2

MAPPING:

	PROGRAMMEOUTCOMES									PROGRAMMESPECIFICOUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M		H	L	M	L	-	-	-	-	-	L	M
CO2	M	L	L	L	L	L	L	-	-	L	-	-	L
CO3	-	-	-	-	L	M	M	-	-	-	L	L	-
CO4	M	M	M	M	-	-	-	-	-	M	L	L	-
CO5	M	L	M	L	L	M	M	M	M	L	-	L	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-

COURSEASSESSMENTMETHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1 course – end survey feed back

ALLIED III: AIR REGULATION-1

SEMESTER: III

CODE: U23AV3Y3

TOTAL HOURS: 4

CREDITS: 3

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Study about Indian aircraft act 1934	K3	I
2	Study about Indian aircraft rule 1937	K3	II
3	Explain the ATC rules and regulation	K4	III
4	Operation of ATC and aircraft communication	K2	III
5	To understand the aerodrome operation and aerodrome traffic operation	K4	IV
6	To understand operational procedure air plane and manual	K1	V

COURSE OBJECTIVE:

To gain the knowledge about the rules and regulation for those who are contribution to the Indian industry.

COURSE CONTENT:

UNIT 1: INDIAN AIRCRAFT ACT, 1934

Short title and extent, Power of Central Government to exempt certain aircraft, Power of Central Government to make rules, Power of Central Government to make orders in emergency, Power of Central Government to make rules for investigation of accidents, Power to detain aircraft, Power of Central Government to prohibit or regulate construction of buildings, planting of trees, Payment of compensation, Penalty for act in contravention of rule made under this Act, Penalty for flying so as to cause danger, Penalty for abetment of offences and attempted offences, Laying of rules before Parliament, Use of patented invention on aircraft not registered in India, Saving for acts done in good faith under the Act.

UNIT 2: INDIAN AIRCRAFT RULES, 1937

Short title and extent, Nationality of aircraft, Definitions and Interpretation, General condition of flying, General safety condition, Personal of aircraft, Airworthiness, Radio telegraph

Apparatus Aeronautical beacon, Ground lights and false lights, Log book, Investigation of accidents, Investigation of Incidents.

UNIT 3: SEPARATION METHODS AND MINIMA

Air traffic control clearances-Scope & Purpose- Emergencies, General provisions for the separation of controlled traffic, Vertical separation during climb and descend, Horizontal Separation, Lateral Separation- By using same navigation aid or method-VOR, NDB, DR, RNAV, Longitudinal Separation- Same track, Reciprocal tracks, Crossing tracks, Longitudinal Separation minima based on time-Aircraft at same level, Aircraft flying on crossing track, Aircraft Climbing or descending –Same track, crossing track, reciprocal track

UNIT 4: AERODROME CONTROL SERVICE

Functions of aerodrome control tower, alerting service provided by aerodrome control tower, Control of aerodrome traffic, Selection of runway in use, Essential information on aerodrome conditions on, Control of traffic in the traffic circuit, Control of departing & arriving aircraft, Aeronautical Ground Lights.

UNIT 5: OPERATIONAL PROCEDURES

General Requirements, Operator Certification, Operational requirements, Minimum Equipment List, Aero-plane flight manual, Fire/Smoke-Classifications-Fire Extinguisher-Locations, Ground De-icing, Icing Conditions, De-icing, Anti-icing, Types of De-icing fluids, NOTAMs, Wake turbulence-categories-wake turbulence separation minima-time, distance-dealing with wake turbulence

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	ICAO annex	https://www.icao.int/safety/airnavigation/nationalitymarks/annexes_booklet_en.pdf
2	Airspace classification in India	https://aim-india.aai.aero/eaip/PUB/2012-04-01/html/eAIP/EC-ENR-1.4-en-GB.html
3	Documents to be carried on board by Indian registered aircraft	http://164.100.60.133/ftppub/D2X-X7.pdf

REFERENCE BOOKS

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.
4. Air Regulation Part 2 by R.K Bali.

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY
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			LEVEL
I	Indian Aircraft Act, 1934		
1.1	Short title and extent	Short title and extent, Power of Central Government to exempt certain aircraft	K4
1.2	rules	Power of Central Government to make rules orders in emergency rules for investigation of accidents	K3
1.3	Power of Central Government	Power to detain aircraft, Power of Central Government to prohibit or regulate construction of buildings, planting of trees, Payment of compensation	K3
1.4	Penalty Act,	Penalty for act in contravention of rule made under this Act, Penalty for flying so as to cause danger Penalty for abetment of offences and attempted offences	K3
1.5	invention on aircraft	Use of patented invention on aircraft not registered in India, Saving for acts done in good faith under the Act	K2
II	Indian Aircraft Rules, 1937		
2.1	title and extent	Short note and on Nationality of aircraft	K2
2.2	Flying details	Definitions and Interpretation, General condition of flying	K2
2.3	safety condition	Define general safety condition	K1
2.4	Airworthiness	Define Personal of aircraft, Airworthiness	K3
2.5	Aeronautical beacon, lights	Radio telegraph Apparatus Aeronautical beacon, Ground lights	K2
2.6	Investigation	Compare Investigation of accidents, Investigation of Incidents.	K2
III	SEPARATION METHODS AND MINIMA		
3.1.0	ATC	Explain ATC clearances-Scope &	K4
3.1.1	traffic control	Emergencies, General provisions for the separation of controlled traffic	K2
3.1.2	Horizontal Separation, Lateral Separation	Define navigation aide VOR, NDB, DR, RNAV	K3
3.1.3	Longitudinal Separation	Same track, Reciprocal tracks,	K3

3.1.4	Aircraft flying	What is crossing track, Aircraft Climbing or descending –Same track, crossing track, reciprocal track	K2
IV	AERODROME CONTROL SERVICE		
4.1.0	aerodrome control tower	Functions of aerodrome control tower, alerting service	K3
4.1.1	Selection of runway in use	Discuss about Selection of runway in use	K1
4.1.2	Essential information	Explain about Essential information on aerodrome conditions on, Control of traffic in the traffic circuit, Control of departing & arriving aircraft	K4
4.1.3	Aeronautical Ground Lights.	Define Aeronautical Ground Lights.	K1
V	OPERATIONAL PROCEDURES		
5.1.0	Requirements	General Requirements, Operator Certification, Operational requirements	K2
5.1.1	Minimum Equipment List	Define Aero-plane flight manual, Fire/Smoke-Classifications-Fire Extinguisher-Locations, Ground De-icing, Icing Conditions, De-icing, Anti-icing	K3
5.1.2	Types of De-icing fluids	What is the Types of De-icing fluids	K2
5.1.3	Wake turbulence	NOTAMs, Wake turbulence-categories-wake turbulence separation minima-time	K3

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	-	-	L	-	H	-	-	-	-	-	-	-	-

CO2	-	-	L	-	H	-	-	-	-	-	-	-	-
CO3	M	-	H	-	H	M	H	-	-	L	L	-	H
CO4	M	-	H	-	M	M	M	M	L	-	-	L	H
CO5	L	-	H	-	L	-	L	L	-	M	-	-	L
CO6	M	M	M	M	-	-	L	-	-	H	M	L	H

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 1. 3. End Semester Examination
Indirect
1. course – end survey feed back

SEC IV TICKETING AND VISA

SEMESTER: III

CODE: U23AV3S5

TOTAL HOURS: 1

CREDITS: 1

OBJECTIVE

- To impart basic knowledge to the students about the airline ticketing, visa types and applications.
- To inculcate systematic knowledge and skill in ticketing and visa requirements.

COURSE OUTCOMES

CO1: To outline the principles of community engagement and plan for strategies to address the prevailing issues ethically (K2)

CO2: To identify the types of ticketing (K3)

CO3: To analyze the cost and of alternate ticketing sources (K5)

CO4: To evaluate the visa requirements, prepare and present a visa refusal report (K5)

CO5: To develop a method for successful Visa submission with required documents (K6)

Unit I: Concepts of Service-Learning

6 hours

Service-learning – Definition, Principles- engagement, reflection, reciprocity, public dissemination; Meaning of community and understanding of community dynamics. Project planning stages and Ethical concerns

Activity: Assignment/Role Play/Case Study/Any other

Unit II: Fundamentals of Airline Ticketing (Theoretical Concepts)

12 hours

Formalities – Refund & Cancellation policy

Activity: Assignment / Seminar / Group Discussion / Hands-on Training / Designing Pamphlets / Handouts / Any other

Unit III: Types of Visa (Theoretical Concepts)

12 hours

Visa Understanding and important technologies - Business – Work – Tourism - Research – Student - On Arrival – Transit – J1 (Minor) – PR – NRI – Steps to apply any visa for any country.

Activity: Assignment / Seminar / Group Discussion / Hands-on Training / Designing Pamphlets / Handouts / Any other

Unit IV: Ticketing Audit (Practical Community Engagement)

Ticket Fares – Availability – Class – Connections – Meal plan - E-Boarding Procedures - Security Producers – Baggage limitation

Activity: Preparation of Questionnaire for preliminary survey / Video Presentations / Journal Maintenance / Any other

Unit V: Visa filling (Community Engagement)

Understanding types of Visa – Refusal Avoidance – Covering Letter – Travel Itinerary – Hotel Vouchers – Supporting Documents – Financial Documents – Submission of Visa – Visa Appointment

Activity: Preparing Questionnaire for preliminary survey/Video Presentations/Journal Maintenance/ Any other

Text Books

1. Ticketing Handbook, IATA 39th Edition
2. Flight Reservation and Airline ticketing by Jitendra K. Sharma.
3. Air Fares and Ticketing by Doris S. Davidoff, Philip G. Davidoff.
4. DO IT YOURSELF: Apply your Canada visitor visa application with confidence and avoid a rejection Paperback – 22 June 2021 by Naveen Chopra (Author), Ravnish Bhola (Author).

References

1. Best Quality Management systems by written by James. O. Westgard, PHD and Sten Westgard.
2. Deborah Boehm, *Returned: Going and Coming in an Age of Deportation* (Berkeley University of California Press, 2016).

SEC V: HUMAN FACTORS

SEMESTER: III

CODE: U23AV3S5

TOTAL HOURS: 2

CREDITS: 2

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Explain basic physiology in human factors	K2	I
2	Discuss about social psychology	K2	II
3	Outline of the human affecting factors	K2	III
4	Comparison of error and asks in human in aviation	K3	IV
5	Explain the memory skill mental working human factors	K2	V
6	Our line of the human information processing	K1	V

COURSE OBJECTIVE

- Understand the role of human cognition and physiological effects affecting performance in aviation

COURSE CONTENT:

UNIT1: BASIC PHYSIOLOGY

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 2: SOCIAL PSYCHOLOGY

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 3: FACTORS AFFECTING PERFORMANCE

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 4: COGNITION IN AVIATION

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

UNIT 5: HUMAN INFORMATION PROCESSING.

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

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Basic physiology and physiology	
2	Cognition in aviation	
3	Human information processing	

REFERENCE BOOKS

1. Human Factors for Pilots, Roger G Green, Helen Muir et al., Ashgate Publishing Limited.
2. Air Regulation by R.K. Bhali
3. Air regulations by K.D. Tuli

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Basic Physiology		
1.1	human factors into account	What need to take human factors into account	K2
1.2	human error	Incidents attributable to human factors/human error;	K2
1.3	Murphy's Law	Explain Murphy's Law	K3
1.4	Hearing Vision	Explain Hearing Vision	K2
1.5	Information processing; Attention and perception	What Information processing; Attention and perception	K1
1.6	physical access	Hyperventilation, Hypoxia, Decompression Sickness anatomy	K2
1.7	physiology	physiology of the ear, Vision.	K3
II	Social Psychologyk2		
2.1	Responsibility	Explain Responsibility of social psychology	K2
2.2	individual and group	Define individual and group Psychology	K1
2.3	Motivation and de-motivation	Short note of Motivation and de-motivation	K2
2.4	Peer pressure	What is Peer pressure	K1
2.5	'Culture' issues	Define 'Culture' issues	K3
2.6	Team working	How to Management, supervision and leadership, interacting with ATC, Cabin Crew, Passengers.	K2

III	Factors Affecting Performance		
3.1.0	Fitness/health	How to maintain Fitness/health	K1
3.1.1	Stress	Work stress company ³ domestic and work related	K2
3.1.2	pressure	Explain pressure related time and dead line	K3
3.1.3	Workload	Define overload and under-load	K2
3.1.4	shift work	What are all the factor Alcohol, medication, drug abuse.	K1
IV	Cognition in Aviation		
4.1.0	Error models	What is Error models	K1
4.1.1	Types of error	Classification error in maintenance tasks	K2
4.1.2	Theories of error	What is error managing in aviation	K1
V	Human Information Processing		
5.1.0	Introduction	Introduction about human information	K1
5.1.1	Basic plan	What is basic plan in Introduction	K1
5.1.2	Sensation & Sensory memory	Deference between Sensation & Sensory memory	K2
5.1.3	perception & mental	What is perception & mental	K2
5.1.4	memory	Types of memory long-term memory, motor memory	K2

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	L	-	-	-	-	L	M	L	L	-	-	-	-
CO2	L	-	-	-	-	L	M	L	L	-	-	-	L
CO3	L	-	-	-	-	L	L	-	-	-	-	-	L
CO4	L	-	-	-	-	L	M	M	M	-	-	-	L
CO5	L	-	-	-	-	L	L	L	L	-	-	-	L
CO6	L	-	-	-	-	L	L ⁹⁸	M	M	-	-	-	L

COURSEASSESSMENTMETHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1. course – end survey feed back

SEMESTER IV

S.No	CourseTitle	CourseCode
1.	□□□□□□□□□□ IV	U23TM4L4
2.	Language through Literature	U23EG4L4
3.	Aero Engines	U23AV409
4.	Air Regulation II	U23AV410
5.	Practical Hangar Workshop- I 99	U23AV4P2

6.	Principle of Management	U23AV4Y2
7.	Life Skills	U23AV4S6
8.	Service Learning Outcome(SLO)	U23AV4S7
9.	Environmental Studies	U23EST41

CORE IX: AERO ENGINES

SEMESTER: IV

CODE: U23AV409

TOTAL HOURS: 4

CREDITS: 4

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Summaries the Basics of set Principle	K2	I
2	Illustrate the working of air Intake	K2	II
3	List out the various types of compressor and its benefits	K4	III
4	Dissect and Explain the different part of a combustion chamber	K4	IV
5	Explain the working principle of Fuel Atomizer And Igniter	K2	IV
6	Discuss the faults of a compressor	K6	V

COURSE OBJECTIVE:

- Understand the principle behind Gas Turbine Engine operation, their working, types and components.

UNIT 1: GAS TURBINE THEORY

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 2: AIR INTAKES

Intake design, Design requirement of an ideal air intake, Airflow through Ducts, Types of Air intake design (simple pitot, conical spike, wedge type), Subsonic Intake & Intake operation (critical, sub critical & super critical operations), Supersonic intake, shock waves, supersonic theory & supersonic inlet duct three speed zones operations (subsonic, Transonic & supersonic), Types of intakes for supersonic flight (pitot type & External compression, External compression types (Two shock, three shocks, Isentropic & variable geometry intakes), Super intake critically (critical, sub critical & super critical operations).

UNIT 3: COMPRESSORS

Introduction, design basic requirement of a compressor, Centrifugal compressor, Main feature of single stage centrifugal compressor, Principles of operation & efficiency loss of CF Compressor, airflow through double entry impeller, diffuser system, Axial flow compressor, construction & its principles of operation, Reverse flow compressor, The main features of axial flow compressors, compressor stall & surging, Stall conditions/occasions (At low & high RPM & acceleration stall) effects of compressor surge, Avoidance of compressor stall & surge (variable position guide vanes, air release valves (Bleed valves), multi spool engines, Variable area nozzle), compressor icing Axial & centrifugal type and causes of icing, comparison of axial flow and centrifugal flow compressor engines.

UNIT 4: COMBUSTION SYSTEMS

Introduction, combustion system requirements, Basic types of combustion chambers, multiple combustion chambers, The annular combustion chamber, Cannular combustion chamber, The direct flow type combustion chamber, Reverse flow combustion chamber, Advantage & disadvantages of Annular over other two types of CC, Fuel injection and vaporization, Atomization of fuel, Types of Burners (simplex, duplex, spill & Lubbock).

UNIT 5: TURBINES

Introduction, turbine principle of operation, constructions of Reaction and impulse turbine, Basic Material requirements of turbine, turbine faults (loss of tip clearance, buckling, cracking and distortion, FOD, Turbine blade containment), turbine blade creep, Types of installations (Single spool, multi-spool, Direct couple & free turbines), nozzle guide vanes (NGV), Exhaust system & its components (Exhaust unit, Jet pipe & Propelling Nozzle), 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 (constant speed control unit), turboprop performance, Introduction, Turbo Prop aircraft, principle of operation.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Gas Turbine Theory	https://en.wikipedia.org/wiki/Gas_turbine 101

2	Air Intakes	https://www.sciencedirect.com/topics/earth-and-planetary-sciences/air-intakes
3	Combustion Systems	https://www.sciencedirect.com/topics/engineering/combustion-system

REFERENCE BOOKS

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

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Gas Turbine Theory		
1.1	Introduction	Outline the basic about jet engine	K2
1.2	Jet engine types	List out the different type of Jet engine	K4
1.3	principle of jet thrust	Illustrate the working principle of jet thrust	K2
1.4	engine efficiency	Decide the factors which Influence the efficiency of engine	K5
1.5	factors affecting thrust	List out the factors which affect thrust	K4
1.6	internal engine parameter change	Inspect the factors which changes the engine parameter	K4
1.7	The gas turbine cycle	Explain\e the cycle of gas turbine engine	K2
1.8	Effects of Ram	Summarise the effects of Ram in jet engine	K2
1.9	Density and temperature	Summarised the effects of Ram in jet engine	K2
II	Air Intakes		
2.1	Intake design	Introduction of Intake design	K2
2.2	Design requirement of an ideal air intake	Design requirement of an ideal air intake	K2
2.3	Airflow through Ducts	Define Airflow through Ducts	K3
2.4	Types of Air intake design (simple pitot, conicalspike, wedge type)	Explain Types of Air intake design (simple pitot, conicalspike, wedge type)	K2

2.5	Subsonic Intake &	What is Subsonic Intake &	K3
2.6	Intake operation(critical, sub critical & super critical operations), Supersonic intake, shock waves, supersonic theory &	Explain Intake operation(critical, sub critical & super critical operations), Supersonic intake, shock waves, supersonic theory &	K2
2.7	supersonic inlet duct three speed zones operations (subsonic, Transonic&; supersonic),	Discuss about supersonic inlet duct three speed zones operations (subsonic, Transonic&; supersonic),	K2
2.8	Types of intakesfor supersonic flight (pitot type & External compression, External compression types (Two shock, three shocks, Isentropic & variable geometry intakes)	Types of intakes for supersonic flight (pitot type & External compression, External compression types (Two shock, three shocks, Isentropic & variable geometry intakes)	K2
2.9	Super intake critically (critical, sub critical & super critical operations).	Super intake critically (critical, sub critical & super critical operations).	K2
III	Compressors		
3.1.0	Introduction	Introduction of compressor	K1
3.1.1	design basic requirement of a compressor	design basic requirement of a compressor	K2
3.1.2	Centrifugal compressor	Explain Centrifugal compressor	K3
3.1.3	Main feature of single stage centrifugal compressor	Explain Main feature of single stage centrifugal compressor	K2
3.1.4	Centrifugal Compressor	efficiency loss of CF Compressor, airflow through double entry impeller, , diffuser system	K2

3.1.5	Axial flow compressor	Axial flow compressor , construction & its principles of operation, Reverse flow compressor	K3
3.1.6	The main features of axial flow compressors, compressor stall & surging, Stall conditions/occasions (At low & high RPM & acceleration stall) effects of compressor surge	The main features of axial flow compressors, compressor stall & surging, Stall conditions/occasions (At low & high RPM & acceleration stall) effects of compressor surge	K2
3.1.7	Avoidance of compressor stall & surge (variable position guide vanes, air release valves (Bleed valves), multi spool engines, Variable area nozzle),	Explain Avoidance of compressor stall & surge (variable position guide vanes, air release valves (Bleed valves), multi spool engines, Variable area nozzle),	K3
3.1.8	compressor icing Axial & centrifugal type and causes of icing, comparison of axial flow and centrifugal flow compressor engines.	Explain compressor icing Axial & centrifugal type and causes of icing, comparison of axial flow and centrifugal flow compressor engines.	K3
IV	Combustion Systems		
4.1.0	Introduction, combustion system requirements	Introduction, combustion system requirements	K2
4.1.1	Basic types of combustion chambers multiple combustion chambers, The annular combustion chamber, Cannular combustion chamber, The direct flow type	Basic types of combustion chambers multiple combustion chambers, The annular combustion chamber, Cannular combustion chamber, The direct flow type combustion chamber, Reverse flow combustion chamber	K2

	combustion chamber, Reverse flow combustion chamber		
4.1.2	Advantage & disadvantages of Annular over other two types of CC,	Advantage & disadvantages of Annular over other two types of CC,	K2
4.1.3	Fuel injection and vaporization, Atomization of fuel	Explain Fuel injection and vaporization, Atomization of fuel	K3
4.1.4	Types of Burners (simplex, duplex, spill& Lubbock).	Types of Burners (simplex, duplex, spill& Lubbock).	K2
V	Turbines		
5.1.0	Introduction, turbine principle of operation	Introduction, turbine principle of operation	K2
5.1.1	constructions of Reaction and impulse turbine,	Explain constructions of Reaction and impulse turbine	K3
5.1.2	Basic Material requirements of turbine	Discuss about Basic Material requirements of turbine	K2
5.1.3	turbine faults (loss of tip clearance, buckling, cracking and distortion, FOD, Turbine blade containment), turbine blade creep,	Define turbine faults (loss of tip clearance, buckling, cracking and distortion, FOD, Turbine blade containment), turbine blade creep,	K3
5.1.4	Types of installations (Single spool, multi-spool, Direct couple & free turbines), nozzle guide vanes (NGV),	Types of installations (Single spool, multi-spool, Direct couple & free turbines), nozzle guide vanes (NGV),	K2
5.1.5	Exhaust system & its components (Exhaust unit, Jet pipe & Propelling Nozzle),	Illustrate Exhaust system & its components (Exhaust unit, Jet pipe & Propelling Nozzle),	K3

5.1.6	Turbofan Engines	Turbofan engine layout, Bypass ratio, Turbofan engine performance	K2
5.1.7	Turboprop Engines	principle of operation, types of turboprop engines, turboprop reduction gearing, propeller and engine control (constant speed control unit), turboprop performance	K3
5.1.8	Turbo Prop aircraft	Introduction, Turbo Prop aircraft, principle of operation.	K2

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	L	M	L	M	-	-	L	-	-	M	-	-	M
CO2	L	H	-	H	-	-	M	-	-	M	-	-	M
CO3	M	M	-	M	-	-	-	-	-	M	-	-	-
CO4	M	M	L	M	-	-	-	-	-	L	-	-	L
CO5	M	M	-	M	-	-	-	-	-	-	-	L	-
CO6	M	M	-	M	-	-	L	-	-	-	-	L	L

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1. course – end survey feed back

CORE X: AIR REGULATION-II

SEMESTER: IV

CODE: U23AV410

TOTAL HOURS: 3

CREDITS: 3

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Explain about the rules at the air and navigation light in aircraft	K4	I
2	What is the function of interception at civil aircraft	K4	II
3	Define details of margins and lighting	K2	III
4	Definition of airport document provide	K3	IV
5	Define Requirement for passenger and Customs	K2	V
6	Explain ICAO Annexure terminology	K3	V

COURSE OBJECTIVE :

- Get an insight into the various laws and rules applicable during flight, airspace restrictions and terminologies associated therewith.

UNIT 1: RULES OF THE AIR

Applicability of rules of the air, General Rules-Protection of persons & property, Surface movement of Aircraft, Lights to be displayed by aircraft, Flight plans, VFR, IFR, SVFR, Airspace classification, FIRs & Location indicator, Air Defense Identification Zones, Restricted Areas, Prohibited Area, Danger Area, Navigational lights to be displayed in the aircraft

UNIT 2: INTERCEPTIONS OF CIVIL AIRCRAFT

Interceptions of civil aircraft, procedure, signals for use in the event of interception, phrases for use by intercepting/intercepted aircraft, signals initiated by intercepted aircraft and response by intercepting aircraft, visual signals for aerodrome traffic, visual ground signals, marshalling signals, indicators & signaling devices wind direction indicators, landing direction indicator, signaling lamp, signal panel and signal area

UNIT 3: AERODROMES

Aeronautical Beacon- Location- Characteristics- Identification Beacon-Characteristics, right of way on the ground, Runway Markings-Threshold Markings-Holding position markings, Taxiway markings, Runway lightings-wing bar lights, Taxiway lightings-stop way lights, Isolated aircraft parking position, Aircraft stand markings, Apron safety lines, Road holding position marking, mandatory instruction marking, Declared Distances

UNIT 4: FACILITATION

Definitions, Entry & Departure of aircraft-Description, Purpose & use of aircraft documents, General Declaration-Entry & departure of persons and their baggage-Entry requirement & procedures for crew & other operator's personnel, National Provisions- Customs duty on aircraft, Customs requirement

UNIT 5: ICAO ANNEXURE TERMINOLOGY

Various definitions, terminologies used in aviation.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Rule Of Aircraft	https://www.civilaviation.gov.in/sites/default/files/moca_000947.pdf
2	Civil Aviation Requirement	http://164.100.60.133/rules/car-ind.htm
3	ICAO Annexure	https://www.icao.int/safety/airnavigation/nationalitymarks/annexes_booklet_en.pdf

REFERENCE BOOKS

1. Air Pilot's Manual, Vol 2, Aviation Laws by Peter. D. Godwin
2. Air Regulation Part 1 by R.K Bali.
3. Air Regulation Part 2 by R.K Bali.

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Rules of the Air		
1.1	Applicability of rules of the air	Explain Applicability of rules of the air	K3

1.2	General Rules-Protection of persons &	General Rules-Protection of persons &	K1
1.3	Surfacemovement of Aircraft	Define Surfacemovement of Aircraft	K3
1.4	Lights to be displayed by aircraft	What are the Lights to be displayed by aircraft	K1
1.5	Flight plans	What is Flight Plans	K1
1.6	VFR, IFR, SVFR	Explain VFR, IFR, SVFR	K2
1.7	Airspace classification	Explain Airspace classification	K3
1.8	FIRs &	Define FIRs &	K3
1.9	Location indicator	What is Location indicator	K1
1.10	Air Defense Identification Zones	Explain Air Defense Identification Zones	K2
1.11	Restricted Areas, Prohibited Area, Danger Area	Explain Restricted Areas, Prohibited Area, Danger Area	K2
1.12	Navigational lights to be displayed in the aircraft	Explain Navigational lights to be displayed in the aircraft	K3
II	Interceptions of Civil Aircraft		
2.1	Interceptions of civil aircraft	Interceptions of civil aircraft	K2
2.2	signals for use in the event of interception	What are signals for use in the event of interception	K3
2.3	phrases for use by intercepting/intercepted aircraft	Define phrases for use by intercepting/intercepted aircraft	K1
2.4	signals initiated by intercepted aircraft and response by intercepting aircraft	Explain signals initiated by intercepted aircraft and response by intercepting aircraft	K3
2.5	Signals	visual signals for aerodrome traffic, visual groundsignals, marshalling signals, indicators &	K3
2.6	signalling devices wind direction indicators	Explain signalling devices wind direction indicators	K1

2.7	landing direction indicator, signaling lamp, signal panel and signal area	Define landing direction indicator, signaling lamp, signal panel and signal area	K3
III	Aerodromes		
3.1.0	Aeronautical Beacon	Explain BeaconAeronautical	K3
3.1.1	Beacon	Location- Characteristics- Identification Beacon	K1
3.1.2	Runway Markings- Threshold Markings Holding positionmarkings , Taxiway markings	Define Runway Markings- Threshold Markings Holding positionmarkings , Taxiway markings	K2
3.1.3	Runway lightings	Explain Runway lightings	K3
3.1.4	wing bar lights	What is wing bar lights	K1
3.1.5	Taxiway lightings- stopway lights	Define Taxiway lightings- stopway lights	K3
3.1.6	Isolated aircraft parking position	Explain Isolated aircraft parking position	K3
3.1.7	Aircraft stand markings	What Aircraft stand markings	K1
3.1.8	Apron safety lines	What is Apron safety lines	K1
3.1.9	Road holding position marking	What is Road holding position marking	K1
3.1.10	mandatory instruction marking	What is mandatory instruction marking	K1
IV	Facilitation		
4.1.0	Entry &	Definitions Entry &	K2
4.1.1	Departure of aircraft-Description	Departure of aircraft-Description	K1
4.1.2	use of aircraftdocuments	use of aircraftdocuments	K2

4.1.3	General Declaration-Entry &	General Declaration-Entry &	K3
4.1.4	departure of persons and their baggage-Entryrequirement &	departure of persons and their baggage-Entryrequirement &	K1
4.1.5	procedures for crew &	procedures for crew &	K1
4.1.6	National Provisions-Customs duty on aircraft, Customs requirement	National Provisions-Customs duty on aircraft, Customs requirement	K2
V	ICAO Annexure Terminology		
5.1.0	Various definitions	Various definitions ICAO	K3
5.1.1	Terminologies	Terminologies used in aviation.	K3

MAPPING:

	PROGRAMMEOUTCOMES									PROGRAMMESPECIFICOUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	-	L	-	M	-	-	-	-	M	M	-	L
CO2	L	-	-	-	M	-	-	L	-	L	-	-	L
CO3	L	L	-	L	L	-	-	-	-	M	H	-	-
CO4	-	-	L	-	L	-	-	-	-	-	M	-	-
CO5	L	-	-	-	M	-	-	L	-	-	-	-	L
CO6	L	-	-	-	M	-	-	-	-	L	L	-	-

COURSEASSESSMENTMETHODS

Direct
1.Continuous Assessment Test I, II 2.Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3.End Semester Examination
Indirect
1. course – end survey feed back

CORE PRACTICAL II: PRACTICAL HANGAR WORKSHOP- I

SEMESTER: IV

CODE: U23AV4P2

TOTAL HOURS: 3

CREDITS: 3

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Experiment with Different Aviation tool	K3	I
2	Identify a particular tool for a particular Purpose	K3	I
3	Organize the used files	K3	I

4	Classify the Different classes of fire	K4	II
5	Inspect the Source of fire	K4	II
6	Choose the Correct fire extinguishers	K5	II

COURSE OBJECTIVE;

- To familiarize with the general tools used in aircraft maintenance

1. FAMILIARIZATION OF GENERAL HAND TOOLS

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, Vernier Scale, Using a Micrometer, calipers.

2. FIRE TRAINING.

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

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	General Hand Tools	https://generaltools.com/hand-tools
2	Fire Training	https://emergency.yale.edu/sites/default/files/files/TMS-Fire-Extinguisher-Training.pdf

REFERENCE BOOKS

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

PECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
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I	Familiarization of general hand tools		
1.1	Experiment with Different Aviation tool	Experiment with Different Aviation tool	K3
1.2	Identify a particular tool for a particular Purpose	Identify a particular tool for a particular Purpose	K3
1.3	Organize the used files	Organize the used files	K3
1.4	Categories the files Selection	Categories the files Selection	K4
1.5	Explain the procedure to read venire scale	Explain the procedure to read venire scale	K2
1.6			
II	Fire Training		
2.1	Classify the Different classes of fire	Classify the Different classes of fire	K4
2.2	Inspect the Source of fire	Inspect the Source of fire	K4
2.3	Choose the Correct fire	Choose the Correct fire	K5
2.4	Demonstrate the procedure to use fire extinguisher	Demonstrate the procedure to use fire extinguisher	K2
2.5	Explain Different fire warning Experiment	Explain Different fire warning Experiment	K2

MAPPING:

	PROGRAMMEOUTCOMES									PROGRAMMESPECIFICOUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	H	L	H	-	-	M	M	M	H	M	M	H
CO2	M	H	-	H	-	-	M	M	M	H	M	L	H
CO3	H	L	L	L	M	-	L	M	L	-	M	-	L
CO4	H	H	M	H	-	M	M	L	L	M	M	-	H
CO5	M	M	L	M	-	M	M	H	H	H	H	-	H
CO6	M	H	M	H	-	M	M	L	M	H	H	-	H

COURSEASSESSMENTMETHODS

Direct
1.Continuous Assessment Test I, II 2.Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3.End Semester Examination
Indirect
1. course – end survey feed back

SEMESTER V

S.No	CourseTitle	CourseCode
1.	Aircraft Sysyems	U23AV511
2.	Flight Performance and Planning	U23AV512
3.	Practical Hangar Workshop - II	U23AV5P3
4.	CORE PROJECT WITH VIVA VOICE	U23AV5PJ
5.	Meteorology – II	U23AV5:A
6.	Aviation Security	U23AV5:B
7.	Abundant Life	U23VLO51
8.	Human Value	U23VLO52
9.	Internship/Industrial Training Programme	U23AV511

CORE XI: AIRCRAFT SYSTEMS

SEMESTER: V

CODE: U23AV511

TOTAL HOURS: 5

CREDITS: 4

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Outline of the Hydraulic And Pneumatic Power systems	K2	I
2	Illustrate the Air conditioning And Cabin Pressurization of the Aircraft	K3	II
3	Identify the Details of the Fuel System	K2	III
4	Classify the Landing Gear system	K2	IV
5	Explain the Landing Gear Systems	K3	IV
6	To know the Knowledge about the Engine Fuel System	K4	V

COURSE OBJECTIVE

- To understand the various principles and functions of Hydraulic And Pneumatic Power Systems, Fuel Systems

UNIT 1: HYDRAULIC AND PNEUMATIC POWER SYSTEMS.

Hydraulic System lay-out; Reservoir, pumps, actuator, valves. Pneumatic System lay-out; sources: engine/APU, compressors, air bottles, ground supply, pressure control; distribution.

UNIT 2: AIR CONDITIONING AND CABIN PRESSURIZATION

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

UNIT3: FUEL SYSTEMS

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.

UNIT4: LANDING GEAR

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.

UNIT5: ENGINE FUEL SYSTEMS

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.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Hydraulic and Pneumatic power systems	https://www.nexflow.com/blog/difference-between-pneumatics-and-hydraulics/
2	Engine Fuel Systems	https://www.skybrary.aero/articles/aircraft-fuel-systems
3	Landing Gear	https://simpleflying.com/how-does-landing-gear-work/

Reference Books

1. Professional Pilot Study Guide (Mike Burton)
2. Oxford ATPL ground training series-Airframe system.

PECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Hydraulic and Pneumatic power systems		
1.1	Hydraulic System lay-out	Explain Hydraulic System lay-out	K3
1.2	Reservoir, pumps, actuator, valves. Pneumatic System lay-out	Explain Reservoir, pumps, actuator, valves. Pneumatic System lay-out	K3
1.3	engine/APU	Define engine/APU	K3
1.4	compressors, air bottles, ground supply	Explain compressors, air bottles, ground supply	K2
1.5	pressure control; distribution	Define pressure control; distribution	K2
II	Air Conditioning and Cabin Pressurization		
2.1	Air Supply-sources of air supply including engine bleed	Explain Air Supply-sources of air supply including engine bleed	K2
2.2	APU and ground cart	Illustrates APU and ground cart	K2
2.3	Air conditioning systems; Air cycle and vapor cycle machines distribution systems	Explain Air conditioning systems; Air cycle and vapor cycle machines distribution systems	K3
2.4	Flow, temperature and humidity control system	Explain Flow, temperature and humidity control system	K1
2.5	Pressurization systems	Define Pressurization systems	K2
2.6	control and indication including control and safety valves	control and indication including control and safety valves	K3
2.7	cabin pressure controllers	Illustrate cabin pressure controllers	K2
2.8	safety and warning devices	What safety and warning devices	K1
2.9	protection and warning devices	Explain protection and warning devices	K3
III	Fuel Systems		
3.1.0	System lay-out	What is System lay-out	K1

3.1.1	fuel tanks	Explain fuel tanks and its use	K2
3.1.2	supply systems	Explain supply systems	K2
3.1.3	dumping	What is dumping	K2
3.1.4	venting and draining	What is venting and draining	K3
3.1.5	cross-feed and transfer	Explain cross-feed and transfer	K2
3.1.6	indications and warnings	What is indications and warnings	K3
3.1.7	refuelling and defueling	refuelling and defueling	K2
3.1.8	longitudinal balance fuel systems	Explain longitudinal balance fuel systems	K2
IV	Landing Gear		
4.1.0	Construction, shock absorbing,	Construction, shock absorbing,	K2
4.1.1	extension and retraction systems	Explain extension and retraction systems	K2
4.1.2	normal and emergency Landing Gear	Explain normal and emergency Landing Gear	K2
4.1.3	Indications and warning Landing Gear	Indications and warning Landing Gear	K3
4.1.4	wheels, brakes, antiskid and auto braking	Define wheels, brakes, antiskid and auto braking	K1
4.1.5	tyres, steering, air-ground sensing, skids, floats	Explain tyres, steering, air-ground sensing, skids, floats	K2
V	Engine Fuel Systems		
5.1.0	Carburetor types	Carburetor types construction and principles of operation	K3

5.1.1	icing and heating,	Illustrate icing and heating,	K 2
5.1.2	Types of fuel system,	Types of fuel system, construction and principle of operation	K2
5.1.3	Starting systems, pre-heat systems	What is Starting systems, pre-heat systems	K2
5.1.4	Magneto types, construction and principles of operation	Magneto types, construction and principles of operation	K3
5.1.5	ignition harness, spark plugs-, low- and high-tension systems	ignition harness, spark plugs-, low- and high-tension systems	K2

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	M	L	M	-	-	M	M	M	M	-	M	H
CO2	H	H	L	H	-	-	H	M	M	-	-	H	H
CO3	H	H	M	H	-	-	M	M	L	L	-	M	M
CO4	H	H	M	H	-	-	H	L	L	L	L	M	H
CO5	H	H	M	H	-	-	H	L	L	L	L	L	H
CO6	H	H	M	H	-	-	H	M	M	-	-	M	H

COURSE ASSESSMENT METHODS

Direct

1. Continuous Assessment Test I, II

2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation

3. End Semester Examination

Indirect

1. course – end survey feed back

CORE PRACTICAL III: PRACTICAL HANGAR WORKSHOP - II

SEMESTER: V

CODE: U23AV5P3

TOTAL HOURS: 6

CREDITS: 3

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Demonstrate the working of c152 aircraft systems	K2	I
2	Function as aircraft technician under suberized environment	K4	I
3	Take part in maintenance schedule of Cessna 152 aircraft	K4	I
4	Demonstrate the working of c 172 aircraft system	K2	II
5	Examine the function of auto pilot system in Cessna 172	K4	II
6	Take part in maintenance schedule of Cessna 172 aircraft	K4	II

COURSE OBJECTIVE

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

1. FAMILIARIZATION ON CESSNA 152

- 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

2. FAMILIARIZATION ON CESSNA 172

- a. Airframe familiarization
- b. Engine familiarization
- c. Cessna 172 Electrical system
- d. Cessna 172 Hydraulic system
- e. Cessna 172 Landing gear system
- f. Cessna 172 Aircraft Instrument system

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Cessna 152	https://en.wikipedia.org/wiki/Cessna_152
2	Cessna 172	https://en.wikipedia.org/wiki/Cessna_172

REFERENCE BOOKS

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

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
1	Fire Training.		
1.1	Aircraft fam	Explain the basics of Cessna 172 aircraft	K2
1.2	Engine fam	Interpret the basic parts of Cessna 172 aircraft	K2
1.3	Cessna 172 electrical	Demonstrable the working principle of electrical system in Cessna 172	K2
1.4	Cessna 172 by diaulic system	Apply the theoretical knowledge of hyraclics in practical session	K3

1.5	Cessna 172 landing gear system	Emperiment with the working of long gear of Cessna 172	K3
1.6	Cessna 172 aircraft instrument system	Apply the theosophical knowledge of aircraft instruments in preached session	K3

SMAPPING:

	PROGRAMMEOUTCOMES									PROGRAMMESPECIFICOUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	L	M	L	-	-	-	-	-	L	-	-	M
CO2	L	M	M	M	-	-	M	M	L	M	-	L	H
CO3	L	M	H	H	-	-	H	H	M	M	-	-	H
CO4	L	L	L	L	-	-	-	-	-	L	-	-	L
CO5	M	M	L	M	-	-	-	-	-	L	-	-	L
CO6	M	H	H	H	-	-	H	H	M	H	-	-	H

COURSEASSESSMENTMETHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect

1. course – end survey feed back

ELECTIVE I: METEOROLOGY - II

SEMESTER: V

CODE: U23AV5:A

TOTAL HOURS: 4

CREDITS: 4

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Types of cloud and the study of Clouds	K2	I
2	Illustrate Knowledge On the thunderstorm	K3	II
3	Illustrate Knowledge On the Air masses	K3	II
4	Explain Dangers of Icing And how to rectify in the pilot static System	K3	III
5	Outline of the Weather forecast And its Report	K2	IV
6	Symbols And Abbreviation in Weather On MET Chart	K2	V

COURSE OBJECTIVE:

- To know the various aspects of weather

COURSE CONTENT:

UNIT 1: CLOUDS

Types of clouds according to their height and form, Precipitation, Humidity, Dew point temperature, Adiabatic process, the Fohn wind effect, Precipitation associated with cloud, cumino nimbus, Ice crystal theory, Coalescence theory, Giant nuclei theory, Types of cloud, Various Mountain Clouds, necessary condition for the formation of clouds, condensation trails.

UNIT 2: THUNDERSTORM AND AIR MASSES

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 3: ICING

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

UNIT 4: WEATHER FORECAST AND REPORTS

Dissemination of weather information, AIR MET service, types of weather information, meteorological forecast, special forecast, aerodrome forecast, Terminal Aerodrome forecast (TAF), METAR, TRENDS, Speci, Cloud base, VFR- in flight weather report, Automatic Terminal Information System (ATIS), Notam, Sigmet.

UNIT 5: SYMBOLS AND ABBREVIATIONS

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, METAR decoding.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Types of Clouds	https://www.weather.gov/jetstream/corefour
2	Weather Forecast and report	https://en.wikipedia.org/wiki/Weather_forecasting
3	Icing and Deicing	https://en.wikipedia.org/wiki/Deicing

REFERENCE BOOKS

1. Aviation meteorology by I.C. Joshi
2. Oxford- meteorology
3. Ground Studies for Pilots – Meteorology

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Clouds		
1.1	Types of clouds	Types of clouds according to their height and form	K2
1.2	Precipitation, Humidity, Dew point temperature, Adiabatic process	Explain Precipitation, Humidity, Dew point temperature, Adiabatic process	K2
1.3	the Fohn wind effect, Precipitation associated with cloud	the Fohn wind effect, Precipitation associated with cloud	K2
1.4	cumin nimbus, Ice crystal theory, Coalescence theory, Giant nuclei theory,	cumino nimbus, Ice crystal theory, Coalescence theory, Giant nuclei theory,	K3
1.5	Types of cloud, Various Mountain Clouds	Types of cloud, Various Mountain Clouds	K2
1.6	necessary condition for the formation of clouds, condensation trails.	What is the necessary condition for the formation of clouds, condensation trails?	K3
2	Thunderstorm and Air Masses		
2.1.0	Necessary conditions for thunderstorm	Necessary conditions for thunderstorm	K2
2.1.1	life cycle of a thunderstorm, the danger of thunderstorm	life cycle of a thunderstorm, the danger of thunderstorm	K3
2.1.2	Air masses, the origin of an air mass its path, divergence and convergence	Explain Air masses, the origin of an air mass its path, divergence and convergence	K2
2.1.3	the warm front, observation from the ground	What is the warm front, observation from the ground	K2
2.1.4	observation from the air, the cold front, observation from the ground, observation	observation from the air, the cold front,	K2

	from the air, the occluded front, depressions,	observation from the ground, observation from the air, the occluded front, depressions,	
2.1.5	weather associated with it, trough of low pressure, the wave of frontal depression, the cyclone storm, anti-cyclone	weather associated with it, trough of low pressure, the wave of frontal depression, the cyclone storm, anti-cyclone	K3
2.1.6	weather associated with it, a ridge of high pressure.	weather associated with it, a ridge of high pressure.	K2
3	Icing		
3.1.0	The dangers of icing	Explain The dangers of icing	K3
3.1.1	the formation of ice	Explain the formation of ice	K3
3.1.2	super-cooled water drops	What is super-cooled water drops	K2
3.1.3	clear ice, Rime ice, cloudy ice, hoar frost	Explain Rime ice, cloudy ice, hoar frost	K2
3.1.4	De-icing, anti-icing	Classify De-icing, anti-icing	K3
3.1.5	structural icing and cloud type	structural icing and cloud type	K2
3.1.6	carburettor icing, pitot static system icing	Explain carburettor icing, pitot static system icing	K3
4	Weather Forecast and Reports		
4.1.0	Dissemination of weather information	Dissemination of weather information	K2
4.1.1	AIR MET service	What is AIR MET service	K2
4.1.2	types of weather information	Classify the types of weather information	K3
4.1.3	meteorological forecast	Explain meteorological forecast	K2
4.1.4	special forecast	Explain special forecast	K2
4.1.5	aerodrome forecast	Explain aerodrome forecast	K2
4.1.6	Terminal Aerodrome forecast (TAF),	Define Terminal Aerodrome forecast (TAF),	K2
4.1.7	METAR, Transspecies	Classify METAR, Transspecies	K1
4.1.8	VFR- in flight weather report,	Define VFR- in flight weather report,	K2
4.1.9	Automatic Terminal Information System (ATIS)	Explain Automatic Terminal Information System (ATIS)	K3

4.1.10	Notam, Sigma.	Notam, Sigmet	K1
5	Symbols and Abbreviations		
5.1.0	Symbols for significant weather on MET charts	Short note on Symbols for significant weather on MET charts	K4
5.1.1	weather abbreviations (Cloud Type),	What weather abbreviations (Cloud Type),	
5.1.2	Cloud amount	Cloud amount	K2
5.1.3	CB amount, common MET abbreviations	CB amount, common MET abbreviations	K2
5.1.4	CAVOK, TEMPO, lasting change,	CAVOK, TEMPO, lasting change,	K2
5.1.5	Synoptic charts, wind symbols, visibility, METAR decoding	Synoptic charts, wind symbols, visibility, METAR decoding	K3

MAPPING:

	PROGRAMMEOUTCOMES									PROGRAMMESPECIFICOUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	M	H	M	-	-	M	L	L	M	H	M	M
CO2	H	M	H	M	-	-	M	-	-	-	H	M	M
CO3	M	M	H	M	-	-	L	-	-	-	H	L	M
CO4	H	M	H	M	-	-	-	-	-	-	M	M	L
CO5	M	M	H	M	-	L	M	L	-	L	H	M	H
CO6	H	M	H	M	-	L	H	L	-	L	H	M	H

COURSEASSESSMENTMETHODS

Direct

1. Continuous Assessment Test I, II

2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation

3. End Semester Examination

Indirect

1. course – end survey feed back

ELECTIVE – II: AVIATION SECURITY

SEMESTER: V

CODE: U23AV5:B

TOTAL HOURS: 4

CREDITS: 3

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Define the terms related to aviation security	K1	I
2	Identify the process & equipment required for screening	K3	II
3	Identify the objects which are restricted in flight	K3	III
4	Determine the threat level for aviation and convention Related to safeguarding aviation	K5	IV
5	Summarize host age negotiation plan	K2	V
6	Outline the objective of aviation security	K2	I

COURSE OBJECTIVE:

The aim of the course is to

- Train various terminologies and threats in aviation.
- Learn to screen and search the passengers and staffs.
- Study about the restricted articles and substances regarding aircraft.

- Know about the aircraft hijacking and different international conventions.
- Have good knowledge in situation of hostage negotiation and their role.

COURSE CONTENT:

UNIT 1 – DEFINITIONS, OBJECTIVES AND THREATS

Aviation security and Airport security – Terminologies related to aviation security – Objectives of Aviation security – Nature of threats – Types / Characteristics of offenders.

UNIT 2– SCREENING AND SEARCHING OF PASSENGERS AND STAFF

Stages involved in inspection/screening process – Equipment's required for screening – X-ray examination of baggage – Physical inspection of baggage.

UNIT 3– RESTRICTED ARTICLES AND SUBSTANCES

Definition – Categories of restricted articles – Improvised explosive devices – Places of concealment of Explosives – Types of explosives detectors – Bomb threat – Threat to an airborne aircraft.

UNIT 4 – AIRCRAFT HIJACKING AND INTERNATIONAL CONVENTIONS

Unlawful seizure of Aircraft (Hijacking) – Why is Civil aviation considered as an attractive target? Where can the threats come from? – Historical review of the past incidents – Dealing with the hijacking situation onboard – Tokyo convention Hague convention – Montreal convention.

UNIT 5- HOSTAGE NEGOTIATION

Hostage situation – Hostage situation move through several distinct phases – Hostage takers – The negotiator arrives on the scene – Negotiator objectives and tactics – Making a deal with the hostage taker – Role of Cabin crew in hostage situation.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links

1	Emerging security threat in aviation security	http://blog.safe-passage.com/emerging-threats-to-aviation-security
2	Improvised explosive devices	https://en.wikipedia.org/wiki/Improvised_explosive_device
3	Improved passenger screening technology	https://www.futuretravelexperience.com/2016/08/new-technologies-strive-to-enhance-airport-security/

REFERENCE BOOKS

- R.K. Bali – Regulation
- Kathleen M. Sweet – Aviation and airport security
- ICAO Annex 17

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	DEFINITIONS, OBJECTIVES AND THREATS		
1.1	Aviation security and airport security	Exploited of aviation security	K2
1.2	Terminology related to aviation security	Defeathers related to aviation security	K1
1.3	Objectives of aviation security	List out the roles & responsibilities of aviation security units	K4
1.4	Nature of threats	Determine the threats for aviation	K5
1.5	Characteristics of offenders	Identify the offenders	K3
II	SCREENING AND SEARCHING OF PASSENGERS AND STAFF		
2.1	Stages involved in inspection/screening process	List out the stages in screening process	K4
2.2	Equipment required for screening	Choose the correct equipment for specific purpose of screening	K3
2.3	x-ray examination of baggage	Explain the process of screening baggage using x-ray	K2

2.4	Physical inspection of baggage	Explain the process of physical inspection of baggage	K2
III	RESTRICTED ARTICLES AND SUBSTANCES		
3.1.0	Definition	Define the terms related with restricted article	K1
3.1.1	Categories of restricted items	List out the items which are restricted	K4
3.1.2	Improvised explosive devices	Explained	K2
3.1.3	Places of concealment of explosive	Identify the places of concealment of explosives	K3
3.1.4	Types of explosive detector	Compare different type of detector for a particular purpose	K4
3.1.5	Bomb threat	Decide what to do in bomb threat situation	K5
3.1.6	Threat to an airborne aircraft	Plan contingency procedure	K6
IV	AIRCRAFT HIJACKING AND INTERNATIONAL CONVENTIONS		
4.1.0	Unlawful seizure of aircraft	Explain the meaning of hijack	K2
4.1.1	Why civil aviation considered as an attractive target	List out the reason for hijack	K4
4.1.2	Where are the threats come from	Identify the area of threats	K3
4.1.3	Historical review of past incidents	Recall past incidents for future protection	K1
4.1.4	Dealing with hijacking situation onboard	Explain the procedure of negotiation	K2
4.1.5	Tokyo convention, Hague convention, Montreal convention	List out the important contents of these conventions	K4
V	HOSTAGE NEGOTIATION		
5.1.0	Hostage situation	Assume the situation of hostages	K4
5.1.1	Hostage situation move through several distinct phases	Explain the situation of hostages during several phases	K2
5.1.2	The negotiator arrives on the scene	Outline the negotiation of the scene	K2

5.1.3	Negotiator's objectives & tactics	Formulate the objective of negotiator	K6
5.1.4	Making a deal with hijackers	Outline the procedure of negotiation	K2
5.1.5	Relocating crew in hijacking situation	Decide the responsibility of cabin crew during negotiation process	K5

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	L	M	M	M	-	M	M	M	M	M	M	M
CO2	M	H	-	M	L	L	H	H	H	L	H	H	H
CO3	M	L	H	H	H	H	H	M	M	L	-	L	H
CO4	L	M	H	H	H	H	M	M	M	-	M	H	M
CO5	M	M	H	H	-	L	M	M	M	-	L	M	M
CO6	M	M	H	H	H	M	H	L	M	M	M	H	H

COURSE ASSESSMENT METHODS

Direct

1. Continuous Assessment Test I, II
2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation
3. End Semester Examination

Indirect

1. course – end survey feed back

SEMESTER VI

S.No	CourseTitle	CourseCode
1.	Aircraft Instruments	U23AV613
2.	Radio Aids	U23AV614
3.	Flight Synthetic Practical	U23AV6P4
4.	Civil Aviation Requirements (Car) And Safety Management systems	U23AV6:A
5.	Flight Planning Practical	U23AV6:P
6.	Extension Activities	U23ETA61
7.	Airport Ground Handling	U23AVPG1

CORE XIII: AIRCRAFT INSTRUMENTS

SEMESTER: VI

CODE: U23AV613

TOTAL HOURS: 6

CREDITS: 4

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Outline of the Pressure instrument And types of pressure	K3	I
2	Describe About working principle and construction of Air speed indicator	K3	II
3	Describe About working principle and construction of Vertical Speed Indicator	K3	III
4	Study of Earth Magnetism	K2	IV
5	Study of Magnetic Compass	K2	IV
6	Describe about Gyro Instrument	K2	V

COURSE OBJECTIVE:

- To understand the various principles and functions of pressure instruments and gyro instruments.

COURSE CONTENT:

UNIT1: PRESSURE INSTRUMENTS

Revision on atmospheric pressure, static pressure, dynamic pressure, Pressure system, Pressure altimeter, simple altimeter, sensitive altimeter, servo-assisted altimeter- its working principle and construction, 10000 feet warning flag, altimeter errors, blockage and leakage associated with altimeter, purpose of servo assisted altimeter, Hysteresis.

UNIT 2: AIRSPEED INDICATORS

Working Principle and construction of ASI, speeds which are mentioned on the dial of ASI using colored ark, IAS, TAS, EAS, CAS, RAS, conversion, error, leakages and

blockages associated with ASI. Mach meter, its principle, Mach/TAS calculations, Mach meter errors.

UNIT 3: VERTICAL SPEED INDICATOR

Working principle and construction of VSI, Delayed Static pressure, best rate of climb (V_y), Best angle of climb (V_x), Pressure error, Time lag, Position error and blockages, Instantaneous vertical speed indicator (IVSI), Purpose of IVSI, Dashpot, Problem with Dashpot during turn.

UNIT 4: MAGNETISM AND COMPASS.

Earth magnetism, Properties of magnet, Horizontality, sensitivity, aperiodicity, turning error, acceleration error, variation and deviation, Compass heading, magnetic heading, true heading.

UNIT 5: GYRO INSTRUMENTS

Properties and fundamentals of gyros, types of gyros-space gyro, earth gyro, tied gyro, rate gyro, drift, topple and wander, gyro rotor, spin axis Direction Indicator-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 slip Indicator- Principle and construction, bank indication, turn coordinator.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Pressure Instruments, Gyro Instruments	https://pilotinstitute.com/gyroscopic-instruments/#:~:text=The%203%20main%20gyroscopic%20instruments,aircraft's%20orientation%20can%20be%20measured.
2	speed Indicators	https://www.skybrary.aero/articles/air-speed-indicator#:~:text=An%20air%20speed%20indicator%20(ASI,and%20thus%20determine%20forward%20speed.
3	Magnetism and compass	https://www.exploratorium.edu/snacks/circles-of-magnetism#:~:text=A%20compass%20allows%20us%20to,parallel%20to%20magnetic%20field%20lines.

REFERENCE BOOKS

1. GSP – Flight instruments
2. Oxford – general Knowledge 4 (Instrumentation)

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Pressure Instruments		
1.1	Revision on atmospheric pressure, static pressure, dynamic pressure, Pressure system	Revision on atmospheric pressure, static pressure, dynamic pressure, Pressure system	K2
1.2	Pressure altimeter, simple altimeter, sensitive altimeter, servo-assisted altimeter- its working principle and construction	Pressure altimeter, simple altimeter, sensitive altimeter, servo-assisted altimeter- its working principle and construction	K3
1.3	10000 feet warning flag, altimeter errors,	Define 10000 feet warning flag, altimeter errors,	K2
1.4	blockage and leakage associated with altimeter	Explain blockage and leakage associated with altimeter	K2
1.5	purpose of servo assisted altimeter, Hysteresis.	purpose of servo assisted altimeter, Hysteresis.	K2
II	Airspeed Indicators		
2.1	Working Principle and construction of ASI	Working Principle and construction of ASI	K3
2.2	speeds which are mentioned on the dial of ASI using colored ark	Explain speeds which are mentioned on the dial of ASI using colored ark	K3
2.3	IAS, TAS, EAS, CAS, RAS, conversion, error, leakages and blockages associated with ASI	Detail about IAS, TAS, EAS, CAS, RAS, conversion, error, leakages and blockages associated with ASI	K2

2.4	Mach meter, its principle, Mach/TAS calculations,	What is Mach meter, its principle, Mach/TAS calculations	K2
2.5	Mach meter errors.	Explain Mach meter errors.	K3
III	Vertical speed indicator		
3.1.0	Working principle and construction of VSI	Explain Working principle and construction of VSI	K3
3.1.1	Delayed Static pressure	What is Delayed Static pressure	K2
3.1.2	best rate of climb (Vy), Best angle of climb (Vx),	Explain best rate of climb (Vy), Best angle of climb (Vx),	K2
3.1.3	Pressure error, ,	What is Pressure error	K2
3.1.4	Time lag, Position error and blockages	What is Time lag, Position error and blockages	K3
3.1.5	Instantaneous vertical speed indicator (IVSI)	Explain Instantaneous vertical speed indicator (IVSI)	K2
3.1.6	Purpose of IVSI, Dashpot, Problem with Dashpot during turn.	Purpose of IVSI, Dashpot, Problem with Dashpot during turn.	K3
IV	Magnetism and compass		
4.1.0	Earth magnetism	Explain Earth magnetism	K2
4.1.1	Properties of magnet	Horizontality, sensitivity, aperiodicity, turning error, acceleration error, variation and deviation	K2
4.1.2	Compass	Compass heading, magnetic heading, true heading.	
V	Gyro Instruments		
5.1.0	Properties and fundamentals of gyros	Properties and fundamentals of gyros	K2
5.1.1	types of gyros-space gyro, earth gyro, tied gyro, rate gyro, drift,	types of gyros-space gyro, earth gyro, tied gyro, rate gyro, drift, topple and wander, gyro rotor, spin axis	K3

	topple and wander, gyro rotor, spin axis		
5.1.2	Direction Indicator-Principle of operation	What is Direction Indicator-Principle of operation	K2
5.1.3	adjustment procedure, erection system, gimbal error,	adjustment procedure, erection system, gimbal error	K3
5.1.4	Drift calculation, Drift compensation	Drift calculation, Drift compensation	K4
5.1.5	Attitude Indicator-Principle and construction, erection mechanism, acceleration errors, turning errors	Attitude Indicator-Principle and construction, erection mechanism, acceleration errors, turning errors	K3
5.1.6	electrically driven attitude indicator and its errors Turn and slip Indicator-	Explain electrically driven attitude indicator and its errors Turn and slip Indicator	K4
5.1.7	Principle and bank turn construction, indication, coordinator.	Principle and construction, bank indication, turn coordinator.	K2

MAPPING:

	PROGRAMMEOUTCOMES									PROGRAMMESPECIFICOUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PSO1	PSO 2	PSO 3	PSO 4
CO1	H	H	L	H	-	-	M	-	-	M	L	H	M
CO2	H	H	L	H	-	-	L	-	-	L	L	H	M
CO3	H	H	L	H	-	-	M	-	-	L	-	H	M
CO4	M	H	M	H	-	-	M	-	-	M	-	H	H
CO5	H	H	M	H	-	-	M	-	-	H	-	M	M

CO6	H	H	L	H	-	-	L	-	-	M	-	H	M
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COURSEASSESSMENTMETHODS

Direct
1.Continuous Assessment Test I, II 2.Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3.End Semester Examination
Indirect
1. course – end survey feed back

CORE PAPER VII: RADIO AIDS

SEMESTER: IV

CODE: U21AV407

TOTAL HOURS: 4

CREDITS: 3

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Understand about the Direction finding Aids	K4	I
2	What is Radar and It's types	K2	II
3	Classify the Advantage and Disadvantage of the Radar	K2	II
4	What is cockpit Display And it's types	K2	III
5	Explain Secondary Radar theory And DME	K3	IV
6	Explain Secondary Surveillance Radar	K3	V

COURSE OBJECTIVE:

- Understand the functioning of various Nav aids that are made available inflight, on ground, principle behind their operation.

UNIT 1: DIRECTION FINDING AIDS

Basic Radio Propagation Principles

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 2: BASIC RADAR

Introduction to RADAR principles, Primary RADAR, Secondary RADAR, Terminology, Advantages and Disadvantages of primary and secondary RADAR, RADAR parameters, use of RADAR, Types of ground radar services, Use of Surveillance RADAR, Types of radar approaches.

UNIT 3: AIRBORNE WEATHER RADAR AND COCKPIT DISPLAYS

Introduction to CRT and LCD Head-up display, Principle of operation and functions of airborne weather Radar, Types of antennae and beam used, Selection of frequency, Intensity of weather displayed in color display, Iso echo circuit, Controls in panel, Mapping display, hazard detections.

UNIT 4: SECONDARY RADAR THEORY AND DME

Introduction to Secondary Radar principle, Transponder, airborne equipment, working principle of DME, Saturation of ground equipment, Distance calculation, slant range, Search mode, Track mode, co-located VOR and DME, ILS paired DME, Use of the equipment.

UNIT 5: SECONDARY SURVEILLANCE RADAR

Working principle of SSR, Frequency used, Advantages and disadvantages of SSR, current modes and codes, Mode 'C' and 'S' interrogation, Advantage of Mode S, SQUAWK codes, Fruiting and Garbling.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Basic principle of Radio Propagation	https://www.eetimes.com/rf-basics-radio-propagation/#:~:text=Radio%20waves%20can%20propagate%20from,the%20surface%20of%20the%20earth.

2	Radar theory	https://www.infineon.com/cms/en/product/promopages/makeradar/makeradar-school/radar-theory/
3	Secondary Surveillance Radar	https://en.wikipedia.org/wiki/Secondary_surveillance_radar

Reference Books

1. Oxford- Navigation 2(Radio Navigation)
2. Ground studies for Pilots-Radio Aids
3. General navigation by R.K. Bali
4. Guide to Radio telephony, Radio aids and avionics.

PECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Direction Finding Aids		
1.1	VDF -Principles, Factors affecting range (D)	Explain VDF -Principles, Factors affecting range (D)	K3
1.2	Factors affecting accuracy, VHF let-down service.	Factors affecting accuracy, VHF let-down service.	K2
1.3	ADF/NDB -Types of NDB, principles of airborne D/F	Explain ADF/NDB -Types of NDB, principles of airborne D/F	K3
1.4	frequency range, ADF, RBI, RMI, uses of RBI, Errors (ADF and NDB), and Accuracy.	frequency range, ADF, RBI, RMI, uses of RBI, Errors (ADF and NDB), and Accuracy.	K2
1.5	VOR (VHF OMNIRANGE) - Principle of operation, Airborne equipment, frequency range	Explain VOR (VHF OMNIRANGE) -Principle of operation, Airborne equipment, frequency range	K3
1.6	Factors affecting accuracy, factors affecting range. RMI - Advantages and use of RMI, HSI.	Factors affecting accuracy, factors affecting range. RMI - Advantages and use of RMI, HSI.	K2
II	Basic RADAR		

2.1	Introduction to RADAR principles	Define Introduction to RADAR principles	K1
2.2	Primary RADAR, Secondary RADAR, Terminology	What Is Primary RADAR, Secondary RADAR, Terminology	K2
2.3	Advantages and Disadvantages of primary and secondary RADAR, RADAR parameters, use of RADAR,	Advantages and Disadvantages of primary and secondary RADAR, RADAR parameters, use of RADAR,	K3
2.4	Types of ground radar services	Types of ground radar services	K2
2.5	Use of Surveillance RADAR,	Use of Surveillance RADAR,	K2
2.6	Types of radar approaches.	Types of radar approaches.	K2
III	Airborne Weather RADAR and Cockpit Displays		
3.1.0	Introduction to CRT and LCD Head-up display	Introduction to CRT and LCD Head-up display	K1
3.1.1	Principle of operation and functions of airborne weather Radar	Explain Principle of operation and functions of airborne weather Radar	K2
3.1.2	Types of antennae and beam used	Types of antennae and beam used	K2
3.1.3	Selection of frequency, Intensity of weather displayed in colour display	Selection of frequency, Intensity of weather displayed in colour display	K2
3.1.4	Iso echo circuit, Controls in panel, Mapping display, hazard detections.	Iso echo circuit, Controls in panel, Mapping display, hazard detections.	K1
IV	Secondary RADAR Theory and DME		

4.1.0	Introduction to Secondary Radar principle	Introduction to Secondary Radar principle	K1
4.1.1	Transponder, airborne equipment, working principle of DME, Saturation of ground equipment, Distance calculation, slant range	Explain Transponder, airborne equipment, working principle of DME, Saturation of ground equipment, Distance calculation, slant range	K3
4.1.2	Search mode, Track mode, co-located VOR and DME, ILS paired DME, Use of the equipment	What is Search mode, Track mode, co-located VOR and DME, ILS paired DME, Use of the equipment	K2
V	Secondary Surveillance RADAR		
5.1.0	Working principle of SSR, Frequency used	Working principle of SSR, Frequency used	K3
5.1.1	Advantages and disadvantages of SSR, current modes and codes,	Advantages and disadvantages of SSR, current modes and codes,	K2
5.1.2	Mode 'C' and 'S' interrogation,	What is Mode 'C' and 'S' interrogation,	K2
5.1.3	Advantage of Mode S, SQUAWK codes, Fruiting and Garbling	Advantage of Mode S, SQUAWK codes, Fruiting and Garbling	K2

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	M	L	M	-	L	L	L	L	M	-	L	L
CO2	L	M	L	M	-	-	-	-	-	L	L	L	L

CO3	L	M	-	M	-	-	-	-	-	M	-	L	-
CO4	L	M	-	M	-	-	L	-	-	M	-	L	L
CO5	M	M	-	M	-	-	L	--	-	M	-	-	-
CO6	M	M	L	M	-	-	-	-	-	M	-	-	L

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1. course – end survey feed back

CORE PAPER XIV: RADIO AIDS

SEMESTER: VI

CODE: U23AV614

TOTAL HOURS: 6

CREDITS: 4

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Understand about the Direction finding Aids	K4	I
2	What is Radar and It's types	K2	II
3	Classify the Advantage and Disadvantage of the Radar	K2	II
4	What is cockpit Display And it's types	K2	III
5	Explain Secondary Radar theory And DME	K3	IV

6	Explain Secondary Surveillance Radar	K3	V
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COURSE OBJECTIVE:

- Understand the functioning of various Nav aids that are made available inflight, on ground, principle behind their operation.

UNIT 1: DIRECTION FINDING AIDS

Basic Radio Propagation Principles

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 2: BASIC RADAR

Introduction to RADAR principles, Primary RADAR, Secondary RADAR, Terminology, Advantages and Disadvantages of primary and secondary RADAR, RADAR parameters, use of RADAR, Types of ground radar services, Use of Surveillance RADAR, Types of radar approaches.

UNIT 3: AIRBORNE WEATHER RADAR AND COCKPIT DISPLAYS

Introduction to CRT and LCD Head-up display, Principle of operation and functions of airborne weather Radar, Types of antennae and beam used, Selection of frequency, Intensity of weather displayed in color display, Iso echo circuit, Controls in panel, Mapping display, hazard detections.

UNIT 4: SECONDARY RADAR THEORY AND DME

Introduction to Secondary Radar principle, Transponder, airborne equipment, working principle of DME, Saturation of ground equipment, Distance calculation, slant range, Search mode, Track mode, co-located VOR and DME, ILS paired DME, Use of the equipment.

UNIT5: SECONDARY SURVEILLANCE RADAR

Working principle of SSR, Frequency used, Advantages and disadvantages of SSR, current modes and codes, Mode ‘C’ and ‘S’ interrogation, Advantage of Mode S, SQUAWK codes, Fruiting and Garbling.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Basic principle of Radio Propagation	https://www.eetimes.com/rf-basics-radio-propagation/#:~:text=Radio%20waves%20ca

		n% 20propagate% 20from, the% 20surface% 20of% 20the% 20earth.
2	Radar theory	https://www.infineon.com/cms/en/product/promopages/makeradar/makeradar-school/radar-theory/
3	Secondary Surveillance Radar	https://en.wikipedia.org/wiki/Secondary_surveillance_radar

Reference Books

5. 1 Oxford- Navigation 2(Radio Navigation)
6. Ground studies for Pilots-Radio Aids
7. General navigation by R.K. Bali
8. Guide to Radio telephony, Radio aids and avionics.

PECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Direction Finding Aids		
1.1	VDF -Principles, Factors affecting range (D)	Explain VDF -Principles, Factors affecting range (D)	K3
1.2	Factors affecting accuracy, VHF let-down service.	Factors affecting accuracy, VHF let-down service.	K2
1.3	ADF/NDB -Types of NDB, principles of airborne D/F	Explain ADF/NDB -Types of NDB, principles of airborne D/F	K3
1.4	frequency range, ADF, RBI, RMI, uses of RBI, Errors (ADF and NDB), and Accuracy.	frequency range, ADF, RBI, RMI, uses of RBI, Errors (ADF and NDB), and Accuracy.	K2
1.5	VOR (VHF OMNIRANGE) - Principle of operation, Airborne equipment, frequency range	Explain VOR (VHF OMNIRANGE) -Principle of operation, Airborne equipment, frequency range	K3
1.6	Factors affecting accuracy, factors affecting range. RMI - Advantages and use of RMI, HSI.	Factors affecting accuracy, factors affecting range. RMI - Advantages and use of RMI, HSI.	K2

II	Basic RADAR		
2.1	Introduction to RADAR principles	Define Introduction to RADAR principles	K1
2.2	Primary RADAR, Secondary RADAR, Terminology	What Is Primary RADAR, Secondary RADAR, Terminology	K2
2.3	Advantages and Disadvantages of primary and secondary RADAR, RADAR parameters, use of RADAR,	Advantages and Disadvantages of primary and secondary RADAR, RADAR parameters, use of RADAR,	K3
2.4	Types of ground radar services	Types of ground radar services	K2
2.5	Use of Surveillance RADAR,	Use of Surveillance RADAR,	K2
2.6	Types of radar approaches.	Types of radar approaches.	K2
III	Airborne Weather RADAR and Cockpit Displays		
3.1.0	Introduction to CRT and LCD Head-up display	Introduction to CRT and LCD Head-up display	K1
3.1.1	Principle of operation and functions of airborne weather Radar	Explain Principle of operation and functions of airborne weather Radar	K2
3.1.2	Types of antennae and beam used	Types of antennae and beam used	K2
3.1.3	Selection of frequency, Intensity of weather displayed in colour display	Selection of frequency, Intensity of weather displayed in colour display	K2
3.1.4	Iso echo circuit, Controls in panel, Mapping display, hazard detections.	Iso echo circuit, Controls in panel, Mapping display, hazard detections.	K1
IV	Secondary RADAR Theory and DME		

4.1.0	Introduction to Secondary Radar principle	Introduction to Secondary Radar principle	K1
4.1.1	Transponder, airborne equipment, working principle of DME, Saturation of ground equipment, Distance calculation, slant range	Explain Transponder, airborne equipment, working principle of DME, Saturation of ground equipment, Distance calculation, slant range	K3
4.1.2	Search mode, Track mode, co-located VOR and DME, ILS paired DME, Use of the equipment	What is Search mode, Track mode, co-located VOR and DME, ILS paired DME, Use of the equipment	K2
V	Secondary Surveillance RADAR		
5.1.0	Working principle of SSR, Frequency used	Working principle of SSR, Frequency used	K3
5.1.1	Advantages and disadvantages of SSR, current modes and codes,	Advantages and disadvantages of SSR, current modes and codes,	K2
5.1.2	Mode 'C' and 'S' interrogation,	What is Mode 'C' and 'S' interrogation,	K2
5.1.3	Advantage of Mode S, SQUAWK codes, Fruiting and Garbling	Advantage of Mode S, SQUAWK codes, Fruiting and Garbling	K2

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	M	L	M	-	L	L	L	L	M	-	L	L
CO2	L	M	L	M	-	-	-	-	-	L	L	L	L

CO3	L	M	-	M	-	-	-	-	-	M	-	L	-
CO4	L	M	-	M	-	-	L	-	-	M	-	L	L
CO5	M	M	-	M	-	-	L	--	-	M	-	-	-
CO6	M	M	L	M	-	-	-	-	-	M	-	-	L

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1. course – end survey feed back

ELECTIVE III: CIVIL AVIATION REQUIREMENTS (CAR) AND SAFETY MANAGEMENT SYSTEMS

SEMESTER: VI

CODE: U23AV6:A

TOTAL HOURS: 5

CREDITS: 3

COURSE OUTCOMES

On completion of this course, the students will be able to:

No	Course Outcomes	Level	Unit Covered
1	Purpose of the civil Aviation And Introduction of Civil Aviation Requirement	K4	I
2	Monitoring the Aircraft and the airport Regulation and noise management in Civil Aviation	K3	II
3	Study in Terms of General terms of Civil Aviation Requirement.	K2	III

4	Study of Airworthiness and air space and air navigation service standard	K3	III
5	Safety management System And Indian safety policy	K2	IV
6	Describe the Error and case study for the Accidents	K3	V

COURSE OBJECTIVE:

- Understanding the various laws and regulations pertaining to aviation safety and standards.

COURSE CONTENT:

UNIT 1: INTRODUCTION

Purpose of Civil Aviation requirement (CAR), purpose of safety management systems, applications, circulars, sections pertaining to various operations.

UNIT 2: AVIATION ENVIRONMENTAL PROTECTION

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

UNIT 3: CIVIL AVIATION REQUIREMENTS (CAR)

Section 1 to Section 11

- General
- Airworthiness
- Air transport
- Aerodrome standards
- Air safety
- Design standard and type certification
- Flight crew standard training & licensing
- Aircraft operations
- Airspace and air navigation service standards
- Aviation environment protection
- Safe transport of dangerous goods by air

UNIT 4: 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 5: CASE STUDIES

Description, error, cause of accident and solution of following accidents.

- American Airlines Flight 587
- Aires Flight 8250
- American airlines flight 191
- Air France 447
- Flight Itavia 870

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Safety Management System	https://www.faa.gov/about/initiatives/sms
2	Case study accidents	https://www.aopa.org/training-and-safety/online-learning/accident-case-studies
3	CAR	http://164.100.60.133/rules/car-ind.htm

REFERENCE BOOKS

1. DGCA website for latest CAR updates.
2. Aerodrome Information Publication (AIP)

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Introduction		
1.1	Purpose of Civil Aviation requirement (CAR)	Explain Purpose of Civil Aviation requirement (CAR)	K2
1.2	purpose of safety management systems	Explain purpose of safety management systems	K3

1.3	applications, circulars, sections pertaining to various operations	applications, circulars, sections pertaining to various operations	K2
II	Aviation Environmental Protection		
2.1	Noise management of aircraft	Explain Noise management of aircraft	K2
2.2	Noise Abatement operational Procedure	Explain Noise Abatement operational Procedure	K2
2.3	aircraft operations at airport	aircraft operations at airport	K3
2.4	climate change initiatives and local air quality monitoring in civil aviation.	climate change initiatives and local air quality monitoring in civil aviation.	K3
III	Civil Aviation Requirements (CAR)		
3.1.0	Section 1 to Section 11	General	K1
3.1.1	Airworthiness	Explain Airworthiness	K2
3.1.2	Air transport	Explain Air transport	K2
3.1.3	Aerodrome standards	Explain Aerodrome standards	K2
3.1.4	Air safety	Explain Air safety	K3
3.1.5	Design standard and type certification	Define Design standard and type certification	K2
3.1.6	Flight crew standard training & licensing	Explain Flight crew standard training & licensing	K3
3.1.7	Aircraft operations	Describe the Aircraft operations	K3
3.1.8	Airspace and air navigation service standards	Illustrate Airspace and air navigation service standards	K2
3.1.9	Aviation environment protection	Explain Aviation environment protection	K2

3.1.10	Safe transport of dangerous goods by air	Safe transport of dangerous goods by air	K3
IV	Safety Management System (SMS)		
4.1.0	Indian safety policy	Explain Indian safety policy	K3
4.1.1	Indian safety plan, SMS, SSP, ICAO ANNEX 19- Safety management,	Indian safety plan, SMS, SSP, ICAO ANNEX 19- Safety management,	K3
4.1.2	establishment of safety management system	establishment of safety management system	K2
4.1.3	applicability of SMS	Explain the applicability of SMS	K3
4.1.4	safety policy and objective	safety policy and objective	K4
4.1.5	coordination of emergency response planning, documentation,	coordination of emergency response planning, documentation,	K3
4.1.6	safety management system manual	What is safety management system manual	K2
4.1.7	safety risk management, safety assurance, safety promotions, quality policy.	Explain safety risk management, safety assurance, safety promotions, quality policy.	K3
V	Case Studies		
5.1.0	American Airlines Flight 587	Description, error, cause of accident and solution of following accidents.	K3
5.1.1	Aires Flight 8250	Description, error, cause of accident and solution of following accidents.	K3
5.1.2	American airlines flight 191	Description, error, cause of accident and solution of following accidents.	K3
5.1.3	Air France 447	Description, error, cause of accident and solution of following accidents.	K3

5.1.4	Flight Itavia 870	Description, error, cause of accident and solution of following accidents.	K3
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MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	-	L	-	M	-	L	-	-	-	L	L	L
CO2	M	-	L	-	M	-	M	L	L	L	L	M	L
CO3	M	-	L	-	M	-	-	-	-	-	-	L	L
CO4	H	-	L	-	M	-	-	-	-	M	-	L	M
CO5	M	-	L	-	M	-	L	L	L	H	L	L	H
CO6	H	-	L	-	M	-	L	L	L	M	L	L	L

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1. course – end survey feed back

ELECTIVE IV: FLIGHT PLANNING (PRACTICAL)

SEMESTER: VI

CODE: U23AV6:P

TOTAL HOURS: 5

CREDITS: 3

COURSE OUTCOMES:

On Completion of this course, the student will be able to,

U. No	Course Outcomes	Level	Unit Covered
1	Outline the different agencies involved for flight planning	K2	I
2	Develop and submit a fresh flight plan	K3	II
3	Decide the mode of submission of flight plan according to their requirement	K5	III
4	Interpret the information's in NOTAM	K2	V
5	Interpret ATIS into	K2	VI
6	List out the procedure to obtain current Weather obtaining	K4	VII

COURSE CONTENT:

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.

TOPICS FOR SELF STUDY

S. No	Topics	Web Links
1	Flight Plan	https://en.wikipedia.org/wiki/Flight_plan
2	Weather obtaining procedures	https://gargicollege.in/wp-content/uploads/2020/03/weather_forecast.pdf
3	NOTAM	https://www.faa.gov/about/initiatives/notam/what_is_a_notam

REFERENCE BOOKS

1. Aeroplan Technical, Trevor Thom.
2. Oxford Mass and balance performance
3. Oxford Flight planning and monitoring.
4. Aircraft technical by Mike Burton.
5. Ground studies for pilots, Flight planning.

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
1			
1.1	Understanding, Coordination with different agencies	Understanding, Coordination with different agencies	K3
1.2	Filling of Flight Plan	Filling of Flight Plan	K2
1.3	Mode of submissions of flight plan	Mode of submissions of flight plan	K2
1.4	Obtaining FIC and ADC	Outline and the purpose of the obtaining FIC AND ADC	K2
1.5	Study of NOTAM	Study of NOTAM	K2
1.6	ATIS	ATIS	K2
1.7	Weather obtaining procedures.	Weather obtaining procedures.	K2

MAPPING:

	PROGRAMME OUTCOMES									PROGRAMME SPECIFIC OUTCOMES			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	M	M	M	L	L	M	-	-	L	L	M	M
CO2	M	L	M	L	L	-	M	L	L	-	L	H	M
CO3	M	M	M	M	L	-	L	-	-	L	L	L	M
CO4	M	M	M	L	L	-	L	L	-	M	M	L	M
CO5	H	L	M	M	-	L	L	M	-	M	M	M	H
CO6	H	H	H	M	L	L	M	M	-	L	L	M	H

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Open Book Test Assignment Seminar Journal Paper Review Group Presentation 3. End Semester Examination
Indirect
1. course – end survey feed back

