



BHARATHIDASANUNIVERSITY, TIRUCHIRAPPALLI-620024.

**B.Sc. AVIATION
CHOICE BASED CREDIT SYSTEM –**

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS-LOCF)

(Applicable to the candidates admitted from the academic year 2026-2027 onwards)

Sem	Part	Courses	Title	Ins. Hrs.	Credits	Exam. Hours	Maximum Marks		
							Int.	Ext.	Total
I	I	Ability Enhancement Course – I (AEC - I)	(Tamil \$ / Other Languages +, #)	6	3	3	30	70	100
	II	Ability Enhancement Course – II (AEC - II)	English Course - I	6	3	3	30	70	100
	III	Core Course - 1 (CC - 1)	Familiarization of Aircraft	4	4	3	30	70	100
		Core Practical - 1 (CP - 1)	Familiarization of Airport	4	4	3	40	60	100
		Allied Course – 1 (AC - 1)	Introduction to Physics	4	4	3	30	70	100
		Allied Course Practical – 1 (ACP-1)	Physics Lab	2	**	**	**	**	**
	IV	Value Education	Value Education	2	2	3	30	70	100
		Interdisciplinary Course – 1 (IDC - 1) #	One Course from Outside Department	2	2	3	30	70	100
	Total			30	22	--	--	--	700
II	I	Ability Enhancement Course – III (AEC - III)	(Tamil \$ / Other Languages +, #)	6	3	3	30	70	100
	II	Ability Enhancement Course – IV (AEC - IV)	English Course - II	6	3	3	30	70	100
	III	Core Course - 2 (CC - 2)	Dangerous Goods and Regulations	4	4	3	30	70	100
		Core Practical - 2 (CP - 2)	Radio Telephony and Communications	4	4	3	40	60	100
		Allied Course – 2 (AC - 2)	Basic Electricity and Aircraft Electrical Systems	4	4	3	30	70	100
		Allied Course Practical - 1 (ACP-1)	Physics Lab	2	4	3	40	60	100
	IV	Skill Enhancement Course - 1 (SEC - 1) ##	Human Performance	2	2	3	30	70	100
		Interdisciplinary Course – 2 (IDC - 2) #	One Course from Outside Department	2	2	3	30	70	100
	Total			30	26	--	--	--	800

III	I	Ability Enhancement Course – V(AEC - V)	(Tamil \$ / Other Languages +, #)	6	3	3	30	70	100
	II	Ability Enhancement Course – VI (AEC - VI)	English Course - III	6	3	3	30	70	100
	III	Core Course - 3 (CC - 3)	Piston Engines and Propellers	4	4	3	30	70	100
		Core Practical - 3 (CP - 3)	ATC Communication and Its Units	4	4	3	40	60	100
		Allied Course – 3 (AC - 3)	Aviation Calculation and Numericals	4	4	3	30	70	100
		Allied Course Practical - 2 (ACP-2)	Flight Synthetic	2	**	**	**	**	**
	IV	Skill Enhancement Course - 2 (SEC - 2) ##	Aviation Logistics and Cargo Management	2	2	3	30	70	100
		Interdisciplinary Course – 3 (IDC - 3) \$\$	One Course from Outside Department	2	2	3	30	70	100
		Health & Wellness @		--	1	--			100
	Total			30	23	--	--	--	800
	I	Ability Enhancement Course – VII (AEC - VII)	(Tamil \$ / Other Languages +, #)	6	3	3	30	70	100
IV	II	Ability Enhancement Course – VIII (AEC - VIII)	English Course - IV	6	3	3	30	70	100
	III	Core Course - 4 (CC - 4)	Air Navigation	4	4	3	30	70	100
		Core Practical - 4 (CP - 4)	Hangar Workshop	4	4	3	40	60	100
		Allied Course – 4 (AC - 4)	Meteorology	4	4	3	30	70	100
		Allied Course Practical - 2 (ACP-2)	Flight Synthetic	2	4	3	40	60	100
	IV	Skill Enhancement Course - 3 (SEC - 3) ##	Basic Radio and Instrument Navigation	2	2	3	30	70	100
		Interdisciplinary Course - 4 (IDC - 4) \$\$	One Course from Outside Department	2	2	3	30	70	100
	Total			30	26	--	--	--	800
		Summer Internship / Industrial Activity during the Summer Vacation after II Year							

V	III	Core Course - 5 (CC - 5)	Aircraft Systems	4	4	3	30	70	100
		Core Course - 6 (CC - 6)	Flight Performance and Planning	5	4	3	30	70	100
		Core Course - 7 (CC - 7)	Air Regulations	5	4	3	30	70	100
		Core Course - 8 (CC - 8)	Aviation Security	5	4	3	30	70	100
		Core Practical - 5 (CP - 5)	Air Navigation Practical	5	4	3	40	60	100
	IV	Skill Enhancement Course - 4 (SEC - 4)	Ticketing and Visa	2	2	3	30	70	100
		Skill Enhancement Course - 5 (SEC - 5) ##	Aviation Safety Regulation	2	2	3	30	70	100
		Introduction to Disaster Management		2	2	3	30	70	100
		Summer Internship / Industrial Activity @@	(with Viva-Voce)	--	2	--	20	80	100
	Total			30	28	--	--	--	900
VI	III	Core Course - 9 (CC - 9)	Aircraft Instruments	4	4	3	30	70	100
		Core Course - 10 (CC - 10)	Airport Ground Handling	5	4	3	30	70	100
		Core Course - 11 (CC - 11)	Civil Aviation Requirements and Management Systems	5	4	3	30	70	100
		Core Project Work (CPW) @@	Project Work (with Viva-Voce)	6	4	3	20	80	100
	IV	Value Added Course	General Studies for Competitive Examinations	2	1	--	30	70	100
		Skill Enhancement Course - 6 (SEC - 6)	Radio Aids	2	2	3	30	70	100
		Skill Enhancement Course - 7 (SEC - 7) ##	Travel Agency Operation	2	2	3	30	70	100
		Environmental Studies		2	2	3	30	70	100
		Gender Studies		2	1	3	30	70	100
		Extension Activities *		--	1	--	--	--	--
		Total			30	25	--	--	900
	Grand Total			180	150	--	--	--	4900

ALLIED COURSE

First Year	Second Year
1. Introduction to Physics 2. Physics Lab (P) 3. Basic Electricity and Aircraft Electrical Systems	1. Aviation Calculation and Numericals 2. Flight Synthetic (P) 3. Meteorology

SKILL ENHANCEMENT COURSE (SEC)

Sl. No.	Title of paper	Sl. No.	MANDATORY Naan Mudhalvan Scheme ##
1.	Human Performance	1.	2nd Semester:
2.	Aviation Logistics and Cargo Management		
3.	Basic Radio and Instrument Navigation	2.	3rd Semester:
4.	Ticketing and Visa		
5.	Aviation Safety Regulation	3.	4th Semester:
6.	Radio Aids		
7.	Travel Agency Operation	4.	5th Semester:
8.	-----	5.	6th Semester:

INTERDISCIPLINARY COURSE (IDC) FOR WHO HAVE OPT TAMIL AS PART - I (for other Department Students only)

1 st Semester	Introduction to Aviation
2 nd Semester	Theory of Flight (Aerodynamics)
3 rd Semester	Introduction to Airlines
4 th Semester	Radio Telephony

INTERDISCIPLINARY COURSE (IDC) # FOR WHO HAVE NOT OPT TAMIL AS PART - I

Those who have studied Tamil upto 10 th +2 but opt for other languages in degree	1 st Semester	Special Tamil - I
	2 nd Semester	Special Tamil - II
Those who have not studied Tamil in school level	1 st Semester	Basic Tamil - I
	2 nd Semester	Basic Tamil - II
Those students who opt for either special Tamil (or) Basic Tamil as IDCs, have to choose 2 more IDCs courses in their 3 rd and 4 th Semester from Outside his/her department.		

INTERDISCIPLINARY COURSE (IDC) \$\$ FOR NCC CADETS ONLY	
NCC Course is a Compulsory Course for the NCC Cadets in the 3rd Semester:	NCC Course is a Compulsory Course for the NCC Cadets in the 4th Semester:
Introduction to NCC	1. Special Subject Army (or) 2. Special Subject Navy (or) 3. Special Subject Air force
Those students who opt for NCC Courses as IDCs, have to choose 2 more IDCs courses in their 1 st and 2 nd Semester from Outside his/her department.	

SUMMARY OF CURRICULUM STRUCTURE OF UG PROGRAMMES – SCIENCE

Sl. No.	Part	Types of the Courses	No. of Courses	Credits for each Course	Total Credits	Marks
1.	I	Ability Enhancement Course	4	3	12	400
2.	II	Ability Enhancement Course	4	3	12	400
3.	III	Core Course	11	4	44	1100
4.		Core Practical	5	4	20	500
5.		Allied Course (AC)	4	4	16	400
6.		Allied Course Practical (ACP)	2	4	8	200
7.		Core Project Work (CPW)	1	4	4	100
8.	IV	Skill Enhancement Course (SEC)	7	2	14	700
9.		Interdisciplinary Course (IDC)	4	2	8	400
10.		Value Education	1	2	2	100
11.		Health and Wellness	1	1	1	100
12.		Introduction to Disaster Management	1	2	2	100
13.		Summer Internship / Industrial Activity	1	2	2	100
14.		Value Added Course	1	1	1	100
15.		Environmental Studies	1	2	2	100
16.		Gender Studies	1	1	1	100
17.		EXTENSION ACTIVITIES (NCC / NSS / SPORTS / ANTI DRUG CELL / YRC & Any Other Activities	--	1	1	--
Total			49	-	150	4900

\$	For those who have studied Tamil upto 10 th +2 (Regular Stream)
+	Syllabus for other Languages should be on par with Tamil at degree level
#	Those who have studied Tamil upto 10 th +2 but opt for other languages in degree level under Part - I should study special Tamil and those who have not studied Tamil in the school level should study Basic Tamil in Part – IV under the Interdisciplinary Course.

**	Examination at the end of the next semester															
##	Naan Mudhalvan Scheme: As per the Naan Mudhalvan Scheme instructions, 5 courses from 2 nd to 6 th semester should be studied under Skill Enhancement Course.															
\$\$	NCC Course is one of the Choices in the Interdisciplinary Course. Only the NCC Cadets are eligible to choose this course. However, NCC Course is a Compulsory Course for the NCC Cadets.															
@	Health and Wellness: Assessments: • Use self-reflective worksheets to assess their understanding • submit the worksheets to internal audit / external audit • Every student's activity report should be documented and the same have to be assessed by the Physical Director with Mentor. The evaluation should be for 100 marks. No examination is required. Scheme of Evaluation: <table><tr><th>Part</th><th>Description</th><th>Marks</th></tr><tr><td>A</td><td>Report</td><td>40</td></tr><tr><td>B</td><td>Attendance</td><td>20</td></tr><tr><td>C</td><td>Activities (Observation During Practice)</td><td>40</td></tr><tr><td colspan="2">Total</td><td>100</td></tr></table>	Part	Description	Marks	A	Report	40	B	Attendance	20	C	Activities (Observation During Practice)	40	Total		100
Part	Description	Marks														
A	Report	40														
B	Attendance	20														
C	Activities (Observation During Practice)	40														
Total		100														
@@	Summer Internship / Industrial Activity Internship will be carried out during the summer vacation after the second year. Viva-Voce will be conducted by the college and Marks shall be send to the University and the same will be included in the 5th semester Mark Statement. Summer Internship / Industrial Activity& Project Work Scheme of Evaluation: <table><tr><th>Description</th><th>Marks</th></tr><tr><td>Report</td><td>80</td></tr><tr><td>Viva-Voce</td><td>20</td></tr><tr><td>Total</td><td>100</td></tr></table>	Description	Marks	Report	80	Viva-Voce	20	Total	100							
Description	Marks															
Report	80															
Viva-Voce	20															
Total	100															
*	Extension Activities shall be outside instruction hours.															

PROGRAM OUTCOMES–B.Sc.-AVIATION

On Successful completion of the Program the undergraduate of aviation will be able to,

KNOWLEDGE

PO1	Exhibit knowledge on difference element used together for safe 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 stream lined flow of airline business
SKILLS	
PO4	Demonstrate skill in handling & operating various aviation tools, instruments & equipment's.
PO5	Exhibit intra and inter personal skills including wide knowledge of Indian and International air law.
PO6	Demonstrates soft communication skills that uplift passenger handling.
ATTITUDES	
PO7	Demonstrate importance of team work, 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 by product 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 coded aviation information.

PSO3 Evaluate plan and 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.

LEARNING OUTCOMES (LO):

LO1: Disciplinary Knowledge
LO2: Communication Skills
LO3: Critical thinking
LO4: Problem Solving
LO5: Analytical Reasoning
LO6: Research-related Skills
LO7: Cooperation/ Team Work
LO8: Scientific Reasoning
LO9: Reflective Thinking
LO10: Information/ digital literacy
LO11: Self-directed learning
LO12: Multicultural competence
LO13: Moral and ethical awareness/reasoning
LO14: Leadership readiness/qualities
LO15: Life-long learning

First Year

CORE COURSE 1

Semester I

Code:

FAMILIARIZATION OF AIRCRAFT

Credits: 4

(Theory)

COURSE OBJECTIVE:

To provide fundamental knowledge of aircraft structure, systems, types, and basic principles of operation to build a foundation in aviation.

UNIT – I: UNDERSTANDING OF BASIC MECHANICS, THERMO DYNAMICS 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 – II: AIR FRAME & SYSTEMS:

Types of Fuselages, Load transfer technique, Various Wing Structures- Rectangular, Elliptical, sweptback, 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-III: 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-IV: AIR CRAFT 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.

UNIT – V: AIR CRAFT 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.

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Draw a simple airfoil and explain how lift is produced. Study aircraft diagrams and identify parts: fuselage, wings, tail. Observe videos/simulators and note how each control affects movement (roll, pitch, yaw)

TOPIC FOR SELF STUDY:

Sl. 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(Air frame and systems)
2. Oxford–Aircraft General Knowledge 3 (power plant)
3. Aero plane Technical by Trevor Thom

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Understanding basic fluid mechanics and thermodynamics relevant to aviation applications	LO1
CO2	Understand the basic components of aircraft and airframe	LO6
CO3	Demonstrate knowledge of landing gear types, shock struts and braking systems used in aircraft.	LO1
CO4	To know the various purposes of landing gear	LO4
CO5	Describe the structure and operation of piston engines including major components and types of induction systems	LO1
CO6	Analyze different types of compressors, combustion chambers and fuel systems of Jet engines	LO6

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	Torque, Work, Energy, Power, Pressure, Stress, Elasticity of Material	K2

1.5	Principle of the Gyroscope	Explain the working of the Gyroscope	K3
1.6	Laws of Thermodynamics	Define Laws of Thermodynamics	K3
1.7	Heat Transfer, Specific Heat	What is Heat Transfer, Specific Heat	K1
1.8	Values of fuels; Viscosity, Fluid Resistance, Specific gravity	Explain values of fuels Viscosity, Fluid Resistance, Specific gravity	K2
1.9	Pascal's law & its application	Hydraulic press, Hydraulic and Pneumatic system	K3
1.10	Bernoulli's Theorem	Explain Bernoulli's Theorem	K3
1.11	Venturi's tube theory	Venturi's tube	K2
1.12	Laminar and turbulent flow. Streamline	Laminar and turbulent flow. Streamline	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	K3
2.3	Control Surfaces	Primary control surface, Secondary control Surface	K3
2.4	Aileron, Elevator, Rudder	Working of Aileron, Elevator, Rudder	K4
2.5	Fuel system	What is Fuel system	K1
2.6	Cooling System	Define Cooling System	K2
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	K2
3.1.2	Types of Landing Gear	Tricycle type	K2
3.1.3	Types of Landing Gear	Tail Dragger Landing Gear, Main Landing Gears	K4
3.1.4	Shock Strut	Define Shock Strut	K3
3.1.5	Types of Shock Strut	Rigid struts, Spring Steel Struts	K2
3.1.6	Brake System	Define Brake System	K3

IV	Air craft Engine (Piston)		
4.1.0	Basic Piston engine components:	Crankcase, Crankshaft, Camshaft, Bearings, Connecting Rod, Piston, Piston Rings	K3
4.1.1	Four-Stroke engine	Explain Four-Stroke engine	K4
4.1.2	Engine components	Define engine Handling	K4
	charging	Compare Turbocharging, Supercharging	K3
V	Air craft Engine (Jet)		
5.1.0	Basic Jet engines	Propeller, Parts of Propeller	K3
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	K3
5.1.3	Fuel injection	Define Fuel injection	K3
5.1.4	Types of Combustion Chambers	Types of Combustion Chambers	K4
5.1.5	Gas turbine engine	What is gas turbine engine	K4

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H	M	L		L	H	L		L		M			L	L
CO2	H			M					M	M			L	M	
CO3	H	M	L	L		L	L	H		H	L	L	M		L
CO4	H	L	L			L								L	M
CO5	H	M		M	L		L	L	L	M		L	M	M	
CO6	H	L	M	L	M			M			L		L		M

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

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

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, taxi way and runway.

MARKINGS & LIGHTINGS:

- Difference between markings, Lightings and Signboards
- Apron markings-aero bridge movement are a 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.

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

AIRTRAFFIC 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

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

TOPICS FOR SELFSTUDY

Sl. No	Topics	Weblinks
1	Airport Marking Aids and Signs	https://www.faa.gov/air_traffic/publications/atpubs/aim_html/chap2_section_3.html
2	Air traffic control position	https://mediawiki.ivao.aero/index.php?title=Air_traffic_control_position
3	Important Aviation organization	https://www.civilaviation.gov.in/en/aboutus/orgsetup

REFERENCEBOOKS:

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)

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Understand basic airport areas like terminal, runway, taxiway, apron, and hangar.	LO1
CO2	Learn about airport markings, lighting, and signboards used for safe aircraft movement.	LO6
CO3	Understand basic navigation and communication systems used in aviation.	LO2
CO4	Learn how Air Traffic Control (ATC) works and its different units.	LO2
CO5	Understand flight planning and basic dispatch procedures.	LO3
CO6	Know the roles of important aviation organizations like International Civil Aviation Organization and Airports Authority of India.	LO6

SPECIFIC 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, taxi way and runway	Analyze the work done in a particular airport	K4
II	Markings & Lightings		
2.1.0	Difference between markings, Lightings and Signboards	Distinguish the purpose of marking, lighting and sign age	K4
2.1.1	Apron markings- movement are a markings, stand lead inline, Apron edge marking, Aircraft stand identification marking, Taxiway centerline and edge marking & lighting, Run way marking & lighting	Interpret apron, Taxiway, Run way 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, Aero drome 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	Analyze how security is	K4

		maintained in Aviation	
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

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H	M	L		L	H	M	L		M	M		L	L	L
CO2	H		H	M	L		M	H	L						M
CO3	L	M	L		H	M				M	L		M	L	L
CO4	H	L		L			L			H			L		
CO5	M		L		L	M	L	H	L	M	L	M			L
CO6	H	M	M	L		H		L		L			L		M

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

To understand the theory concepts and fundamental principles of motion, force and energy.

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–streamline and turbulent motions – wave motion – comparison of light and sound waves – free, forced, damped oscillations

UNIT – V: SURFACETENSION:

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

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

- i)Observe moving objects (vehicle, aircraft, fan)
- ii)Record speed, distance, and time in a simple table
- iii) List examples of push and pull forces in aviation (thrust, drag)
- iv)Relate motion, force, and energy to aircraft operation, Example: take off (thrust vs drag, lift vs weight)

TEXTBOOKS:

1. D.S. Mathur, 2010, Elements of Properties of Matter, S. Chand and Co
2. BrijlalandN.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.

WEBRESOURCES:

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

COURSE OUTCOMES:

CO	COURSE OUTCOMES	LO
CO1	Apply concept of vectors to understand concepts of Physics and solve problems	LO4
CO2	Appreciate different forces present in nature while learning about phenomena related to these different forces.	LO1
CO3	Quantify energy in different process and relate momentum, velocity and energy	LO5
CO4	Differentiate different types of motions they would encounter in various courses and understand their basics	LO6
CO5	Relate various properties of matter with their behavior and connect them with different physical parameters involved.	LO6
CO6	Apply concepts of motion, force, and energy by observing real-life examples and relating them to aircraft operations such as takeoff and movement.	LO11

COURSE ARTICULATION MATRIX (CAM) for defined Cos

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H		M	M		L		L		M	H				L
CO2	M				L	M			L	M	L		L		
CO3	H		L					M		L	M	L			
CO4	M			M		M	L		M		H				L
CO5	H	L			M			L		H	M				
CO6	H		M	L	L	H	L		L		L				M

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

To develop practical skills in measuring and analyzing physical properties and principles through hands-on experiments involving mechanics, optics, electricity, and material science.

List of experiments

1. Non-uniform bending-micro scope method.
2. Compound pendulum-g and K.
3. Surface tension and interfacial tension-drop weight method.
4. Sonometer-verification of laws.
5. Long focus convex lens-f, R.
6. Characteristics of junction diodes.
7. Statictorsion-determination of n.
8. Spectrometer-refractive index of the prism.
9. Digital Screw Gauge-Basic measurements
10. Digital Vernier Calipers-Dimensions of materials
11. Mega Ohmmeter-Measurement of High Resistance
12. Cantilever depression-scale and telescope.
13. Meld's string Arrangement-Transverse and longitudinal mode

COURSE OUTCOMES (CO):

After the completion of this course the student will be able to:

CO	Course Outcomes	LO
CO1	Determine surface tension and inter facial tension by weight drop method, measurements and dimension of materials	LO4
CO2	Analyze the basic operations and the characteristics of Zenerdiodein various configuration	LO1
CO3	Demonstrate and apply the concept of optical theory of lenses to find the focal Length, radius of curvature of long focus convex lens	LO4
CO4	Determine the frequency of AC mains using Sono meter and find wave length, period, amplitude using Melde's method	LO6
CO5	Estimate the moduli of elasticity, rigidity modulus for different materials using non uniform bending pin and micro scope and torsion method.	LO1
CO6	Determine refractive index of given prism by spectrometer and measure g and K using compound pendulum.	LO4

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H			H	M	H		H	L	M					L
CO2			L	M	H	L				L	H				
CO3	H			L	M	H		L	L		M				
CO4			L	H	L	M	L			L	M				
CO5	M			M	M	L		M	M	M	H				
CO6	H		L	H	H	M		M	L	L	M				

L – Low

M- Medium

H-High

First Year

INTERDISCIPLINARY COURSE 1

Semester I

Code:

**INTRODUCTION TO AVIATION
(Theory)**

Credits: 2

COURSE OBJECTIVE:

To understand the aviation industry, including its structure, operations, and fundamental concepts related to air transport and aircraft.

UNIT – I: Basics of Aviation & Aircraft Knowledge

Introduction to Aviation Industry, History of Aviation (World & India), Types of Aircraft: Fixed wing Rotary wing, Basic Parts of Aircraft: Fuselage, Wings, Empennage, Landing gear, Aircraft systems overview, Role of aviation authorities (DGCA, ICAO basics)

UNIT – II: Air Regulations & Aviation Safety

Introduction to Air Regulations, ICAO & DGCA rules (basic understanding) Rules of the Air, Aviation Safety & Security, Airport safety procedures, Emergency procedures: Fire safety, Evacuation, Dangerous goods awareness, Human factors in aviation

UNIT – III: Theory of Flight

Four forces of flight: Lift, Weight, Thrust, Drag, Principles of lift generation (Bernoulli's theorem), Drag types (parasite, induced), Glide ratio, Steady and unsteady flight, Theory of turn, Load factor and stall, Flight envelope and limitations, Lift augmentation (flaps, slats)

UNIT – IV: AIR NAVIGATION

Time – Midnight – Time Zones – Daylight Saving Time – Indian Standard Time, Understanding the Earth, Distance and Speed, Unit Conversions

UNIT – V: Aviation Meteorology (Basics)

Atmosphere structure, Temperature, pressure, and density, Wind: Types and measurement, Clouds: Types and formation Visibility and fog, Thunderstorms and hazards, Air masses and fronts, Basic weather charts and METAR introduction

UNIT – VI CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

i) Prepare a comparison chart Fixed-wing vs Rotary-wing aircraft. ii) Write about human errors in aviation and their impact. iii) Explain steady vs unsteady flight with diagrams. iv) Convert between IST, GMT, Local Time. v) Draw and label layers of the atmosphere.

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Basics of Flight	https://www.aopa.org/training-and-safety/online-learning/safety-spotlights/pinch-hitter/the-basics-of-flight
2	Air Regulation	https://iclg.com/practice-areas/aviation-laws-and-regulations/india
3	Air Navigation	https://www.faa.gov/air_traffic/publications/atpubs/aim_html/chap1_section_1.html

REFERENCEBOOKS:

1. R.K. Bali- Air Regulation
2. Oxford – Navigation
3. Oxford–Aircraft General Knowledge

COURSEOUTCOMES:

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

CO	Course Outcomes	LO
CO1	Understanding Basics of Aviation & Aircraft Knowledge	LO1
CO2	Understand the basic of Air Regulations & Aviation Safety	LO3
CO3	Demonstrate knowledge of Lift, Weight, Thrust, Drag, Principles of flight.	LO1
CO4	To Understand the basic concept of Air navigation	LO4
CO5	Demonstrate knowledge Atmosphere structure, Temperature, pressure, and density knowledge, Wind: Types and measurement, Clouds: Types and formation	LO6
CO6	Demonstrate Visibility and fog, Thunderstorms and hazards, Air masses and fronts, Basic weather charts and METAR introduction	LO3

SPECIFIC LEARNING OUTCOMES(SLO)

UNIT	COURSECONTENTS	LEARNINGOUTCOMES	TAXONOMY LEVEL
I	Basics of Aviation & Aircraft Knowledge		
1.1	Introduction to Aviation Industry	Understand basic aviation terminology and concepts	K1
1.2	History of Aviation	Describe key milestones in	K3

	(World & India)	global aviation development	
1.3	Types of Aircraft: Fixed wing Rotary wing	Differentiate between fixed-wing and rotary-wing aircraft Identify examples and uses of each aircraft type	K2
1.4	Basic Parts of Aircraft: Fuselage, Wings, Empennage, Landing gear	Identify major aircraft components: fuselage, wings, empennage, landing gear Explain the function of each part	K1
1.5	Aircraft systems overview	Understand basic aircraft systems (engine, fuel, electrical, hydraulic) Explain how these systems support aircraft operations	K3
1.6	Role of aviation authorities (DGCA, ICAO basics)	Understand the role of regulatory bodies in aviation safety Identify functions of DGCA and ICAO Explain the importance of aviation regulations	K3
II	Air Regulations & Aviation Safety		
2.1	Introduction to Air Regulations	Understand the purpose of aviation laws and regulations Identify key regulatory principles	K3
2.2	ICAO & DGCA rules (basic understanding) Rules of the Air	Explain basic ICAO standards and DGCA regulations Understand fundamental rules governing aircraft movement	K3
2.3	Aviation Safety & Security	Distinguish between safety and security in aviation Identify common safety and security measures	K2
2.4	Airport safety procedures Emergency procedures: Fire safety, Evacuation	Understand airport safety practices Demonstrate knowledge of fire safety and evacuation procedures	K3

2.5	Dangerous goods awareness	Identify hazardous materials in aviation Understand handling and labelling of dangerous goods	K2
2.6	Human factors in aviation	Understand the role of human performance in safety Identify common human errors and their impact	K2
III	Theory of Flight		
3.1.0	Four forces of flight: Lift, Weight, Thrust, Drag	Explain lift, weight, thrust, and drag Understand how these forces interact during flight	K2
3.1.1	Principles of lift generation (Bernoulli's theorem)	Explain how lift is generated using Bernoulli's principle Relate airflow to pressure differences	K3
3.1.2	Drag types (parasite, induced)	Differentiate between parasite drag and induced drag Understand their effects on aircraft performance	K3
3.1.3	Glide ratio	Define glide ratio Calculate and interpret glide performance	K4
3.1.4	Steady and unsteady flight	Differentiate between steady and unsteady flight conditions	K2
3.1.5	Theory of turn	Explain how an aircraft turns Understand banking and centripetal force	K2
3.1.6	Load factor and stall	Define load factor Explain stall conditions and their causes	K3
3.1.7	Flight envelope and limitations	Understand aircraft operational limits Interpret flight envelope diagrams	K3
3.1.8	Lift augmentation (flaps, slats)	Explain how flaps and slats increase lift Understand their role during take-off and landing	K4
IV	Air Navigation		
4.1.0	Time – Midnight – Time Zones – Daylight Saving Tim	Understand aviation time concepts Convert between time zones	K3

4.1.1	Indian Standard Time	Explain IST and its application in aviation	K4
4.1.2	Understanding The Earth	Understand Earth's shape, latitude, and longitude Interpret basic geographic concepts	K4
4.1.3	Distance and Speed, Unit Conversions	Calculate speed, distance, and time, unit conversions relevant to aviation	K4
V	Aviation Meteorology (Basics)		
5.1.0	Atmosphere structure	Identify layers of the atmosphere Understand their characteristics	K2
5.1.1	, Temperature, pressure, and density	Explain how these factors affect flight Understand their relationship	K2
5.1.2	Wind: Types and measurement	Identify different types of winds Understand wind measurement techniques	K2
5.1.3	Clouds: Types and formation	Identify cloud types Understand cloud formation processes	K1
5.1.4	Visibility and fog	Explain causes of reduced visibility Identify types of fog	K2
5.1.5	Thunderstorms and hazards	Understand thunderstorm formation Identify associated aviation hazards	K1
5.1.6	Air masses and fronts	Differentiate between air masses and fronts Understand their impact on weather	
5.1.7	Basic weather charts	Interpret simple aviation weather charts	
5.1.8	METAR introduction	Decode basic METAR reports Understand aviation weather reporting format	

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H	M		M	H	M			M	M	L	M			
CO2	M		L	H			L	H	L	M	H			M	L
CO3	H	L	M	M	L				H	H	L	L			
CO4	H		L		M	L		M		M			M		
CO5	H		H	M		M			H	M	L				M
CO6	H	M	M	L	L	H	L	H	L	H	M	M			

L – Low

M- Medium

H-High

First Year

CORE COURSE 2

Semester II

Code:

**DANGEROUS GOODS AND REGULATIONS
(Theory)**

Credits: 4

COURSE OBJECTIVE:

To provide fundamental knowledge of dangerous goods, their classification, handling procedures, and regulatory requirements to ensure safety in aviation operations.

UNIT – I: Introduction to Dangerous Goods

Definition Of Dangerous Good, History and Need for Regulation, Role of ICAO DGR, Risk Involved in Air Transport

UNIT – II: Classification and Categories of Dangerous Goods

United Nation Classification System, the 9 Classes And 5 Division of Dangerous Goods, Dangerous Good Categories, Name of Class – Division – Identification – Packing – Marking and Labelling (Un Numbers, Proper Shipping Names, Packing Instruction and Packing Types, Marking and Labelling Requirements, Hazard Labels and Handling Labels)

UNIT – III: Documentation and Regulations of Resonation

Shippers Declaration for Dangerous Goods, Air Waybill Requirements Information To Pilot – In – Command (Pic) Through NOTOC, Documentation Errors and Consequences, Handling and Storage of Dangerous, Goods Acceptance Procedures, Loading and Segregation, Passenger Baggage Restriction, Hidden Dangerous Goods

UNIT – IV: Emergency Response and Safety

Emergency Procedures in Case of Leakage Spillage, Fire Risks and Response. Incident And Accident Reporting, Emergency Response Drills, Drill Letter Table, Numerical List of Dangerous Goods with Drill Codes, Role of Emergency Services at Airport.

UNIT – V: Technological Advantage in Dangerous Goods

Digital Documentation and Automation, Ai – Based Screening and Detection, Smart Sensors and IOT Monitoring, Rapid And Barcode Tracking, Automated Storage and Handling Systems, Fire Detection and Suppression System, Training Through Simulation And VR, Color Identification and Role of X – Ray and Scanning in DGR.

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only)

Case study on major air accidents involving dangerous goods (e.g., ValuJet Flight 592 crash), Create a chart explaining all 9 classes of dangerous goods with examples, Study NOTOC (Notification to Captain) format and importance, Role play: Dangerous goods acceptance procedure at an airport, Fire classification and appropriate extinguishing methods study, Research on AI-based dangerous goods detection systems, Study use of X-ray screening in identifying hidden dangerous goods.

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Regulations ICAO, AAI, WPC ICAO	https://www.aai.aero
2	Dangerous Goods - ICAO	https://www.icao.int/dangerous-goods

REFERENCE BOOKS:

1. Dangerous Goods Regulations (DGR) – International Air Transport Association (IATA) – 65th Edition, 2024
2. Technical Instructions for the Safe Transport of Dangerous Goods by Air – International Civil Aviation Organization (ICAO) – 2023–2024 Edition
3. Dangerous Goods for Aviation – Jeppesen – 3rd Edition, 2018

COURSE OUTCOMES:

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

CO	Course outcome	LO
CO1	Understand the concept and importance of Dangerous Goods in aviation	LO1
CO2	Identify Different Classes of Dangerous Goods as Per International Air Transport Association (IATA) Regulation	LO3
CO3	Understood the ICAO requirements, government of India, requirement and aircraft act 1934, the aircraft rate 2003	LO10
CO4	Have basic understanding about the definitions on dangerous goods	LO1
CO5	Acquire good knowledge in classes of divisions in dangerous goods	LO3
CO6	Apply dangerous goods regulations and safety procedures in handling, documentation, and emergency situations using modern technologies.	LO4

SPECIFIC LEARNING OUTCOMES (SLO):

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Introduction To Dangerous Goods		
1.1	Definition Of Dangerous Goods	Define dangerous goods as per international regulations Identify examples of hazardous materials in aviation	K4
1.2	History And Need for Regulation	Describe the evolution of dangerous goods regulations Explain the necessity of strict	K3

		control in air transport	
1.3	Role Of ICAO DGR	Understand the role of the International Civil Aviation Organization in regulating dangerous goods Explain the purpose of ICAO Technical Instructions (DGR guidelines)	K3
1.4	Risk Involved in Air Transport	Identify risks associated with transporting dangerous goods by air Understand potential consequences (fire, explosion, toxicity, corrosion)	K3
II	Classification And Categories of Dangerous Goods		
2.1	United Nation Classification System	Understand the UN classification framework for hazardous materials Identify how substances are categorized globally	K4
2.2	The 9 Classes And 5 Division of Dangerous Goods	List and explain all 9 classes and their divisions Identify examples for each class	K2
2.3	Dangerous Good Categories	Understand different categories based on risk and handling requirements Distinguish between forbidden, restricted, and permitted goods	K2
2.4	Name Of Class – Division – Identification – Packing – Marking and Labelling	Identify UN Numbers and Proper Shipping Names Understand packing instructions and packaging types Interpret marking and labelling requirements Recognize hazard labels and handling labels	K4
III	Documentation And Regulations of Resonation		
3.1.0	Shippers Declaration for Dangerous Goods	Understand the purpose and format of shipper's declaration Identify mandatory information required	K3
3.1.1	Air Waybill Requirements Information To Pilot – In – Command (Pic) Through NOTOC	Explain the role of the air waybill in dangerous goods transport Identify key entries related to hazardous cargo Understand the purpose of NOTOC (Notification to Captain) Identify critical information provided to the pilot	K2
3.1.2	Documentation Errors and Consequences	Recognize common documentation errors Understand legal and safety	K2

		consequences of incorrect documentation	
3.1.3	Handling And Storage of Dangerous	Understand safe handling procedures Identify storage requirements for different classes	K2
3.1.4	Goods Acceptance Procedures	Understand checklist-based acceptance procedures Verify compliance before shipment	K4
3.1.5	Loading And Segregation	Apply rules for loading dangerous goods Understand segregation requirements to avoid reactions	K4
3.1.6	Passenger Baggage Restriction	Identify prohibited and restricted items in passenger baggage Understand airline and regulatory rules	K3
3.1.7	Hidden Dangerous Goods	Recognize undeclared or misdeclared dangerous goods Identify common examples in cargo and baggage	K4
IV	Emergency Response and Safety		
4.1.0	Emergency Procedures in Case of Leakage Spillage	Understand immediate actions during leakage or spillage Apply containment and safety measures	K2
4.1.1	Fire Risks and Response	Identify fire hazards associated with dangerous goods Understand firefighting procedures and precautions	K2
4.1.2	Incident And Accident Reporting	Understand reporting procedures for dangerous goods incidents Identify documentation required after an event	K4
4.1.3	Emergency Response Drills, Drill Letter Table	Interpret drill codes and emergency response guides	K4
4.1.4	Numerical List of Dangerous Goods with Drill Codes	Use numerical lists of dangerous goods for quick reference	K3
4.1.5	Role Of Emergency Services at Airport	Understand responsibilities of airport emergency teams Identify coordination between different agencies	K4
V	Technological Advantage in Dangerous Goods		
5.1.0	Digital Documentation and Automation	Understand electronic documentation systems Recognize benefits of automation in	K2

		compliance	
5.1.1	AI – Based Screening and Detection	Understand how AI improves detection of hazardous materials Identify applications in security and cargo screening	K3
5.1.2	Smart Sensors and IOT Monitoring, Rapid and Barcode Tracking	Explain the role of sensors in monitoring dangerous goods Understand real-time tracking and condition monitoring	K2
5.1.3	Automated Storage and Handling Systems	Understand barcode and tracking technologies Improve traceability and efficiency Identify automated systems used in cargo handling Understand benefits in safety and efficiency	K4
5.1.4	Fire Detection and Suppression System	Understand modern fire detection technologies Identify suppression systems used in aviation	K2
5.1.5	Training Through Simulation And VR	Recognize the role of simulation in safety training Understand benefits of virtual reality training	K2
5.1.6	Color Identification and Role of X – Ray and Scanning in DGR.	Interpret colour codes used in dangerous goods handling Understand the role of X-ray and scanning systems in detection	K3

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H		H		L	H	L	H	M	M	H	L	H		M
CO2	H	L	L	L		H	L	H	L		L		L	L	M
CO3	M		L		M		M		L	M	M	L	H		
CO4	H	L	H	L		L		L	M		L	M	H	L	
CO5	H		M		L	H	H		M	M		L			L
CO6	H		M	M	H	H	L	H	L	H	M	M	M	M	

L – Low

M- Medium

H-High

First Year

CORE PRACTICAL 2

Semester II

Code:

**RADIO TELEPHONY AND
COMMUNICATIONS
(Practical)**

Credits: 4

COURSE OBJECTIVE:

To understand various aviation terminologies and standard universal communication procedures followed by different departments of aviation.

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

PHRASEOLOGY

- Phraseology used in Aeronautical Communication Services; Abbreviations used in Aeronautical Communication Services.
- Distress
- Distress Relay
- Direction Finding
- Flight Safety
- Metrological Information
- Flight regulatory

‘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

COMMUNICATION:

- Introduction to radio call format, Radio strength check call, Start-up clearance and pushback clearance call, Taxi clearance call, ATC clearance call.

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Regulations ICAO, AAI, WPC ICAO	https://www.icao.int/publications
2	Phraseology	https://www.elecenghub.com/ICAO/194136144/ICAO-AN-10-2?
3	'Q' Codes, Communication	https://quality2wayradios.com/store/q-codes-guide

REFERENCE BOOKS:

1. Pilot's Radio Communications Handbook – Paul E. Illman – 2nd Edition, 2005
2. Aviation Radiotelephony Manual – Wg. Cdr. R.K. Bali – 6th Edition, 2022
3. Manual of Radiotelephony (Doc 9432) – International Civil Aviation Organization – 4th Edition, 200

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Explain the duties of different bodies in aviation and the rules made by them.	LO1
CO2	Outlines the modes of radio propagation and its application.	LO3
CO3	Interpret and apply standard aviation phraseology in different communication scenarios.	LO2
CO4	Analyze pressure values and solve problems related to Q-codes (QNH, QFE, QNE) in aviation.	LO4
CO5	Analyze basic communication between ATC & Aircraft	LO2
CO6	Demonstrate knowledge of cockpit-to-ATC radio communication procedures used in aviation operations.	LO2

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 indent	Interprets basic indent	K2
1.8	Location indicators	Interprets basic indent	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 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

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	M	H	L		L	M	L	H	L	M	L	M	H	L	
CO2	H	H	M	M	M	M		L			M	L	L		
CO3	M	H	L	L		H	L	H	M	H			M		
CO4	H	H	L	M		M		M		M	L	M			L
CO5	M	H	M		H	H	H	H	M		H	L			
CO6	M	H	H	L	M	H		H	L	H	H	M	L	L	

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

To understand the theory concepts and working of ac and dc circuit, basic electrical principles and aircraft electrical systems, including generation, distribution, and application in aviation.

UNIT – I: 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 – II: 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 – III: 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 – IV: 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 – V: 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.

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

- i. Prepare a comparison chart showing how electric charge behaves in: Solids, Liquids, Gases, Vacuum.
- ii. Draw simple circuit diagrams to explain each law. Kirchhoff's Voltage Law (KVL), Kirchhoff's Current Law (KCL)
- iii. Develop calculation skills and practical understanding.

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://aerotoobox.com , electrical

REFERENCE BOOKS:

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

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Understand structure and distribution of electrical charges within atoms molecules ions compounds	LO1
CO2	Understand basic electrical terminologies, units, and measurement of electrical quantities in DC and AC systems.	LO6
CO3	Apply Ohm's Law to analyze resistors in series and parallel circuits and calculate total resistance.	LO4
CO4	Analyze DC circuits using Kirchhoff's Voltage Law (KVL) and Kirchhoff's Current Law (KCL) to determine current, voltage, and resistance.	LO4
CO5	Explain AC fundamentals, including capacitance, inductance, electromagnetic induction, and waveform characteristics.	LO10
CO6	Apply electrical concepts to aircraft electrical systems and develop basic circuit analysis and practical problem-solving skills.	LO11

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, parallel	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 Protection		
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

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H			L	L			H		M	H		M		
CO2	H			M	M	M		L	L						
CO3	H		L	H						M	L		L		
CO4	H	L		H	H			M	M	L					
CO5	H	L		M		L		L			M				
CO6	H		M	M	M	H		H	M	M	H		L		L

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

To understand human physical and psychological limitations, behaviour, and performance factors affecting aviation safety and efficiency.

UNIT – I: HUMAN PHYSIOLOGY:

Structure and functions of the human body; Respiratory system, Circulatory system; Oxygen requirements; Effects of altitude; Hypoxia – causes, symptoms and prevention; Hyperventilation; Vision basics; Hearing basics; Spatial disorientation.

UNIT – II: HUMAN SENSORY SYSTEM & PERCEPTION:

Human senses; Visual perception; Depth perception; Night vision; Visual illusions; Vestibular system; Balance and orientation; Motion sickness; Information processing; Attention and perception.

UNIT – III: HUMAN PERFORMANCE LIMITATIONS:

Fatigue – causes and effects; Sleep and rest; Circadian rhythm; Workload; Human limitations in aviation; Effects of alcohol, drugs and medication; Health and fitness.

UNIT – IV: STRESS AND ITS MANAGEMENT:

Definition of stress; Types of stress; Causes of stress; Effects on performance; Stress management techniques; Coping mechanisms; Anxiety and its control.

UNIT – V: HUMAN ERROR AND DECISION MAKING:

Human error – types and causes; Slip, lapse and mistake; Decision making process; Situational awareness; Risk assessment; Error prevention strategies.

UNIT – VI: CREW RESOURCE MANAGEMENT (Self-Directed Learning Activities for CIA):

Basic CRM concepts; Communication skills; Teamwork; Leadership; Workload management; Case studies of aviation incidents related to human factors.

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Human Physiology	https://www.faa.gov
2	Human Performance & Limitations	https://skybrary.aero
3	CRM & Aviation Psychology	https://www.icao.int

REFERENCE BOOKS:

1. Oxford – Aviation Human Performance and Limitations
2. ICAO – Human Factors Training Manual
3. Human Factors in Aviation – Eduardo Salas

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Understand basic human physiology related to aviation	LO1
CO2	Explain human sensory systems and perception	LO1
CO3	Analyze human performance limitations and fatigue	LO13
CO4	Understand stress and its effects on performance	LO13
CO5	Describe decision making and human error	LO9
CO6	Understand aviation psychology and CRM concepts	LO7

SPECIFIC LEARNING OUTCOMES (SLO):

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Human Physiology		
1.1	Respiratory System	Explain Respiratory system	K3
1.2	Circulatory System	Define Circulatory system	K1
1.3	Hypoxia	Explain causes and prevention	K3
1.4	Hyperventilation	Define Hyperventilation	K1
1.5	Vision & Hearing	Basics of vision and hearing	K2
II	Sensory System & Perception		
2.1	Visual perception	Explain visual perception	K2
2.2	Night vision	Define night vision	K1
2.3	Visual illusions	Identify illusions	K2
2.4	Vestibular system	Explain balance system	K3
2.5	Motion sickness	Define motion sickness	K1
III	Performance Limitations		
3.1	Fatigue	Explain fatigue effects	K3

3.2	Sleep cycle	Define circadian rhythm	K2
3.3	Drugs & alcohol	Effects on performance	K2
3.4	Health & fitness	Importance in aviation	K1
IV	Stress		
4.1	Types of stress	Identify types	K2
4.2	Effects of stress	Explain effects	K3
4.3	Stress management	Techniques to control stress	K3
V	Human Error		
5.1	Types of error	Define slip, lapse, mistake	K2
5.2	Decision making	Explain process	K3
5.3	Situational awareness	Define SA	K1
5.4	Risk assessment	Identify risks	K2
VI	CRM		
6.1	Communication	Importance of communication	K2
6.2	Teamwork	Explain teamwork	K2
6.3	Leadership	Define leadership	K1
6.4	Case studies	Analyze incidents	K4

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H	M		H		M			H		H	H		L	
CO2	L		M		M		L	M		M		H	H		L
CO3	M	L		L		H	M		H	L	H	L	L	H	L
CO4	M	M	M		H	L		M			L		M		L
CO5	L		L	L			M	M		M		H	L	L	
CO6	H	M		M	M	M		L	L		H		M		M

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

To develop a comprehensive understanding of aerodynamic principles and the forces governing aircraft flight, enabling students to analyze and interpret the behaviour and performance of aircraft under various operating conditions.

UNIT – I: 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 – II: AERODYNAMICS AND FLIGHT CONTROLS:

Operation and effect of roll control: ailerons and spoilers pitch 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 – III: 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 – IV: 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 – V: 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.

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Differentiate between streamline and disturbed airflow, define boundary layer and its significance, Understand free stream conditions Explain relative airflow in flight.

TOPICS FOR SELF STUDY

Sl. No	Topics	Web Links
1	Aerodynamics & flight controls	https://aeroplanetech.com/flight-control-and-aerodynamics
2	Theory of flight	https://www.faa.gov/regulationspolicies/handbooksmanuals/aviation/phak/chapter-5-aerodynamics-flight
3	High speed flight	https://www.aircraftsystemstech.com/2017/05/high-speed-flight

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	center 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 control pitch control yaw 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

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Explain the basic principles of aerodynamics and the forces acting on an aircraft.	LO1
CO2	Understand the generation of lift and the factors affecting it.	LO1
CO3	Learn different types of drag and their impact on aircraft performance.	LO5
CO4	Understand airflow characteristics and their effects on airfoil behavior.	LO1
CO5	Evaluate stability and control of aircraft in various flight conditions.	LO6
CO6	Apply aerodynamic principles to analyze aircraft performance during different phases of flight.	LO8

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H	M	M	M		M		L	L	M	M				
CO2	H			H	M	H		H	H	L	L		M		
CO3	H		H		H	M				H	H				
CO4	H		M	M	L	M	L			M		L			
CO5	H		L		H	H			M	H	H				
CO6	H	M	L	M	M	H		H		M	M				L

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

Understand basic working of piston engines and propellers effects on performance

UNIT – I: 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 – II: 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 – III: 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 – IV: SUPERCHARGING AND TURBO CHARGING:

Principle and Purpose of Super Charging and its Effect on Engine Parameters, Construction and Operation of Super charging/ Turbo charging Systems Terminology.

UNIT – V: 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.

UNIT – VI CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Compare Otto vs Diesel cycles in a table, create a mind map linking: Mechanical efficiency, Thermal efficiency, Volumetric efficiency, prepare a short report on how each component contributes to engine performance, Explain the purpose of supercharging in aircraft engines.

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Piston Engine	https://www.aopa.org/training-and-safety/students/solo/special/piston-engine-basics
2	Carburetor and Lubrications	https://www.aviationpros.com/aircraft-maintenance-technology/engines-parts/article/10386623/lubrication-101-piston-engine-oil-its-functions-types-and-characteristics
3	Propeller	https://mechbasic.com/piston-engine-aircraft

REFERENCE BOOKS:

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

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Understand the fundamentals and working principle at piston engines	LO1
CO2	Explain the working principle of 2 stroke 4 stroke otto and diesel engine	LO1
CO3	Define engine construction and performance	LO1
CO4	Study the carburetor and lubrication	LO1
CO5	Explain about supercharging and turbo charging	LO1
CO6	Explain briefly about propeller	LO1

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 strokes	K3
1.2	Fundamentals, Mechanical, thermal and Volumetric efficiencies	Explain About 4 strokes,	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	What is Engine configuration	K2

	and firing order	and firing order	
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 are 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 its 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 its Effect on Engine Parameters, Construction and Operation, Terminology	K3
V	PROPELLER		
5.1.0	Propeller	Fundamentals of Propeller	K3
5.1.1	Propeller angle	Define high-low blade angle	K1
5.1.2	Angle of attack	Explain Angle of attack	K3
5.1.3	Rotational speed	Define Rotational speed	K1
5.1.4	Propeller slip	What is Propeller slip	K1
5.1.5	Aerodynamic	Define Aerodynamic	K3
5.1.6	Centrifugal and Thrust Forces	What is Centrifugal and Thrust Forces	K3
5.1.7	Torque	What is Torque	K1

5.1.8	Relative airflow on Blade angle of attack	Relative airflow on Blade angle of attack	K2
5.1.9	Blade phase, Blade shank, Blade back and Hub assembly	Define Blade phase, Blade shank, Blade back and Hub assembly	K2
5.1.10	fixed pitch, Control pitch	Explain fixed pitch, Control pitch	K3
5.1.11	Constant speeding Propeller,	What Constant speeding Propeller	K2
5.1.12	Propeller Pitch Control	What is Propeller Pitch Control	K1
5.1.13	Propeller ice Protection	Define Propeller ice Protection	K1

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H			M	H	H		H		M	H				
CO2	H			M	L				M				L		
CO3	H		M			H		M		M	H				
CO4	H			L	M		L				L				
CO5	H		M	M		H			M	M	M				
CO6	H			M	M	H		M	L	M	M		M		

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

To understand ATC communication systems, including radio communication, radar systems, signal procedures, and standard RT phraseology used for safe air traffic control operations.

COURSE CONTENT:

1. Radio Spectrum Define different frequency, ranges, wave length, Band width and type of Propagation.
2. Radio transmission range (ATC Coverage)
3. ATC Beam Identification lights
4. Radar – (Radio Detection & Ranging)
 - Types of Radar used in ATC Primary, Secondary Radar & Principles (SSR) etc.
5. Signals for Aerodrome Traffic Air Ground
6. Block diagram of Communications Receiver
7. Block diagram of Transmitter
8. Phraseology used in RT Communications

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Radio Propagation	https://airline-pilot.net/pilot-training/radio-wave-propagation
2	Radar	https://www.radartutorial.eu/02.basics/ATC-Radars.en.html
3	Radio Communication	https://www.mobileatc.com/atc-radio-communications-systems/

REFERENCE BOOKS:

1. Radio Telephony for Air Traffic Control – Brian R. Billings
2. Air Traffic Control: Human Performance Factors – David D. Hopkins
3. Radio telephony by K.D. Tuli

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Radio Spectrum and Wave Propagation	LO1
CO2	Principles of Radio Transmission Range	LO1
CO3	Radar Working Principles and ATC Operations	LO1
CO4	Aerodrome Identification Lights and Radio Communication Signals	LO1
CO5	Receiver and Transmitter use in ATC System	LO1
CO6	Radio Telephony Phraseology	LO2

SPECIFIC LEARNING OUTCOMES (SLO):

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	RADIO TELEPHONY		
1.1	Radio Spectrum	Define frequency, wavelength, bandwidth, and types of propagation.	K4
1.2	Radio Transmission Range (ATC Coverage)	Describe factors affecting ATC radio coverage.	K5
1.3	ATC Beam Identification Lights	State the function of ATC beam identification lights	K4
1.4	Radar (Radio Detection & Ranging)	Explain the working of primary and secondary radar.	K5
1.5	Types of Radar used in ATC	Identify radar types used in ATC and their functions.	K5
1.6	Signals for Aerodrome Traffic Air-Ground	Interpret standard air-ground visual signals.	K6
1.7	Block Diagram of	Draw and label the block	K6

	Communications Receiver	diagram of a communication receiver	
1.8	Phraseology	Phraseology used in RT Communications	K4

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H	M		M	H	M	M		H	M	L	L		H	
CO2	H	M	L	M		M		L		M	M	H	H		M
CO3	H	M			H	H	L	H	M	M	L		L	M	M
CO4	H	M		L		H		H		M	M	H		M	
CO5	H	M	L		H	H	L			M	H		L	L	M
CO6	M			L		H		H	H	H		M	H		L

L – Low

M- Medium

H- High

COURSE OBJECTIVE:

To develop the ability to perform and apply basic mathematical calculations related to aviation, including speed, distance, time, fuel consumption, and other operational parameters for effective flight planning and analysis

UNIT – I: BASIC TRIGONOMETRY & PYTHAGORAS THEOREM:

Revision of trigonometric Ratios and Pythagoras theorem and their applications, Revision of Mathematical calculations, BODMAS Rule, Algebra calculations, Percentage calculation.

UNIT – II: CONVERSIONS:

Conversions between units, Basic definitions of Kilometers, Statute mile, Nautical Mile, feet, meter and conversion between each other. Temperature Conversions, Kelvin to Celsius, Celsius to Kelvin, Fahrenheit to Celsius and its importance in aviation and their applications

UNIT – III: COMPASS:

Basic understanding of Compass it's working Principle, Basic understanding about magnetism, Earth magnetism, Understanding Compass errors- Variation and deviation, Calculating Aircraft direction, Relative heading, True Heading magnetic heading, compass heading and Heading Calculation

UNIT – IV: RELATIVE MOTION AND VERTICAL SPEED:

Calculation of Speed in relation to speed, distance, time. Calculating Estimated Time of Arrival (ETA), Estimated Time of Departure (ETD), Estimated Elapsed Time (EET), Calculating Endurance and Still Air Range (SAR) Calculation of Rate of Climb (ROC), Rate of Descent (ROD)& selection of Altitude according to the flight path, Top of Climb (TOC)&Top of Descent (TOD), its understanding and Implementation.

UNIT – V: TIME CALCULATION AND FUEL CALCULATION:

Understanding Coordinated Universal Time (UTC), Calculation of LMT at any given place, longitude, latitude, meridians, Standard meridian, rhumb line, Indian Standard Time (IST), Difference in longitude, Difference in latitude. Calculating IST and LMT from GMT. Selection of alternate aerodrome, Different alternate, Take off alternate, Enroute Alternate, Destination Alternate, Fuel calculation for the flight, minimum fuel requirement and payload.

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Solve real-life aviation problems using the Example: Calculate runway distance or aircraft path, create flashcards for quick unit conversions, Use Google Maps to compare true direction vs compass direction, calculate: ETA, ETD, EET, Calculate local time at different global locations.

TOPICS FOR SELF STUDY:

Sl. 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:

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

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Construct and analyzing graphs of Trigonometric functions and their inverse	LO4
CO2	Distinguish the different metric units and understand how to convert from one metric unit to another	LO1
CO3	Demonstrate the ability to use the Compass rose to indicate directions, create and use map symbols	LO3
CO4	Basic understanding of calculating speed, distance, time, Rate of climb (ROC), Rate of descent (ROD)	LO4
CO5	Explanation about fuel and Time management	LO1
CO6	Develop a basic fuel management to track all aspects of fuel consumption	LO6

SPECIFIC 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 unit conversions	K4
2.2	Basic definitions of Kilometer, Statute mile, Nautical Mile, feet, meter 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 North's 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)	Analyze 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

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H	H	M	M		L		H	H	M	M	H	M	L	
CO2	H	M			M	M	L	H	M	M		H		M	L
CO3	M	M	M	L		H		L		M	H		H	H	L
CO4	H	M	M	M	H	H	L		H	M	M	M	L		H
CO5	M	M		L		H		M		M	H		L	H	H
CO6	M	M	M	H	H	H			M		H	M	L	H	

L – Low

M- Medium

H-High

COURSE OBJECTIVES:

- To provide fundamental knowledge of aircraft ground and flight procedures, including engine starting, taxiing, take-off, and landing operations.
- To familiarize students with aircraft starting and taxiing techniques, ensuring proper coordination with ground control and adherence to safety protocols.
- To impart knowledge of take-off and landing procedures, including communication with Air Traffic Control (ATC) and execution of safe flight operations.
- To enable identification and understanding of basic aircraft instruments and their role in flight monitoring and control.

LIST OF FLIGHT SYNTHETIC PRACTICAL EXERCISES

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

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Starting procedure	https://www.boldmethod.com/learn-to-fly/systems/how-does-a-plane-start/
2	Taxiing take-off and landing	https://www.faa.gov/air_traffic/publications/atpubs/atc_html/chap3_section_7.html
3	Standard Synthetic Aircraft Operating procedures	https://skybrary.aero/index.php/articles/synthetic-vision-systems-svs

REFERENCE BOOKS:

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

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Learn how to make the Starting procedure for aircraft	LO1
CO2	Learn the procedure how to make Taxiing for aircraft	LO1
CO3	Illustrate the Take Off synthetic procedure	LO3
CO4	Learn about the Landing procedure from ATC	LO1
CO5	Outline of the Aircraft Instrument Identification	LO3
CO6	Understanding the synthetic procedures of aircraft	LO1

SEPCIFIC LEARNING OUTCOMES:

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
1	Starting procedure	Aircraft Starting procedure	K3
2	Taxiing	Aircraft Taxiing Procedure	K3
3	Take Off	Aircraft Take-Off Procedure	K3
4	Landing	Aircraft Landing Procedure	K3
5	Instrument Identification	Aircraft Instrument Identification	K2
6	Standard Synthetic Aircraft Operating Procedures	Understanding the synthetic procedures	K4

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	M	M		H		H	H	H		M	L		M	M	
CO2	M	M		L	M		M	H	M		H	M			L
CO3	H		M		M	H				M		H	L	M	L
CO4	M	M		L	L		M	H	M		H	M	L	L	H
CO5		M		M	M	H	L	L					H	L	
CO6	M		M	L	H	H	L	M		M	L	M	H	M	M

L – Low

M- Medium

H-High

Second Year

SKILL ENHANCEMENT COURSE 2

Semester III

Code:

**AVIATION LOGISTICS AND CARGO
MANAGEMENT
(Theory)**

Credits: 2

COURSE OBJECTIVE:

To understand the principles of air cargo operations, logistics management, cargo handling procedures, and documentation in the aviation industry.

UNIT – I: INTRODUCTION TO AVIATION LOGISTICS:

Meaning and scope of logistics; Importance of logistics in aviation; Supply chain management; Role of air transport in logistics; Advantages and limitations of air cargo; Basic cargo terminology; Role of freight forwarders and cargo agents.

UNIT – II: AIR CARGO HANDLING SYSTEMS:

Cargo terminals; Layout of cargo terminal; Cargo handling equipment; Unit Load Devices (ULDs); Cargo loading and unloading procedures; Warehousing; Cold storage; Automation in cargo handling.

UNIT – III: TYPES OF CARGO & SPECIAL HANDLING:

General cargo; Perishable cargo; Dangerous goods; Live animals; Valuable cargo; Fragile cargo; Handling procedures for special cargo; IATA classification of dangerous goods.

UNIT – IV: CARGO DOCUMENTATION & REGULATIONS:

Air Waybill (AWB); Types of AWB; Cargo manifest; Customs documentation; Import and export procedures; Role of regulatory bodies; Basic knowledge of international regulations.

UNIT – V: CARGO OPERATIONS, PACKAGING & STORAGE:

Cargo packaging methods; Labelling and marking; Storage systems; Inventory control; Cargo tracking systems; E-logistics; Risk management in cargo operations.

UNIT – VI: SAFETY, SECURITY & CURRENT TRENDS (Self-Directed Learning Activities for CIA):

Cargo safety procedures; Security screening; X-ray and scanning systems; Prevention of smuggling; Case studies of cargo incidents; E-commerce and air cargo growth; Future trends in aviation logistics.

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Aviation Logistics Basics	https://www.iata.org
2	Cargo Handling Systems	https://www.skybrary.aero
3	Air Cargo Regulations	https://www.icao.int

REFERENCE BOOKS:

1. IATA – Air Cargo Handling Manual
2. Oxford – Aviation Logistics & Supply Chain
3. Air Cargo Management – Michael Sales

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Understand fundamentals of aviation logistics and cargo	LO1
CO2	Explain air cargo handling procedures and systems	LO3
CO3	Identify types of cargo and special handling requirements	LO1
CO4	Understand documentation and regulatory requirements	LO10
CO5	Analyze cargo operations, packaging and storage	LO7
CO6	Understand safety, security and future trends in cargo	LO15

SPECIFIC LEARNING OUTCOMES (SLO):

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Introduction to Aviation Logistics		
1.1	Logistics basics	Define logistics	K1
1.2	Supply chain	Explain supply chain	K2
1.3	Air cargo role	Importance of air cargo	K2
1.4	Cargo agents	Role of agents	K1
II	Cargo Handling Systems		
2.1	Cargo terminal	Define cargo terminal	K1
2.2	ULD	Explain ULD	K2
2.3	Handling equipment	Identify equipment	K2
2.4	Warehousing	Define warehousing	K1
III	Types of Cargo		
3.1	General cargo	Define general cargo	K1
3.2	Perishable goods	Handling methods	K2
3.3	Dangerous goods	Classification	K2
3.4	Live animals	Special handling	K2
IV	Documentation		
4.1	Air Waybill	Define AWB	K1
4.2	Cargo manifest	Explain manifest	K2

4.3	Customs	Import/export procedures	K2
4.4	Regulations	Identify rules	K1
V	Cargo Operations		
5.1	Packaging	Define packaging	K1
5.2	Labelling	Explain labelling	K2
5.3	Storage	Storage methods	K2
5.4	Tracking	Define cargo tracking	K1
VI	Safety & Trends		
6.1	Cargo safety	Safety procedures	K2
6.2	Security systems	Explain scanning systems	K2
6.3	Case studies	Analyze incidents	K4
6.4	Future trends	E-commerce impact	K2

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C01	H	M		L		H	L	M	M	M	M		M		L
C02	L		L		L	M	L	M		H		H		M	M
C03	L	M		L			M		L	H	L		M		L
C04	H		L		H	L	H	L	M	M		L		L	H
C05	M	M			M	H	L	M	L	M	M	M	M		H
C06	H	H	M	L		M	L	M	H	L	M			M	M

L – Low

M- Medium

H-High

COURSE OBJECTIVES:

- 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.

UNIT - I: Fundamentals of Flight

History and Evolution of flying-Basic principles of Flying-Atmosphere and its properties, Standard atmosphere

UNIT- II: Classification of Aircraft

Classification of Aircraft/Airlines-Narrow Body- Wide body- Propeller Aircraft- Jet Aircraft-Supersonic-Scheduled -Non-Scheduled-Charter Flights

UNIT - III: Components of an Aircraft

Major Components of an Aircraft-Engine-Propeller-Fuselage Tail-Rudder-Landing Gear

UNIT - IV: Airline Organizational Structure

Airline Organizational structure – Corporate Office – Regional Office- City office-Ticketing Agents

UNIT - V: Airline Functional Departments

Airline Functional Structures - Engineering- Operation – Finance – Administration -Marketing-Customer relation

UNIT – VI CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Prepare a timeline of aviation history from early inventions to modern aircraft, explain charter flights with real examples, repair questions to interview airline staff or ticketing agents,

Analyse how airlines handle passenger complaints and feedback.

TOPICS FOR SELF STUDY:

Sl. 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/

REFERENCE BOOKS:

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

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Outline the evolution of aviation industry	LO3
CO2	Classify different types of aircraft and airlines	LO1
CO3	Compare the time zones & time difference between difference parts of globe	LO4
CO4	Identify and describe the major components of an aircraft and their functions.	LO1
CO5	Understand the organizational structure of airlines at corporate, regional, and operational levels.	LO6
CO6	Explain the roles and functions of various airline departments such as engineering, operations, finance and marketing	LO9

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	M	M	H	H		M	L		M	M	H	M		M	
CO2	H	L	M		H		H	H	M	M			M		M
CO3		H	M	H		M	L					H	L		L
CO4	M	M	L	M	H			H	H	M			L	L	
CO5		M	M			H		H			L	L	L	M	
CO6	M		L	L	M	H	H	H	M	M		M		L	

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

To understand the fundamental principles and concepts of air navigation and their application in flight planning and safe, accurate, and efficient aircraft operations

UNIT – I: AIRCRAFT PERFORMANCE AND WEIGHT

Basic weight concepts: BEW, ZFW, TOW, LDW, Weight and balance charts and moments, Center of gravity (CG) calculations, Payload and performance impact, Takeoff and landing distance calculations

UNIT – II: NAVIGATION INSTRUMENTS AND TOOLS

Compass types and errors. Altimeter, airspeed indicator, vertical speed indicator, E6B flight computer (manual and digital), Charts: VFR, IFR, enroute, terminal. Plotters and navigation rulers, GPS basics and RNAV systems

UNIT – III: NAVIGATION PROBLEM SOLVING

Cross-country flight planning, Route selection and alternate planning, Navigational error estimation and correction, Solving diversions and re-routing, Lost procedures and radio navigation fix determination

UNIT – IV: MAPS AND CHARTS

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

UNIT – V: FUEL AND NAVIGATIONAL EMERGENCY DATA

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

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Solve problems using: BEW, ZFW, TOW, LDW, create your own sample aircraft loading scenario, Research basics of GPS and RNAV systems, calculate track error and correction angle, Practice calculating distance using map scale.

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Aircraft Performance, Weight & Balance	https://www.faa.gov/regulations_policies/handbooks_manuals/aviation
2	GPS and Flight Planning	https://www.faa.gov/air_traffic/flight_info/aeronav
3	Aeronautical Charts and Navigation Information	https://surveyofindia.gov.in/pages/aeronautical-charts-and-maps

REFERENCE BOOKS:

1. Air Navigation by R.K. Bali, 7th Revised Edition
2. General Navigation - CAE Oxford Aviation Academy

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
C01	Explain aircraft weight concepts, weight and balance principles, center of gravity calculations	LO1
C02	Apply appropriate methods and tools to calculate takeoff and landing performance, payload limitations, and aircraft weight-related parameters	LO1
C03	Demonstrate the use of aircraft navigation instruments, E6B flight computers, navigation charts, plotters, GPS, and RNAV systems for flight planning and navigation.	LO4
C04	Analyze and solve practical navigation problems including cross-country flight planning, route selection and navigational errors	LO4
C05	Interpret different map projections, topographical maps, and charting techniques	LO10
C06	Calculate fuel requirements, fuel consumption and fuel conversions	LO4

SPECIFIC LEARNING OUTCOMES (SLO):

UNIT	COURSE CONTENT	LEARNING OUTCOMES	TAXONOMY LEVEL
I	AIRCRAFT PERFORMANCE AND WEIGHT		
1.1	Basic Weight Concepts	Explain the basic aircraft weight concepts including BEW, ZFW, TOW, and LDW	K4
1.2	Weight and Balance Charts	Interpret weight and balance charts	K3
1.3	Center of Gravity (CG) Calculations	Calculate the aircraft center of gravity (CG)	K4
1.4	Payload and Performance Impact	Explain the effect of payload and aircraft weight on aircraft performance.	K3
1.5	Takeoff Distance Calculations	Calculate takeoff distance using relevant aircraft weight and performance data.	K3
1.6	Landing Distance Calculations	Calculate landing distance using relevant aircraft weight and performance data.	K3

II NAVIGATION INSTRUMENTS AND TOOLS			
2.1	Compass types and errors	Explain the different types of aircraft compasses and identify common compass errors.	K3
2.2	Altimeter	Explain the working principle of the altimeter and interpret altitude indications using appropriate pressure settings	K2
2.3	Airspeed Indicator	Explain the operation of the airspeed indicator	K2
2.4	Vertical Speed Indicator	Explain the working principle of the VSI	K2
2.5	E6B flight computer	Use a manual and digital E6B flight computer to solve basic aviation navigation	K4
2.6	Charts: VFR, IFR, enroute, terminal	Identify and interpret the essential information and symbols presented on VFR, IFR, enroute, and terminal charts.	K4
2.7	Plotters and navigation rulers	Use aviation plotters and navigation rulers to measure distances, headings, and other navigation parameters from charts	K4
2.8	GPS basics and RNAV systems	Explain the GPS basics and RNAV systems	K4
III NAVIGATION PROBLEM SOLVING			
3.1	Cross-country flight planning	Explain and apply the principles of cross-country flight planning using appropriate navigation data, charts, and flight parameters	K4
3.2	Route selection and alternate planning	Select suitable flight routes and plan appropriate alternate routes	K2
3.3	Navigational error estimation	Calculate navigational errors and apply suitable corrections to maintain the desired track and heading.	K4
3.4	Solving diversions and re-routing	Solve practical diversion and re-routing problems by determining suitable headings, tracks, distances, and estimated times	K2
3.5	radio navigation	Determine aircraft position using radio navigation aids and appropriate fix-finding techniques.	K2
IV MAPS AND CHARTS			
4.1	Mercator projection	Elaborate Mercator projection	K4
4.2	Lamberts conical	Explain the places where LCC can be used	K2

4.3	Polar stereographic	Choose the appropriate chart for appropriate area	K4
4.4	Orthomorphism scale	Explain Orthomorphism scale	K2
4.5	Reduced earth	Construct reduced earth	K4
4.6	Topographical maps	Explain topographical maps	K2
V	FUEL AND NAVIGATIONAL EMERGENCY DATA		
5.1	Imperial and US gallons	Distinguish between Imperial and US gallons	K4
5.2	Conversion factor	Solve the problems related to unit conversion	K4
5.3	Specific gravity	Explain specific gravity	K2
5.4	Fuel flow and fuel consumption	Compare flow of fuel and consumption of fuel	K4
5.5	Select the most economical cruising level	Choose the economical cruising level	K4
5.6	Payload	Explain Payload	K2

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C01	H		L	M		M		M		H				H	
C02	H	L	H	M	M	L		M			M				L
C03	H	M		H		M	L		L	L				M	
C04	H	M	M	H	H		M	M		M	M			L	
C05	H		H	M		H	L		L	H		L			
C06	H	M	L	M	L	H		L		H			M		L

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

To familiarize with the general tools used in aircraft maintenance

FAMILIARIZATION OF GENERAL HAND TOOLS:

- General Purpose Tools, Hummers and Mallets,
- Screwdrivers, Pliers 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, Callipers, Micrometre Callipers, Micrometre Parts.
- Reading a Micrometer, Vernier Scale, using a Micrometre, Vernier Scale, Using a Micrometre, callipers.

FIRE TRAINING:

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

TOPICS FOR SELF STUDY:

Sl. 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

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Experiment with Different Aviation tool	LO1
CO2	Identify a particular tool for a particular Purpose	LO3
CO3	Organize the used files	LO11
CO4	Classify the Different classes of fire	LO1
CO5	Inspect the Source of fire	LO6
CO6	Choose the Correct fire extinguishers	LO1

SPECIFIC LEARNING OUTCOMES (SLO):

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Familiarization of general hand tools		
1.1	Experiment with Different Aviation tool	Experiment Aviation tool With Different	K3
1.2	Identify a tool for a Purpose particular	Identify a particular tool for a particular Purpose	K3
1.3	Organize the used files	Organize the used files	K3
1.4	Categories Selection the files	Categories the files Selection	K4
1.5	Explain the procedure to read venire scale	Explain the procedure to read venire scale	K2
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

COURSE ARTICULATION MATRIX (CAM) for defined Cos

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H		H					M		M	M				
CO2	M				H	H	L						L		
CO3	L		M			M			M		M				
CO4	M		L					H		M	H				L
CO5	H		L			H					M		L		
CO6	M			L		H		H		M					

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

To know the various aspects of weather and decode the aviation weather report

UNIT – I: 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, cumulonimbus, Ice crystal theory, Coalescence theory, Giant nuclei theory, Types of cloud, Various Mountain Clouds, necessary condition for the formation of clouds, condensation trails.

UNIT – II: 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 – III: ICING:

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

UNIT – IV: 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 –V: 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.

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Observe the sky daily and record: Cloud type, Height, Weather conditions, classify types of air masses and their origin, De-icing vs Anti-icing systems, prepare a daily weather report for a selected airport, Practice decoding complete METAR reports with symbols.

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Types of Clouds	https://www.weather.gov/jetstream/corefour
2	Weather Forecast and report	https://aviationweather.gov/
3	Icing and De-icing	https://www.aopa.org/training-and-safety/online-learning/safety-spotlights/winter-operations/airframe-icing

REFERENCE BOOKS:

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

COURSE OUTCOMES

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

CO	Course Outcomes	LO
CO1	Types of cloud and the study of Clouds	LO1
CO2	Illustrate Knowledge on the thunderstorm	LO3
CO3	Illustrate Knowledge on the Air masses	LO3
CO4	Explain Dangers of Icing And how to rectify in the pitot static System	LO6
CO5	Outline of the Weather forecast and its Report	LO9
CO6	Symbols And Abbreviation in Weather on MET Chart	LO5

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 from the air, the occluded front, depressions,	Observation from the air, the cold front, observation from the ground, observation from the air, the occluded front, depressions,	K2
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	Carburetor icing, pitot static system icing	Explain carburetor 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, Trans species	Classify METAR, Trans species	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, Sigmet.	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

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H			M	L	L	M	M	M	M	M	L	L		
CO2	H		L		H	H		H		M		M			
CO3	H			M	L	M		M	L	M	M	H		L	
CO4	M	L	M		M	H	L	H		M	L				
CO5	H		L	L	H	H	L	M	L	H		H	L		L
CO6	M				L	H	M	H		H	L	M			

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

To understand the principles of radio navigation, aircraft instruments, and their applications in safe aircraft navigation.

UNIT – I: BASIC RADIO PRINCIPLES:

Radio wave propagation; Frequency, wavelength, amplitude; Types of radio waves; Line of sight communication; Factors affecting radio signals; Introduction to communication systems; Basic principles of VHF and HF communication.

UNIT – II: RADIO NAVIGATION AIDS:

Principles and working of VDF (Visual Direction Finder); NDB (Non-Directional Beacon); ADF (Automatic Direction Finder); VOR (VHF Omni Range); DME (Distance Measuring Equipment); ILS (Instrument Landing System); Basic uses and limitations.

UNIT – III: FLIGHT INSTRUMENTS:

Basic flight instruments; Pitot-static system; Airspeed indicator; Altimeter; Vertical speed indicator; Gyroscopic instruments – Artificial horizon, Directional gyro, Turn and bank indicator; Magnetic compass and its errors.

UNIT – IV: INSTRUMENT FLIGHT PRINCIPLES:

Introduction to instrument flying; Instrument errors; Gyroscopic precession; Compass errors; Spatial disorientation; Scan techniques; Basic instrument interpretation.

UNIT – V: ADVANCED NAVIGATION SYSTEMS:

Area Navigation (RNAV); Global Positioning System (GPS); Inertial Navigation System (INS); Flight Management System (FMS); Advantages and limitations of modern navigation systems.

UNIT – VI: CURRENT CONTOURS (Self-Directed Learning Activities for CIA):

Study of cockpit instrument panels; Simulation of navigation aids; Observation of flight simulators; Case studies of navigation failures; Modern trends in avionics and satellite navigation.

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Radio Navigation Basics	https://www.icao.int
2	Aircraft Instruments	https://www.skybrary.aero
3	Modern Navigation Systems	https://www.faa.gov

REFERENCE BOOKS:

1. Oxford – Aircraft General Knowledge (Instruments & Radio)
2. Jeppesen – Instrument/Commercial Manual
3. Trevor Thom – Air Navigation

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Understand basic radio wave propagation and communication principles	LO2
CO2	Explain working of radio navigation aids	LO1
CO3	Identify aircraft flight instruments and their functions	LO1
CO4	Understand instrument flight principles and errors	LO4
CO5	Analyze advanced navigation systems	LO8
CO6	Understand modern navigation technologies and applications	LO6

SPECIFIC LEARNING OUTCOMES (SLO):

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Basic Radio Principles		
1.1	Radio waves	Define radio waves	K1
1.2	Frequency & wavelength	Explain relationship	K2
1.3	Propagation	Types of propagation	K2
1.4	Communication systems	Basic principles	K1
II	Navigation Aids		
2.1	VDF	Explain VDF	K2
2.2	NDB/ADF	Working principle	K2
2.3	VOR	Explain VOR	K2
2.4	DME	Define DME	K1
2.5	ILS	Explain ILS	K3
III	Flight Instruments		
3.1	Pitot-static system	Explain working	K3
3.2	Airspeed indicator	Define ASI	K1
3.3	Altimeter	Explain altimeter	K2
3.4	Gyroscopic instruments	Working principle	K3
3.5	Magnetic compass	Errors	K2
IV	Instrument Flight		
4.1	Instrument	Define IFR	K1

	flying		
4.2	Instrument errors	Identify errors	K2
4.3	Gyroscopic precession	Explain precession	K3
4.4	Scan techniques	Basic scanning	K2
V	Advanced Navigation		
5.1	GPS	Define GPS	K1
5.2	RNAV	Explain RNAV	K2
5.3	INS	Working of INS	K2
5.4	FMS	Define FMS	K1
VI	Trends		
6.1	Cockpit instruments	Identify instruments	K2
6.2	Simulation	Observe simulators	K2
6.3	Case studies	Analyze failures	K4
6.4	Modern avionics	Explain trends	K2

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C01	L	M		L		H			M		M			L	M
C02	L		L		L		M		L						
C03	H	M		M				H		H	L		M	L	M
C04		L	L		L	M						H			
C05	H	M		M			L			M	M		M	L	
C06			M	L	L			L		L		L			L

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

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

UNIT – I: 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 – II: 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 – III: PHRASEOLOGY:

Phraseology used in Aeronautical Communication Services; Abbreviations used in Aeronautical Communication Services. Distress, Distress Relay, Direction Finding, Flight Safety, Meteorological Information, Flight regulatory.

UNIT – IV: ‘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 – V: COMMUNICATION:

Introduction to radio call format, Radio strength check call, Start-up clearance and pushback clearance call, Taxi clearance call, ATC clearance call.

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Memorize and practice the ICAO phonetic alphabet and numbers, draw layers of ionosphere (day vs night conditions), Create a list of common abbreviations and their meanings, Use Q-codes in sample ATC communication, use aviation apps or recordings to simulate live communication.

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Marking and lighting	https://www.icao.int/NACC/Documents/Meetings/2012/ICAOFAAGACertification2012/ICAOFAACertification07.pdf
2	Air Traffic Services (ATS)	https://mediawiki.ivao.aero/index.php?title=Air_traffic_services
3	Radio Propagation Basic	https://www.mobileatc.com/atc-radio-communications-systems/

REFERENCE BOOKS:

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

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Explain the Duties of Different Bodies In aviation and The Rule Made by them	LO1
CO2	Interpret the Meaning of marking and lighting in airport	LO3
CO3	Outline Of the Air traffic Service	LO1
CO4	What is basic Radio Propagation	LO6
CO5	What is Frequency Bands	LO1
CO6	Analyze Basic Communication between ATC and Aircraft	LO2

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 indent	Interprets basic indent	K2

1.8	Location indicators	Interprets basic indent	K2
1.9	FIR	Analyses difference FIR & ground services	K4
1.10	Identification of ground services	Analyses difference FIR & ground services	K4
II	Runway Markings		
2.1	Runway marking	Explain Runway marking	K2
2.2	Threshold markings	Explain threshold markings	K3
2.3	Taxiway markings	Detail about taxiway markings	K2
2.4	Runway lights	Explain About runway lights	K3
2.5	Threshold lights	Detail About threshold lights	K2
2.6	Taxiway lights	Explain About taxiway lights	K2
III	Air Traffic Services (ATS)		
3.1.0	Objective of ATS	Explain Objective of ATS	K2
3.1.1	Flight Information service	Explain Flight Information service	K2
3.1.2	Alerting Service	Detail about Alerting Service	K2
3.1.3	Air Traffic Advisory Service	What is Air Traffic Advisory Service	K2
3.1.4	Air Traffic control Service	Air Traffic control Service Provided by various Air traffic control Units And its control Boundary	K3
IV	Basic Radio Propagation		
4.1.0	Properties of radio wave	Explain Properties of radio wave	K2
4.1.1	Wave length, Frequency, Frequency bands, frequency modulation, Amplitude modulation	Types: Wave length, Frequency, Frequency bands, frequency modulation, Amplitude modulation	K3
4.1.2	Types of propagation, Refraction, reflection, diffraction, Attenuation	Types of propagation, Refraction, reflection, diffraction, Attenuation	K2
V	Communication		
5.1.0	Introduction to radio call format	Introduction to radio call format	K1
5.1.1	Radio strength check call	What is Radio strength check call	K2
5.1.2	Start-up clearance and pushback clearance call	Explain Start-up clearance and pushback clearance call	K2
5.1.3	Taxi clearance call, ATC clearance call	What Taxi clearance call, ATC clearance call	K2

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C01	M	H		L		M		H	L	M		M			
C02	H	M	L		M	H		H		M			L		
C03	M	H					L	H	M	M	L			L	
C04	H	M		M		M		M		M					
C05	H	M	L		M	M		M		M		L		M	
C06	M	M		L	H	L		H	M	H			L		

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

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

UNIT – I: 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 – II: AIR CONDITIONING AND CABIN PRESSURIZATION:

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

UNIT – III: 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.

UNIT – IV: 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.

UNIT – V: 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.

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Hydraulic vs Pneumatic systems (pressure, usage, advantages), What happens if cabin pressurization fails? Write steps and effects, List common fuel system warnings and their meanings, Carburetor vs Fuel Injection systems.

TOPICS FOR SELF STUDY:

Sl.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

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Outline of the Hydraulic and Pneumatic Power systems	LO1
CO2	Illustrate the Air conditioning And Cabin Pressurization of the Aircraft	LO3
CO3	Identify the Details of the Fuel System	LO1
CO4	Classify the Landing Gear system	LO6
CO5	Explain the Landing Gear Systems	LO1
CO6	To know the Knowledge about the Engine Fuel System	LO1

SPECIFIC 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 vapour cycle machines distribution systems	Explain Air conditioning systems; Air cycle and vapour 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	Indications and warnings	K3
3.1.7	Refueling and defueling	Refueling 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-, tension systems	Ignition harness, spark plugs-, low- and high-tension systems	K2

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C01	H		L	M	L	H				M	H				
C02	H							H		M			M		
C03	H		M		M	H			L		L				
C04	H			L						M	M				
C05	H		L			M							L		
C06	H			L	M	H		H		M	M				

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

To understand, infer and interpret performance charts, weight and balance restrictions and its effects.

UNIT – I: TAKE-OFF PERFORMANCE:

Using performance data, effects of weight and altitude, Take- Off performance, wind factors, Runway inclination, Condition of Runway, V1, V2, Vr, Vlof, Vmbe, Vmcg, Vmca, Take- Off flap setting, factors affecting take-off performance.

UNIT – II: LANDING PERFORMANCE:

Landing performance data, factors affecting landing performance, effects of weight and altitude, wind factors, runway surface, runway slope, Runway condition, flap setting, recommended safety factors for landing, approach speeds.

UNIT – III: RUNWAY CHARACTERISTICS:

Take-off distance available (TODA), Take-Off run available (TORA), clearway, rejected Take-Offs, emergency distance, stop way, landing distance available (LDA). Accelerate Stop Distance Available (ASDA)

UNIT – IV: EN ROUTE PERFORMANCE:

Power required and power available curves, range and endurance, best -range speed, maximum- range speed, best endurance speed, cost index, influence of density, weight of aircraft, winds, ceiling, service ceiling, absolute ceiling.

UNIT – V: WEIGHT AND BALANCE:

Definitions (basic empty weight, maximum zero fuel weight, maximum take-off weight, maximum landing weight, payload, rap weight), weight of fuel, weight restrictions, effect of cg on the position of airplane, movement of CG position, mathematical approaches to weight and balance, dangerous goods, baggage and cargo restraint.

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Study a take-off performance chart and interpret safe limits, explain importance of correct approach speed, Explain rejected takeoff procedure, calculate range and endurance for a given scenario, Create a sample aircraft loading sheet.

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Landing and Take-off Performance	https://www.flightstudy.com/2021/04/aircraft-takeoff-and-landing-performance.html#:~:text=Takeoff%20and%20landing%20performance%20is,and%20decelerates%20to%20zero%20speed.

2	En Route Performance	https://ansperformance.eu/methodology/en-route-vertical-flight-efficiency-pi/
3	Weight and Balance	https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/media/faa-h-8083-1.pdf

REFERENCE BOOKS:

1. Oxford – Flight Performance and planning.
2. Ground studies for pilots, Flight planning.

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Apply the previous knowledge in different scenario take off Performance	LO9
CO2	Performance based on the Landing	LO5
CO3	Characteristics of the Runway Details	LO1
CO4	Plan for diversion & rerouting	LO4
CO5	Plan for En rerouting	LO4
CO6	Explain About Weight and Balancing	LO6

SPECIFIC LEARNING OUTCOMES (SLO)

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Take-Off Performance		
1.1	Using performance data, effects of weight and altitude	Using performance data, effects of weight and altitude	K2
1.2	Take- Off performance	Wind factors, Runway inclination, Condition of Runway	K3
1.3	V1, V2, Vr, Vlof, Vmbe, Vmcg, Vmca,	Explain V1, V2, Vr, Vlof, Vmbe, Vmcg, Vmca,	K2
1.4	Take- Off flap setting	Detail about Take- Off flap setting	K2
1.5	Factors affecting take-off performance	Factors affecting take-off performance	K3
II	Landing Performance		
2.1	Landing performance data	Explain Landing performance data	K2

2.2	Factors affecting landing performance	Factors affecting landing performance	K2
2.3	Effects of weight and altitude	Effects of weight and altitude	K2
2.4	Wind factors, runway surface, runway slope, Runway condition, flap setting	Classifies the wind factors, runway surface, runway slope, Runway condition, flap setting	K2
2.5	Recommended safety factors for landing, approach speeds	Recommended safety factors for landing, approach speeds	K3
III	Runway Characteristics		
3.1.0	Take-off distance available (TODA),	Explain Take-off distance available (TODA),	K2
3.1.1	Take-Off run available (TORA)	Explain Take-Off run available (TORA)	K2
3.1.2	Clearway rejected Take- Offs, emergency distance, stop way	What is clearway rejected Take- Offs, emergency distance, stop way	K2
3.1.3	Landing distance available (LDA).	Landing distance available (LDA).	K3
3.1.4	Accelerate Stop Distance Available (ASDA)	Accelerate Stop Distance Available (ASDA)	K2
IV	En Route Performance		
4.1.0	Power required and power available curves	Explain Power required and power available curves	K2
4.1.1	Range and endurance, best - range speed, maximum- range speed, best endurance speed,	What range and endurance, best - range speed, maximum- range speed, best endurance speed,	K3
4.1.2	Cost index, influence of density, weight of aircraft, winds, ceiling, service ceiling, absolute ceiling	Explain cost index, influence of density, weight of aircraft, winds, ceiling, service ceiling, absolute ceiling	K2
V	Weight and Balance		
5.1.0	Definitions (basic empty weight, maximum zero fuel weight, maximum take-off weight, maximum landing weight, payload, rap	Definitions (basic empty weight, maximum zero fuel weight, maximum take-off weight, maximum landing weight, payload, rap weight)	K3

	weight)		
5.1.1	Weight of fuel	What is weight of fuel	K2
5.1.2	Weight restrictions,	What is weight restrictions	K2
5.1.3	Effect of cg on the position of airplane	Effect of cg on the position of airplane	K3
5.1.4	Movement of CG position	Explain movement of CG position	K2
5.1.5	Mathematical approaches to weight and balance	Explain mathematical approaches to weight and balance	K4
5.1.6	Dangerous goods, baggage and cargo restraint.	Define dangerous goods, baggage and cargo restraint	K2

COURSE ARTICULATION MATRIX (CAM) for defined Cos

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H		M	H		H		H		M					L
CO2	H		M	H	M	H		H			H				
CO3	H			M	L	M	L		L			L			
CO4	M		H	H		H		H	L						
CO5	M	L	H	H		M					H		L		
CO6	H		M	M	L	H	L	H		M					

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

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

UNIT – I: 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 Defence Identification Zones, Restricted Areas, Prohibited Area, Danger Area, Navigational lights to be displayed in the aircraft

UNIT – II: 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 & signalling devices wind direction indicators, landing direction indicator, signalling lamp, signal panel and signal area

UNIT – III: 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 – IV: 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 – V: ICAO ANNEXURE TERMINOLOGY:

Various definitions, terminologies used in aviation.

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Analyze a scenario involving violation of airspace rules, create a flowchart for interception procedures, watch airport operation videos and identify markings and lights, analyze customs procedures for international flights, use aviation terms in sentences related to flight operations.

TOPICS FOR SELF STUDY:

Sl. 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.html
3	ICAO Annexure	https://www.icao.int/safety/airnavigation/nationalitymarks/annexes_booklet_en.pdf

REFERENCE BOOKS:

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

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Explain about the rules at the air and navigation light in the aircraft	LO1
CO2	What is the function of interception at civil aircraft	LO1
CO3	Define details of margins and lighting	LO1
CO4	Definition of airport document provide	LO1
CO5	Define Requirement for passenger and Customs	LO1
CO6	Explain ICAO Annexure terminology	LO1

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 & amp	General Rules-Protection of persons & amp	K1
1.3	Surface movement of Aircraft	Define Surface movement 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 & amp	Define FIRs & amp	K3

1.9	Location indicator	What is Location indicator	K1
1.10	Air Defence Identification Zones	Explain Air Defence 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 ground signals, marshalling signals, indicators & amp	K3
2.6	Signalling devices wind direction indicators	Explain signalling devices wind direction indicators	K1
2.7	Landing direction indicator, signalling lamp, signal panel and signal area	Define landing direction indicator, signalling lamp, signal panel and signal area	K3
III	Aerodromes		
3.1.0	Aeronautical Beacon	Explain Beacon Aeronautical	K3
3.1.1	Beacon	Location- Characteristics- Identification Beacon	K1
3.1.2	Runway Markings- Threshold	Define Runway Markings- Threshold Markings Holding position markings, Taxiway	K2

	Markings Holding position markings, Taxiway markings	markings	
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-stop way lights	Define Taxiway lightings-stop way 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 aircraft documents	use of aircraft documents	K2
4.1.3	General Declaration- Entry &	General Declaration-Entry & &	K3
4.1.4	departure of persons and their baggage- Entry requirement & &	departure of persons and their baggage-Entry requirement & &	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

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C01	M			L		H		H			L				L
C02	M	M	M	L					L						
C03	H	M			L		L	M				H	L		
C04	M		M			M			L	M	M				
C05	M				M			L	M						
C06	H			M		H	M	H		M		M			

L – Low

M- Medium

H-High

COURSE OBJECTIVES:

- 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.
- Identification of baggage's with bombs

UNIT – I: DEFENITIONS, 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 – II: 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 – III: 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 – IV: 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 – V: HOSTAGE NEGOTIATION:

Hostage situation – Hostage situation moves 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.

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Create a glossary of aviation security terms and definitions, “Why is aviation a high-risk target?” – Write your own explanation, create a checklist for effective baggage screening, Study how Improvised Explosive Devices (IEDs) are detected, “Why civil aviation is an attractive target?”.

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Emerging security threat in Aviation security	http://blog.safepassage.com/emerging-threats-to-aviation-security
2	Improvised explosive devises	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:

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

SPECIFIC LEARNING OUTCOMES (SLO):

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	DEFENITIONS, OBJECTIVESANDTHREATS		
1.1	Aviation security and airport security	Exploited of aviation security	K2
1.2	Terminology related to aviation security	Definition related to aviation security	K1
1.3	Objectives of aviation security	List 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 of the items which are restricted	K4
3.1.2	Improvised explosive Devises	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	Un lawful 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 on board	Explain The procedure of negotiation	K2
4.1.5	Tokyo convention Hague convention, Montreal convention	List out the important contents of these convention	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 negotiators 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

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	M		H		M	M		H		M					L
CO2	M	M		L	H				L	M			M		
CO3	M		L		M		L	H			L		H		
CO4	M	H	H		L	H					M			L	
CO5	M	M	L		M			M	M	H			M		L
CO6	M		H		L	M		H		M		M	H		

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

To understand the fundamental principles of air navigation and develop the ability to apply geographical and navigational concepts for accurate determination of position, distance, direction and speed

COURSE CONTENT:

1. Study and Understanding of the Earth and Its Geographical Features
2. Study and Identification of Aeronautical Charts and Navigation Symbols
3. Determination of Latitude, Longitude, and Aircraft Position
4. Measurement of Distance and Calculation of Ground Speed
5. Calculation of Time, Speed, Distance, and Estimated Time of Arrival (ETA)
6. True, Magnetic, and Compass Directions Using Variation and Deviation Corrections
7. Application of Basic Air Navigation Principles

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Earth, position, direction and navigation principles	https://www.faa.gov/regulations_policies/handbooks_manuals/aviation
2	Compass Directions	https://www.faa.gov/regulations_policies/handbooks_manuals/aviation
3	Aeronautical Charts and Navigation Information	https://surveyofindia.gov.in/pages/aeronautical-charts-and-maps

REFERENCE BOOKS:

1. Air Navigation by R.K. Bali, 7th Revised Edition
2. General Navigation – CAE Oxford Aviation Academy

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Explain the Earth's geographical features, coordinate system, latitude, and longitude relevant to air navigation	LO1
CO2	Determine an aircraft's position using latitude, longitude, and appropriate chart-based methods	LO7, LO10
CO3	Measure navigation distances and calculate ground speed, time, distance, and estimated time of arrival (ETA).	LO4
CO4	Calculate and apply true heading, magnetic heading, variation, deviation, and drift correction during navigation.	LO4
CO5	Identify and interpret aeronautical charts, symbols, scales, and essential navigation information	LO10
CO6	Apply fundamental air navigation principles and practical calculations to solve basic navigation problems	LO3, LO2

SPECIFIC LEARNING OUTCOMES (SLO):

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
1	The Earth and Its Geographical Features	Understand the shape, size, geographical features, latitude, longitude, and coordinate system of the Earth as applied to air navigation.	K3
2	Aeronautical Charts	Identify and interpret aeronautical charts, symbols, scales, and essential navigation information.	K4
3	Position Fixing	Determine an aircraft's position using latitude, longitude, and chart-based references	K5
4	Distance & Ground Speed	Measure route distances and calculate ground speed accurately for flight planning	K5
5	Time & ETA	Calculate flight time, estimated time of arrival (ETA), and related navigation parameters.	K3
6	Compass Directions	Determine true, magnetic, and compass directions by applying appropriate magnetic variation and compass deviation corrections.	K3
7	Basic Air Navigation Principles	Interpret basic aircraft navigation parameters.	K4

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H	M	L	H		M	H	M		M		L			M
CO2	H	L	M	H	M	M	L		H	L	H		L		
CO3	H	M		H	L		M	L		M	L	M		M	
CO4	H	L	H	H		L	H		M	M	H				M
CO5	M	H	M	H	M			M	L	H		M	L	H	
CO6	M	M	L	H		L	H			M	M				L

L – Low

M- Medium

H-High

COURSE OBJECTIVES:

- The nature and types of business organizations-Principles & functions of Management
- Process of decision making
- Advanced level of theoretical and applied knowledge in subjects concerning with the business of Travel Agency and tour operator.

UNIT – I: Introduction to Air Ticketing

Basic concepts and definitions in air ticketing-Overview of Airline Industry- Types of air tickets (e-tickets, paper tickets, open tickets)-The role of a travel agent in air ticketing Key terminology in air ticketing (PNR, fare basis, ticketing designator- Ticketing rules and conditions.

UNIT – II: Fundamentals of Airline Ticketing (Theoretical Concepts):

Introduction to Airline ticketing –Policy and Procedures – location Geography & Reservation – Ticketing Formalities – Refund & Cancellation policy Activity: Assignment / Seminar / Group Discussion / Hands-on Training / Designing Pamphlets / Handouts / Any other

UNIT – III: Types of Visas (Theoretical Concepts):

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

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Create a visual map of: Engagement, Reflection, Reciprocity, Public dissemination, analyse a sample ticket and identify: Fare, taxes, class, route, analyze reasons for visa rejection and suggest solutions, Data Collection & Analysis Collect responses and analyse trends (fare, baggage, service)

Practical: (i) Travel Agency Visit (ii) Domestic and International Departure formalities Practice (iii) Case Studies on Foreign Currency Conversion (iv) Tour Brochures and Package Preparation & Calculation Practical.

TEXT BOOKS:

1. Aviation Maintenance Management – Harry A. Kinnison McGraw Hill

Reference Books:

1. Risk Management and Error Reduction in Aviation Maintenance – Manoj S. Patankar and James C. Taylor – Ashgate Publishing Ltd.

REFERENCE BOOKS:

1. Managing Maintenance Error – James Reason and Alan Hobbs – Ashgate Publishing Ltd.
2. TOURISM OPERATIONS AND MANAGEMENT–, 25 March 2009
3. Airline Airport & Tourism Management by Dr.Sumeet Suseelan

E- REFERENCE:

1. <http://teamslive.com/DOWNLOADS/Bharathiar%20University%20Study%20Materials/UG/BBA%20Airline%20&%20Airport%20Management/Third%20Year/Travel%20Agency%20Operations.pdf>

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Understand the concepts, principles, and ethical practices of service-learning and community engagement.	LO1
CO2	Explain airline ticketing policies, procedures, and reservation systems used in the aviation industry.	LO2
CO3	Identify and differentiate various types of visas and outline the application procedures for different countries.	LO2
CO4	Analyze ticketing elements such as fare structures, availability, baggage rules, and security procedures through practical exposure.	LO13
CO5	Demonstrate the ability to prepare and process visa documentation including applications, itineraries, and supporting documents.	LO10
CO6	Apply knowledge of ticketing and visa procedures in real-world or simulated community-based scenarios.	LO3

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	M							H	M	M		H			
CO2	H	M			H	H				M					
CO3	M	M				H				M		M			
CO4	H	H	M			H		M		M					
CO5	M		M			H				H	M				
CO6	M		M		H	H			M	H	M	H			

L – Low

M- Medium

H-High

Third Year

SKILL ENHANCEMENT COURSE 5

Semester V

Code:

**AVIATION SAFETY REGULATION
(Theory)**

Credits: 2

COURSE OBJECTIVE:

To understand aviation safety principles, regulatory frameworks, international standards, and procedures to ensure safe and secure aircraft operations.

UNIT – I: INTRODUCTION TO AVIATION SAFETY:

Definition of aviation safety; Importance of safety in aviation; Safety culture; Human factors in safety; Basic safety concepts; Risk and hazard identification; Accident vs incident; Safety terminology.

UNIT – II: AVIATION REGULATORY BODIES:

Role of international and national organizations such as International Civil Aviation Organization (ICAO), Directorate General of Civil Aviation (DGCA); Functions and responsibilities; Basic ICAO Annexures; Role of other aviation authorities; Regulatory framework in aviation.

UNIT – III: AVIATION RULES AND REGULATIONS:

Rules of the Air; Air traffic rules; Licensing requirements; Aircraft certification; Airworthiness; Operational regulations; Airport safety rules; Compliance and enforcement.

UNIT – IV: AVIATION SECURITY:

Difference between safety and security; Airport security systems; Passenger and baggage screening; Access control; Threats in aviation (hijacking, terrorism); Role of security agencies; Emergency procedures.

UNIT – V: SAFETY MANAGEMENT SYSTEM & ACCIDENT INVESTIGATION:

Safety Management System (SMS); Components of SMS; Risk management; Safety reporting systems; Accident investigation procedures; Causes of accidents; Case studies of aviation accidents.

UNIT – VI: CURRENT CONTOURS (Self-Directed Learning Activities for CIA):

Study of recent aviation incidents; Safety audits; Modern safety technologies; Role of automation in safety; Case studies; Global safety improvements and future trends.

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Aviation Safety Basics	https://www.icao.int
2	DGCA Regulations	https://dgca.gov.in
3	Aviation Security & SMS	https://www.skybrary.aero

REFERENCE BOOKS:

1. ICAO – Safety Management Manual
2. Oxford – Aviation Security & Safety
3. Aircraft General Knowledge – Trevor Thom

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Understand basic aviation safety concepts and principles	LO1
CO2	Explain national and international aviation regulatory bodies	LO1
CO3	Identify aviation safety rules and regulations	LO1
CO4	Understand aviation security systems and procedures	LO1
CO5	Analyze safety management systems and accident investigation	LO1
CO6	Understand current trends in aviation safety and regulations	LO6

SPECIFIC LEARNING OUTCOMES (SLO):

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Aviation Safety		
1.1	Safety concepts	Define safety	K1
1.2	Risk & hazard	Explain risk and hazard	K2
1.3	Safety culture	Importance of safety culture	K2
1.4	Accident vs incident	Differentiate	K2
II	Regulatory Bodies		
2.1	ICAO	Functions of ICAO	K2
2.2	DGCA	Role of DGCA	K2
2.3	Annexures	Basic ICAO annexures	K1
2.4	Regulatory framework	Explain framework	K2
III	Rules & Regulations		
3.1	Rules of air	Define rules	K1
3.2	Licensing	Explain licensing	K2
3.3	Airworthiness	Define airworthiness	K1
3.4	Airport safety	Identify safety rules	K2
IV	Security		
4.1	Safety vs Security	Differentiate	K2
4.2	Screening	Explain screening	K2
4.3	Threats	Identify threats	K2

4.4	Emergency procedures	Define procedures	K1
V	SMS & Investigation		
5.1	SMS	Define SMS	K1
5.2	Risk management	Explain process	K3
5.3	Accident investigation	Steps involved	K2
5.4	Case studies	Analyze accidents	K4
VI	Trends		
6.1	Safety audits	Define audits	K1
6.2	Technology	Role in safety	K2
6.3	Case studies	Analyze incidents	K4
6.4	Future trends	Explain developments	K2

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C01	M	M		L		H		M	M		M		H	L	
C02	L		L		L		L				H	L			H
C03	H	M		M					H		L		L		
C04	H		L									L		L	H
C05	M	M		M	M	H	L			H	M			M	
C06	H	M	M	L				M					L		L

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

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

UNIT – I: 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 – II: AIRSPEED INDICATORS:

Working Principle and construction of ASI, speeds which are mentioned on the dial of ASI using colored arc, IAS, TAS, EAS, CAS, RAS, conversion, error, leakages and blockages associated with ASI. Mach meter, its principle, Mach/TAS calculations, Mach meter errors.

UNIT – III: 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 – IV: 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 – V: 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.

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Concept Static pressure vs Dynamic pressure, Speed Conversion Practice, Solve problems involving: IAS, TAS, CAS, EAS, Best rate of climb (V_y), Best angle of climb (V_x), True heading → Magnetic heading → Compass heading, Rigidity in space, Precession

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)

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Outline of the Pressure instrument and types of pressure	LO8
CO2	Describe About working principle and construction of Air speed indicator	LO1
CO3	Describe About working principle and construction of Vertical Speed Indicator	LO1
CO4	Study of Earth Magnetism	LO6
CO5	Study of Magnetic Compass	LO1
CO6	Describe about Gyro Instrument	LO1

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, and 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, topple and wander, gyro rotor, spin axis	Types of gyros-space gyro, earth gyro, tied gyro, rate gyro, drift, topple and wander, gyro rotor, spin axis	K3
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 construction, bank indication, turn coordinator.	Principle and construction, bank indication, turn coordinator.	K2

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H			L		H		L		L					
CO2	H				L	H		H		M	M				
CO3	H		M	L		H	L	L		L		L			
CO4	H		M			M		H			M				
CO5	H				L	H		M					L		
CO6	H			M		H		M	L		M				

L – Low

M- Medium

H-High

COURSE OBJECTIVES:

- To acquire basic understanding passenger handling;
- Understand the basic about the Dangerous Goods
- Classify the different organization works together for safe conduct of flight

UNIT – I: Passenger Service and Principles of Handling:

Passenger Service and Principles of Handling – Principles of Service – Flight Information Facility – Handling – Transit/Connection – Connection/Transfer- Special Passenger – Special Passenger Handling - Interline Connection Process - Safety and Emergency Procedures

UNIT – II: Dangerous Goods:

Introduction to Dangerous Goods -Introduction to Dangerous Goods - Dangerous Goods - What are Dangerous Goods - Regulations and Standards – Hazard Class Definitions - Identification and Recognition- Dangerous Goods or Hazard Class Definitions - Precautionary Measures Enforcement and Reporting UNIT Summary - Cabin crew Duties- Roles and Responsibilities.

UNIT – III: Crew Resource Management (CRM):

Classifications of Dangerous Goods - Why Dangerous Goods at All Pre Take-Off Preparations - - Passenger Safety Brief – Introduction of Cabin Crew - Pre-flight Preparations - Flight Preparation - Boarding Process - Crew Resource Management (CRM)

UNIT – IV: Grooming:

Grooming: Beauty Tips - Steps to a Pedicure -Frugal Beauty Tips -Beat Dry Skin - Simple Beauty Tips-Tips for Radiant Skin – Tips for Perfect Lips -Look Years Younger -Perfect Eyes -Fade Your Freckles-Look after Your Pores -Makeup Beauty Tips-Shaving -Skin Care- Body Language – Swimming, Yoga & Fitness.

UNIT – V: CRM Training:

CRM Training Evolution and CRM Desired Skills - Performance Standards for Instructors in CRM - CRM Standards and Training - CRIMs (CRM Instructors) and CRIMEs (CRM Instructor Examiners) CRM: Evolution and Basics – Flight Control Crew Management - Maintenance Resource Management- Impact of CRM in Aviation Safety

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Write basic safety and emergency procedures for passengers, Study and identify hazard labels and symbols, Analyze teamwork during, Emergency situations, In-flight operations, Understanding the basic of grooming and personality traits, Analyze an aviation incident where CRM played a role.

REFERENCE BOOKS:

1. Alexander T.Well, Seth Young –Principles of Airport Management-McGraw Hill 2003
2. P.S.Senguttuvan –Fundamentals of Airport Transport Management – McGraw Hill 2003
3. The Complete CabinCrew Interview Manual.
4. Aviation Maintenance Management – Harry A. Kinnison – McGraw Hill

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Understand how to handle passengers, including special passengers, safely and professionally.	LO13
CO2	Learn what dangerous goods are and how to identify and handle them safely	LO3
CO3	Understand basic flight procedures like pre-flight preparation, boarding, and safety instructions.	LO14
CO4	Develop good grooming habits, personality, and body language required for aviation jobs	LO15
CO5	Understand teamwork and communication skills through Crew Resource Management (CRM).	LO2
CO6	Learn how to respond to emergency situations and ensure passenger safety during flights.	LO9

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	M	H		L		L	M	H	M	H	L	M	L	H	L
CO2	M	M	H		H	H		L	L	M		L	H		
CO3			L		M	L	M	H	M			M	M	M	H
CO4		M	H		H				M	H	M	M	H		
CO5			H			M	L	M	L			M	M		
CO6	M	M			M	H		H	H	H		M	H	M	L

L – Low

M- Medium

H-High

Third Year

CORE COURSE 11

Semester VI

Code:

**CIVIL AVIATION REQUIREMENTS AND
MANAGEMENT SYSTEMS
(Theory)**

Credits: 4

COURSE OBJECTIVE:

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

UNIT – I: INTRODUCTION:

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

UNIT – II: 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 – III: 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 – IV: SAFETY MANAGEMENT SYSTEM (SMS):

Indian safety policy, Indian safety plan, SMS, SSP, ICAO ANNEX 19- Safety management, establishment of safety management system, applicability of SMS, safety policy and objective, coordination of emergency response planning, documentation, safety management system manual, safety risk management, safety assurance, safety promotions, quality policy.

UNIT – V CASE STUDIES:

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

UNIT – VI: CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

CAR purpose, Safety Management Systems (SMS), Identify environmental practices followed at airports, Analyze how CAR regulations ensure safe operations, Explain importance of safety culture in aviation, Human error, Technical failure

TOPICS FOR SELF STUDY:

SL. 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)

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Purpose of the civil Aviation and Introduction of Civil Aviation Requirement	LO1
CO2	Monitoring the Aircraft and the airport Regulation and noise management in Civil Aviation	LO14
CO3	Study in Terms of General terms of Civil Aviation Requirement.	LO1
CO4	Study of Airworthiness and air space and air navigation service standard	LO1
CO5	Safety management System and Indian safety policy	LO13
CO6	Describe the Error and case study for the Accidents	LO6

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

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H	M		L		H			M		M			L	
CO2	L		L		L		M					L	H		M
CO3	H	M		L			M	H		H	L		M	H	
CO4	H		L			L			M			L		L	
CO5	H	M		M		H	L		L		M		M		M
CO6	H	M	M	L		M		L		L				H	M

L – Low

M- Medium

H-High

The candidate shall be required to take up a Project Work by group or individual and submit it at the end of the final year. The Head of the Department shall assign the Guide who, in turn, will suggest the Project Work to the students in the beginning of the final year. A copy of the Project Report will be submitted to the University through the Head of the Department on or before the date fixed by the University.

The Project will be evaluated by an internal and an external examiner nominated by the University. The candidate concerned will have to defend his/her Project through a Viva-voce.

ASSESSMENT/EVALUATION/VIVA VOCE:**1.PROJECT REPORT EVALUATION (Both Internal & External)**

I. Plan of the project - 20 marks

II. Execution of the plan/collection of data - 45 marks
Organization of materials/hypothesis
Testing etc. And presentation of the Report

III. Individual initiative - 15 marks

2.VIVA-VOCE / INTERNAL & EXTERNAL - 20 marks

TOTAL - 100marks

PASSING MINIMUM:

Project	Vivo-Voce 20 Marks 40% out of 20 Marks (i.e. 8 Marks)	Dissertation 80 Marks 40% out of 80 marks (i.e. 32 marks)
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A candidate who gets less than 40% in the Project must resubmit the Project Report. Such candidates need to defend the resubmitted Project at the Viva-voce within a month. A maximum of 2 chances will be given to the candidate.

COURSE OBJECTIVE:

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

UNIT – I: 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 – II: 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 – III: 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 – IV: 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 – V: 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.

UNIT – VI CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):

Principles of radio wave propagation in aviation, Working of VDF (Very High Frequency Direction Finding), Basic principles of RADAR technology, Difference between Primary Radar and Secondary Radar, Working principle of airborne weather radar, Types of antennas used in radar systems, Working principle of Secondary Surveillance Radar (SSR), Detailed working of SSR system

TOPICS FOR SELF STUDY:

Sl. 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.

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Understand about the Direction-finding Aids	LO1
CO2	Explain Radar and Its types of radars	LO1
CO3	Classify the Advantage and Disadvantage of the Radar	LO3
CO4	Understand the concept cockpit Display And its types	LO1
CO5	Explain Secondary Radar theory and DME	LO1
CO6	Explain Secondary Surveillance Radar	LO1

SPECIFIC 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	K4

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H	M		L		H			M		M			L	
CO2	L		L		L		M			M		L			H
CO3	H	M		L				H	L		L		H		
CO4	H		L		M	L		M				L		L	
CO5	M	M		M		H	L		L		M				
CO6	H		M	L				L	M	L		M			M

L – Low

M- Medium

H-High

COURSE OBJECTIVE:

To understand the functioning of travel agencies, ticketing procedures, customer service, and tourism operations in the aviation and travel industry.

UNIT – I: INTRODUCTION TO TRAVEL AGENCY:

Definition of travel agency; Types of travel agencies; Role and importance of travel agencies; History of travel industry; Functions of travel agents; Organizational structure of travel agencies.

UNIT – II: TRAVEL AGENCY OPERATIONS:

Functions of travel agency; Tour operators; Travel intermediaries; Services provided (booking, reservations, visa assistance, insurance); Role of travel consultants; Customer handling.

UNIT – III: TICKETING AND RESERVATION SYSTEM:

Air ticketing basics; Types of tickets; Fare construction; Reservation systems; Introduction to Global Distribution Systems (GDS); E-ticketing; Basic airline codes and terminology.

UNIT – IV: TOURISM PRODUCTS & ITINERARY PLANNING:

Tourism products; Types of tourism (domestic, international); Itinerary planning; Tour packages; Costing of tours; Travel documentation (passport, visa); Travel insurance.

UNIT – V: CUSTOMER SERVICE & MARKETING:

Customer service skills; Communication skills; Handling complaints; Marketing strategies in travel industry; Sales promotion; Role of digital marketing; Customer satisfaction.

UNIT – VI: CURRENT CONTOURS (Self-Directed Learning Activities for CIA):

Online travel agencies; E-tourism; Mobile booking apps; Impact of social media; Case studies of travel companies; Future trends in tourism and travel management.

TOPICS FOR SELF STUDY:

Sl. No	Topics	Web Links
1	Travel Agency Basics	https://www.iata.org
2	Ticketing & Reservation	https://www.amadeus.com
3	Tourism Industry Trends	https://www.unwto.org

REFERENCE BOOKS:

1. Travel Agency and Tour Operations – Jagmohan Negi
2. IATA Travel and Tourism Manual
3. Basics of Tourism – Bhatia A.K

COURSE OUTCOMES:

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

CO	Course Outcomes	LO
CO1	Understand the structure and role of travel agencies	LO1
CO2	Explain functions and services of travel agencies	LO1
CO3	Understand ticketing and reservation systems	LO1
CO4	Identify tourism products and itinerary planning	LO1
CO5	Analyze customer service and marketing in travel agencies	LO1
CO6	Understand current trends in travel and tourism industry	LO6

SPECIFIC LEARNING OUTCOMES (SLO):

UNIT	COURSE CONTENTS	LEARNING OUTCOMES	TAXONOMY LEVEL
I	Introduction to Travel Agency		
1.1	Travel agency	Define travel agency	K1
1.2	Types	Identify types	K2
1.3	Functions	Explain functions	K2
1.4	Structure	Organizational setup	K1
II	Operations		
2.1	Tour operators	Define tour operator	K1
2.2	Services	Explain services	K2
2.3	Consultants	Role of consultants	K2
2.4	Customer handling	Basic handling skills	K2
III	Ticketing		
3.1	Air ticket	Define ticketing	K1
3.2	Reservation	Explain reservation	K2
3.3	GDS	Define GDS	K1
3.4	E-ticketing	Explain process	K2
IV	Tourism		
4.1	Tourism products	Define products	K1
4.2	Itinerary	Plan itinerary	K3
4.3	Tour packages	Define packages	K2
4.4	Travel documents	Passport & visa	K1
V	Customer Service		
5.1	Communication	Importance	K2
5.2	Complaints	Handling methods	K3
5.3	Marketing	Strategies	K2
5.4	Customer satisfaction	Define satisfaction	K1
VI	Trends		
6.1	Online agencies	Define OTA	K1
6.2	E-tourism	Explain concept	K2
6.3	Case studies	Analyze companies	K4
6.4	Future trends	Identify trends	K2

COURSE ARTICULATION MATRIX (CAM) for defined COs

CO	Program Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	H	M		L		H			M		M				H
CO2	L		L				M								
CO3	H	M		L		L		H		M		H			H
CO4	L				M	L		M	L		L	L		L	H
CO5	H	M				H				H		M			
CO6		M	L	L				L		L			M		M

L – Low

M- Medium

H-High