STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR 6th Semester (Aeronautical Engg.)(wef 2020-21)

Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th.1		Aircraft Instrumentation	4		-	20	80	3	100
Th.2		Aircraft Jet Engine	4		-	20	80	3	100
Th.3		Basic Helicopter	4		-	20	80	3	100
Th.4		Elective***(Any one) a) Aircraft Inspection, Maintenance and repair b) Civil Aircraft Regulation c) Aircraft Avionics	4			20	80	3	100
		Total	*16*			*80*	*320*	-	*400*
		Practical							
Pr.1		Aircraft Jet Engine Lab	-	-	4	25	50	3	75
Pr.2		Aircraft system Lab	-	-	4	25	25	3	50
Pr.3		CAD/CAM lab	-	-	4	25	25	3	50
Pr.4		Project Phase II			6	50	100	3	150
Pr.5		Life Skill		-	2	25	-	-	25
		Student Centred Activities(SCA)			3				
		Total	-	-	*23*	*150*	*200*	-	*350*
		Grand Total	**16**	**-**	**23**	**230**	**520**	**-**	**750**

Abbreviations: L-Lecturer, T-Tutorial, P-Practical . Each class is of minimum 55 minutes duration

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM/Idea Tinkering and Innovation Lab practice etc. ,Seminar and SCA shall be conducted in a section.

There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester

TH.1. AIRCRAFT INSTRUMENTATION

Theory: 4 periods per week **I.A : 50 Marks**
Examination: 3 hours **TOTAL MARKS : 100 Marks**

Topic-wise distribution of periods

S.L. No.	TOPICS	PERIODS
I	INTRODUCTION TO AIRCRAFT INSTRUMENTATION SYSTEMS	5
II	DISPLAYS AND TYPES OF COCKPIT DISPLAYS	12
III	AIR DATA BASED INSTRUMENT	6
IV	GYRO BASED INSTRUMENT	9
V	RADIO INDICATING COMPASS	10
VI	MACHMETER	10

Rationale

It aims at enabling the student to understand Different type of instruments used in aircraft

Course Outcome

To recognisethe basic aircraft instrumentation and its requirements
To know about the basic Aircraft display systems
To understand about the main air data instruments in an aircraft
To Identifythe gyro instruments in the aircraft
To Identifythe radio indicating compass in the aircraft
To Identifythe machmeter in the aircraft.

COURSE CURRICULAM

UNIT I: INTRODUCTION TO AIRCRAFT INSTRUMENTATION SYSTEMS (CO1)

1.1.1 Introduction to Aircraft Instrumentation systems and Aircraft Requirements of Aircraft Instrumentation System,
1.1.2 Temperature, Humidity High gravity Forces ,
1.1.3 Vibration Accuracy ,
1.1.4 Sensitivity Reliability ,
1.1.5 Maintainability Size,
1.1.6 Weight - Cost FAIL SURE and FAIL SAFE FEATURES
1.1.7 Remote indication and Control.
1.1.8 Instrument Panels and Cockpit Layouts
1.1.9 Grouping of Instruments,
1.1.10 Flight Instruments – Basic “SIX” & BASIC “T” ,
1.1.11 Power Plant
1.1.12 Instruments, basic pitot system of aircraft

UNITII: DISPLAYS AND TYPES OF COCKPIT DISPLAYS

2.1.1 Priority Consideration,
2.1.1 Reference frame consideration Basic Display,
2.1.3 Radial Displays,
2.1.3 Characteristics of Radial Displays.,
2.1.4 Digital Displays,
2.1.5 Characteristics of Digital Display,

2.1.6 Vertical Displays.,
2.1.7 Characteristics of Vertical Display,
2.1.8 Head up Display (H.U.D) – Basic HUD system,
2.1.9Importantcomponents ,H U D System,
2.1.10 Characteristics of HUD system .,
2.1.11 Other Types of cockpit Displays:,
2.1.12 Recorded Displays, Audio Displays ,Illuminated Displays, Head Down Display – HDD
2.1.13Projected Map Display – PMD,
2.1.14Horizontal Situation Indicator – HSI, Helmet Mounted Display,
2.1.15 Integrated Displays
2.2 Instrument Elements – Explanations of four principal elements of an instrument system with diagrams
2.2.1 Instrument Mechanisms, gears, Hair Springs, Bimetal Strip method

UNTIII: AIR DATA BASED INSTRUMENT
3.1 Basic theory of operation of an Altimeter.
3.1.1Pressure altitude and indicated altitude
3.1.2'Q' Codes and their purpose. Servo controlled altimeter –advantages
3.1.3Airspeed indicator-Introduction, purpose.
3.1.4Air speed terminology and Air speed terminology diagram.
3.1.5 Principle of operation of Air speed indicator.
3.1.6 Square law compensation for air speed indicator.
3.1.7Introduction to ROCI and its purpose.
3.1.8Principle of operation of ROCI. Operation of ROCI for climb,
3.1.9level and dive conditions of an aircraft
3.1.10Metering unit in an ROCI and its purpose

UNIT IV: GYRO BASED INSTRUMENT
4.1.1 Introduction to gyroscope and its application in aircraft. Gyroscope and its properties:
4.1.2Rigidity, Precession,
4.1.3 Three degrees of freedom of a gyroscope, Gyroscopic references
4.1.4Limitations of a free gyroscope, Limitations of a displacement gyroscope,
4.1.5 Modern trends: LASER gyroscope.
4.1.6 Introduction to AH- Gyro horizon principles, Electric gyro horizon
4.1.7Introduction to TBI its purpose in an aircraft- Rate gyroscope and its operation,
4.1.8 Bank indications on dial for various conditions of flight of aircraft,
4.1.9 Indication of turn and slip on dial of TBI indicator, Introduction and purpose,
4.1.10 Magnetic Reference Heading System (MHRS), Working principle of an aircraft heading system

UNIT V: RADIO INDICATING COMPASS
5.1 Introduction to DI/RI Compass- Basic principle of operation,
5.2 Radio magnetic indicator (RMI)

UNIT VI: MACHMETER (CO6)
6.1 Introduction to mach meter,
6.1.1purpose and need for mach meter in an aircraft
6.1.2Principle of operation of mach meter

TEXT BOOKS AND REFERENCES
1.Aircraft Instrument systems by EHJ Pallet
2.Aircraft Systems volume IV by Lalit Gupta and Dr OP Sharma
3.Aircraft electrical systems by JOHN KENNEDY

Syllabus to be covered up to I.A-Chapters 1,2 &3

TH.2. Aircraft Jet Engine

Theory: 4 periods per week **I.A : 50 M**
Examination: 3 hours **TOTAL MARKS : 100 Marks**

Topic-wise distribution of periods

S.L. No.	TOPICS	PERIODS
I	*BASIC THEORY OF JET ENGINE , CLASSIFICATION AND BASIC THEORY OF JET ENGINE , TYPES OF JET ENGINES*	10
II	*INLET DUCTS, COMPRESSORS*	10
III	*COMBUSTION CHAMBER*	7
IV	*TURBINE, JET NOZZLE*	9
V	*STARTING, IGNITION SYSTEM, BLEED CONTROL AND LUBRICATION SYSTEMS*	10
VI	*MODERN DEVELOPMENT AND ENVIRONMENTAL EFFECT*	6

Rationale
To enable the students to gain a thorough knowledge about the working of jet engines and to identify its components, their location and functions.

Course Objective
Tounderstand the principle of working of a jet engine and their types
To understand the various types of inlet duct and compressors
To understand the types of combustion chambers, construction and function
To understand the types of turbine and jet nozzles , construction, function
To understand the working of starting , ignition, bleed air control and lubricating system
To understandthe modern development in jet engines.

COURSE CONTENT
UNIT I: *BASIC THEORY OF JET ENGINE , CLASSIFICATION AND BASIC THEORY OF JET ENGINE , TYPES OF JET ENGINES*
1.1 Basic theory of jet propulsion: introduction
1.1.1Principle of operation of jet engine
1.1.2Equation of thrust
1.1.3Comparison between gas turbine engine and reciprocating engine
1.1.4Relation between pressure, velocity and thrust in a jet engine
1.2 Classification and Types of jet engines:
1.2.1 Turbo prop, turbo fan, turbo shaft, turbojet, ramjet , scramjet , pulse jet

UNIT II: *INLET DUCTS, COMPRESSORS*
2.1 Inlet Ducts:
2.1.1 Inlet duct-purpose
2.1.2 Function of inlet-duct
2.1.3 Types of inlet -duct
2.1.4 Ram effect and efficiency
2.1.5 Effects on pressure, velocity and temperature of airflow
2.2 Compressors

2.2.1 Compressor-purpose
2.2.2 Constructional features
2.2.3 principles of axial flow and centrifugal flow
2.2.4 Functions of impellers, diffuser, rotor blades. Stator blade, inlet guide vane
2.2.5 Advantages and disadvantages of centrifugal and axial flow compressor
2.2.6 Compressor stalling and surging

UNIT III: *COMBUSTION CHAMBER*
3.1 Combustion Chamber:
3.1.1 Combustion chamber-purpose
3.1.2 Combustion process
3.1.3 Constructional features of combustion chamber.
3.1.4 Types of combustion chamber- Can, annular and can-annular type and their advantages and disadvantages
3.1.5Factor affecting combustion chamber performance

UNIT IV: *TURBINE, JET NOZZLE*
4.1 Turbines:
4.1.1 Turbine-purpose
4.1.2 Type of turbines and their functions
4.1.3 Construction and materials-turbine blades. Turbine disc, nozzle, guide vane
4.1.4 Principle and operation of- impulse, reaction turbines
4.1.5 Brief description of turbine blade to disc attachment
4.1.6 Blade creep
4.2 Jet Nozzle:
4.2.1 Jet exhaust- purpose
4.2.2 Thrust reversal system
4.2.3 Effect of thrust reverse operation
4.2.4 Noise suppression
4.2.5 Thrust augmentation methods

UNIT V: *STARTING, IGNITION SYSTEM, BLEED CONTROL AND LUBRICATION SYSTEMS*
5.1 STARTING AND IGNITION SYSTEM
5.1.1 Methods of starting
5.1.2 Requirements of starting systems
5.1.3 Types of starting systems
5.2 Bleed Control:
5.2.1 Bleed control system: purpose
5.2.2 Internal cooling and sealing systems
5.2.3 External uses of bleed air
5.3 Lubrication System:
5.3.1 Lubrication systems-purpose
5.3.2 Requirements of gas turbine lubricants
5.3.3 Bearing and seals-purpose
5.3.4 Identification, constructional features operations of bearings and seals used in gas turbine engine

UNIT VI: *MODERN DEVELOPMENT AND ENVIRONMENTAL EFFECT*
6.1 Variable area jet nozzles
6.2 High bypass ratio turbo fan engine
6.3 composite materials for engine
6.4 pollution and emission control

TEXT BOOKS AND REFERENCES
1. A & P Technician power Plant, Jeppesen, FAA

2. Airframe & Power Plant Mechanics,FAA FAA
3 Aircraft Gas Turbine Engine, Treager, McGraw Hill, India
4 Jet Engine, Rolls RoyceM Rolls Royce

Syllabus to be covered up to I.A-Chapters 1,2 &3

TH.3. Basic Helicopter

Theory: 4 periods per week **I.A : 20 Marks**
Examination: 3 hours **TOTAL MARKS : 100 Marks**

Topic-wise distribution of periods

S.L. No.	TOPICS	PERIODS
I	Introduction to Helicopter & Aerodynamics of Helicopter	**10**
II	Main Rotor and Tail Rotor ,Helicopter Construction	**14**
III	Helicopter Systems , Helicopter Engine Systems, Electrical Systems	**10**
IV	Instruments and Avionics	**6**
V	Flight Manual and Helicopter Performance	**4**
VI	Helicopter Maintenance , weighing and General Precautions	**8**

Rationale
To enable the students to gain a thorough knowledge about the working of helicopter and to identify its different components, location and function.

Course Objective
To able to understand Helicopter & Aerodynamics of Helicopter
To ableto understand Main Rotor and Tail Rotor ,Helicopter Construction
To ableto understand Helicopter Systems ,Helicopter Engine Systems, Electrical Systems
To ableto understand Instruments and Avionics
To ableto understand Flight Manual and Helicopter Performance
To ableto understand the importance of Helicopter Maintenance , weighing and General Precautions

COURSE CONTENT

UNIT I: Introduction to Helicopter & Aerodynamics of Helicopter **10 Hrs**
1.1 INTRODUCTION TO HELICOPTETRS
1.1.1History of development of Helicopter
1.1.2Glossary of terms used in helicopter technology and their definition
1.1.3Various configurations of helicopter.
1.1.4Various controls, rotors and engines with their type currently in use of helicopter
1.2 AERODYNAMICS OF HELICOPTER FLIGHT
1.2.1Relative Wind
1.2.2Blade Pitch Angle
1.2.3Powered Flight and its aerodynamics
1.2.4Hovering flight and its aerodynamics
1.2.5 Coning of Main rotors
1.2.6Principle of Gyroscopic Precession
1.2.7 Concept of Ground effect during Hovering(OGE and IGE)
1.2.8Vertical Flight and its relation with Collective Pitch
1.2.9 Translational Flights and aerodynamic forces
1.2.10 Forward Flight
1.2.11Sideward Flight
1.2.12 Rearward Flight
1.2.13 Turning Flight

1.2.14Methods of tilting Rotor Disc
1.2.15Concept of Auto Rotation
1.2.15.1 During Vertical Flight
1.2.15.2 During Forward Flight

UNIT II: Main Rotor and Tail Rotor ,Helicopter Construction **14Hrs**
2.1 MAIN ROTOR AND TAIL ROTOR
2.1.1Main rotor construction and its parts
2.1.2Concept of Flapping, Feathering and Lead lagOver pitching
2.1.3 Effects of Gusts on RPM
2.1.4 Definition and concept of ,Disc loading , Blade Loading ,Solidity, Power Loading ,Tracking ,Centre of Gravity , Centre of Pressure
2.1.5Vibration in Helicopters
2.1.6Groups of Vibrations and definition , Sources of Vibration ,Ways and methods to Overcome vibrations
2.1.7 Concept of Torque Reaction and Directional control
2.1.8Balancing torque reaction
2.1.9Tail rotor and its pitch change mechanism
2.1.10 Hovering Turns
2.1.11Sideways drift of Helicopter and its prevention
2.1.12Influence on Hovering attitude
2.2HELICOPTER CONSTRUCTION
2.2.1Main Structural components of helicopter their types, material, purpose and location
2.2.2Fuselage(cabin, centre section, ,tail boom)
2.2.3Stabilizer
2.2.4Landing gears
2.2.5Main gear box terminology – pitch circle ,addendum, dedundum , pressure angle , centre distance,
2.2.6 Normal module backlash, involute gear, thickness of gear, root diameter , under cut
2.2.7Types of gear box – bevel, helical, spur ,worm ,planetary gear box
2.2.8Selection of appropriate gear box – gear ratio , torque out put , gear alignment
2.2.9Lubrication of gear box –requirement , properties of lubricating oil
2.2.10Tail rotor gear box – need for tail rotor gear box ,pitch change mechanism

UNIT III: Helicopter Systems , Helicopter Engine Systems, Electrical Systems **10 Hrs**
3.1HELICOPTER SYSTEMS
3.1.1Main mechanical systems their construction ,purpose and location , Transmission system
3.1.2Main gear box
3.1.3Tail gear box, Clutch, Freewheeling unit
3.1.4Main rotor head
3.1.5Main Flight Control Systems their purpose, construction and location
3.1.6Collective Pitch Control
3.1.7Throttle Control ,Governor ,Cyclic Pitch Controls
3.1.8Anti torque pedals
3.1.9Swash plates
3.1.10Hydraulic System ,Purpose components and their function
3.2HELICOPTER ENGINE SYSTEMS
3.2.1Engines
3.2.1.1Purpose of engines
3.2.1.2Types, construction ,uses
3.2.2Fuel Systems
3.2.2.1Fuel supply System
3.2.2.2Engine fuel control system(For reciprocating and turbine engines)
3.2.3Lubricating system ,its purpose and functioning
3.3ELECTRICAL SYSTEM
3.3.1Introduction to sources of power and its major components
3.3.2Introduction to Starting systems and its major items

3.3.3Introduction to Lighting systems

UNIT IV: Instruments and Avionics **06 Hrs**
4.1INSTRUMENTS AND AVIONICS
4.1.1Introduction, purpose, working principle, and location of Instruments
4.1.2Flight instruments
4.1.3Engine instruments
4.1.4Gyro Instruments
4.1.5Navigation Instruments
4.1.6General Instruments
4.1.6.1Introduction ,purpose, and location of Avionic systems
4.1.7Intercom systems
4.1.8V/UHF Communication System
4.1.9Radio Compass
4.1.10ADF, CVR, GPS

UNIT V: Flight Manual and Helicopter Performance **04 Hrs**
5.1FLIGHT MANUAL AND PERFORMANCE
5.1.1Introduction to Flight Manual and information /limitations contained in it
5.1.2Factors effecting Helicopter performance their analogy
5.1.3Density Altitude
5.1.4Weight
5.1.5Winds

UNIT VI: Helicopter Maintenance , weighing and General Precautions **08 Hrs**
6.1HELICOPTER MAINTENANCE AND GENERAL PRECAUTIONS
6.1.1Types of Inspections, Maintenance done on Helicopters
6.1.2Introduction to Rigging and Control setting
6.1.3Precautions to be observed during ,Jacking , Towing ,Braking ,Supply of ground power, Refueling and Defueling
6.1.4Procedures – pre flightinspection , safety in and around helicopter , rotor safety considerations
6.1.5 Minimumequipment list
6.1.6 Helicopter weighing – need for it, how it defers from fixed wing aircraft.

TEXT BOOKS AND REFERENCES
1 The Helicopter, J ohn Fay
2 Rotor Craft Flying Handbook, F A A H 8 0 8 3 - 2 1 (US Department of Tpt.)
3 Helicopter Engineering, Lalit Gupta
4 Helicopterr Aerodynamics, RW Prouty
5 Basic helicopterAerodynamics, J Sedden, BSP Professional books

Syllabus to be covered up to I.A-Chapters 1,2 &3

Elective -

1. Aircraft Inspection, Maintenance and repair
2. Civil Aircraft Regulation
3. Aircraft Avionics

Elective 1. Aircraft inspection, maintenance and repair

Theory: 4 periods per week **I.A : 50**
Examination: 3 hours **TOTAL MARKS : 100 Marks**

Topic-wise distribution of periods

S.L. No.	TOPICS	PERIODS
I	INTRODUCTION OF TYPES OF AIRCRAFT INSPECTION AND DOCUMENTATION	8
II	AIR CONDITIONING, PRESSURISATION, EQUIPMENT AND FURNISHINGS	8
III	FIRE DETECTION &EXTINGUISHING SYSTEM, ICE & RAIN PROTECTION SYSTEM	8
IV	INSPECTION OF AIRCRAFT SYSTEMS	10
V	INSPECTION OF AIRCRAFT STRUCTURES, AIRCRAFT POWER PLANTS andLANDING GEAR SYSTEM	12
VI	TOWING, MOORING, WEIGHING AND LEVELLING OF AIRCRAFT	6

Rationale
To make the students to understand the Airframe components and the tools used to maintain the components. Defect investigation, methods to carry out investigation and the detailed maintenance and practice procedures.

Course Objective
To understand the types of aircraft inspection and documentation
To understand inspection procedures in air conditioning, pressurisation, equipment and furnishings
To understand inspection procedures in fire detection &extinguishing system, ice & rain protection system
To understand inspection procedures in different aircraft systems.
To understand inspection procedures in aircraft structures , aircraft power plants and landing gear system
To understand the concepts of towing, mooring, levelling and weighing of aircraft and its corresponding procedures

UNITI: INTRODUCTION OF TYPES OF AIRCRAFT INSPECTION AND DOCUMENTATION
1.1 Importance &purpose of aircraft inspection & Documentation
1.2 Inspection of aircraft for heavy landing- Tyres, landing gear equipment
1.3 Bird strikes: Extent of damage, assessment of repairs to be done
1.4 Familiarization with aircraft documents ATA100 Specifications
1.5 Lay out and contents of aircraft maintenance manual,
1.5.1 Structural repair manual,
1.5.2 Illustrated parts catalogue,
1.5.3 Airworthiness directive, service bulletins,
1.5.4 Maintenance planning documents /inspection schedule.
1.6 Entries to be made in aircraft log book: change of parts, fuel/ oil replenishment

UNIT II: AIR CONDITIONING, PRESSURISATION, EQUIPMENT AND FURNISHINGS

2.1 Air conditioning and pressurization
2.1.1 Discussion on importance and purpose
2.1.2 Inspection of structure in Air-conditioning bay
2.1.3 Installation of air-conditioning components
2.1.4 Security of air-conditioning components
2.1.5 Pneumatic leak check
2.1.6 Oil level check for ACM
2.1.7 Compressor Freon gas level check
2.2 EQUIPMENT AND FURNISHINGS
2.2.1 Basic inspection of equipment and furnishing
2.2.2 Installation of passenger and crew seats, safety harness
2.2.2 Operational check and inspection of life jacket and life raft
2.2.4 Inspection of fire bottle and portable oxygen bottle in the cabin
2.2.5 Presence of emergency equipment

UNTIII: FIRE DETECTION &EXTINGUISHING SYSTEM, ICE & RAIN PROTECTION SYSTEM
3.1 FIRE DETECTION &EXTINGVISHING SYSTEM
3.1.1 Fire detection and extinguishing system importance and purpose
3.1.2 Inspection of fire and smoke detection components,
3.1.3 Inspection of fire extinguishing system components for condition and Security
3.1.3 Types of fire: Explanation on solid liquid & gaseous fire purpose and uses of ground fire extinguishers and extinguishing agents.
3.1.5 Aircraft fire extinguisher with typical markings
3.2 ICE & RAIN PROTECTION SYSTEM
3.2.1 Ice and Rain protection - Importance of inspection
3.2.2 Inspection of components of pneumatic de- icing system
3.2.3 Inspection of thermal de-icing system
3.2.3 Inspection of wind screen de-icings system
3.2.5 Inspection of anti icing system
3.2.3 Ice detection system for condition and security

UNIT IV: INSPECTION OF AIRCRAFT SYSTEMS
4.1 FLIGHT CONTROL SYSTEMS
4.1.1 Flight control system – Importance and purpose
4.1.2 Inspection of :
4.1.2.1 Control cables for wear
4.1.2.2 Linkages for correct sense of operation
4.1.2.3 Play due to wear
4.1.2.4 Condition of control surfaces for de-lamination and damage, travel and neutral portion check of control surfaces.
4.2 AIRCRAFT FUEL SYSTEM
4.2.1 Aircraft fuel system – Introduction & importance of inspection and types of fuel
4.2.2 Precaution during Aircraft fuelling and defueling
4.2.3 Inspection of fuel leak
4.2.4 Aircraft fuel tank contamination check
4.2.4 Inspection of filters for contaminations
4.2. 6 External inspection of fuel system
4.2.7 Fire hazard, static electricity and its effect
4.3 HYDRAULIC SYSTEM
4.3.1 Importance of Hydraulic system inspection.
4.3.2 Inspection of condition of hydraulic lines
5.3.3 Internal leak check of hydraulic components
4.3.4 Flow rate check
4.3.4 Precaution while servicing of hydraulic system
4.4 AIRCRAFT OXYGEN SYSTEM

4.4.1 Inspection of components and pipe lines for conditions and security
4.4.2 Leak check of oxygen system
4.4.3 Precaution to be observed while working with oxygen system

UNIT V: INSPECTION OF AIRCRAFT STRUCTURES, AIRCRAFT POWER PLANTS and LANDING GEAR SYSTEM

5.1 Inspection of
5.1.1 Nacelles /pylon attachment fittings, fillets/fairings
5.1.2 stabilizers (Vertical, Horizontal) for condition & Security
5.1.3 windows for crazing chips and cracks
5.1.4 static dischargers
5.1.5 doors for condition, security and doors warning system
5.2 Inspection of
5.2.1 Ignition system components for condition and functional check
5.2.2 thrust reverser system for leak
5.2.3 oil system for leak, component chip detector and filter check
5.3 Functional check of engine indication instruments
5.4 Power supply equipment -electric, pneumatic, air starting, air-conditioning, and hitting units
5.5 Precaution while servicing of aircraft oil system
5.6 Landing gear system – Importance of inspection
5.7 Inspection of
5.7.1 landing gear system components for condition and Security
5.7.2 Inspection of structures in the wheel well area
5.7.3 Pressure Vs Extension of shock strut
5.7.4 Wheel brakes for wear and over heat condition
5.7.5 Tyres for condition and wear, correct pressure inspections.
5.8 Consequences of over inflation and under inflation of aircraft landing gear type

UNIT VI: TOWING, MOORING, WEIGHING AND LEVELLING OF AIRCRAFT

6.1 Procedures following during towing, mooring , weighing and levelling of aircraft

TEXT BOOKS AND REFERENCES

1. Michael J Kroes , William A Watkins , Frank Delp , Ronald Sterkenburg “Aircraft Maintenance and Repair”, Seventh Edition, 1 Jun 2013
2. FAA ‘S “ Aviation Maintenance Technician’s Handbook” (AC-65-9A)
3. FAA’S “ Civil Aircraft Inspection Procedure” CAIP-459 VOL-II

Syllabus to be covered up to I.A-Chapters 1,2 &3

Elective 2.Civil Aircraft Regulations

Theory: 4 periods per week **I.A : 50 Marks**
Examination: 3 hours **TOTAL MARKS : 100 Marks**

Topic-wise distribution of periods

S.L. No.	TOPICS	PERIODS
I	Introduction, responsibility of operators/owners, procedure for issue of CAR	8
II	Preparation and use of cockpit and emergency check list, minimum equipment list(MEL),defect recording/reporting/investigation	8
III	Flight report, maintenance control by reliability method, aircraft maintenance programme and their approval, on condition maintenance of 'reciprocating engines	10
IV	Flight report, maintenance control by reliability method, aircraft maintenance programme and their approval, on condition maintenance of 'reciprocating engines	8
V	Issue/re validation of type certificate of aircraft, issue /validation and renewal of certificate of airworthiness, control system -duplicate inspection, approval of flight manual	10
VI	Age of aircraft to be imported, mandatory modification (inspection), Extended twin engine operations, flight testing of aircraft, aircraft log books	8

Rationale

To make the students to familiar with the Aircraft Regulationsand the uses in Aerospace industries.

Course OBJECTIVE

.To understand the responsibility of operators/owners and procedure for issue of CAR
To understand how MEL and cockpit and emergency check list are prepared
To understand Flight reporting ,maintenance control by reliability method, aircraft maintenance programme and their approval
To understand Fixing of routine maintenance periods-TBO, approval of organizations/operators, registration/de-registration of aircraft
To understand the Issue/re validation of type certificate of aircraft, issue /validation and renewal of certificate of airworthiness, control system -duplicate inspection, approval of flight manual
To understand the Age of aircraft to be imported, mandatory modification (inspection), extended twin engine operations, flight testing of aircraft, aircraft log books of aircraft

COURSE CONTENT:

UNITI: Introduction, responsibility of operators/owners, procedure for issue of CAR 8 Hrs

1.1 Introduction

1.1.1 Brief history OF ICAO, DGCA, FAA, JAA etc.,
1.1.2 Aircraft Act 1934: Purpose and relevance
1.1.3 Aircraft Act 1034: Important Rule No's
1.2 Responsibility of operators/owners
1.2.1 Background
1.2.2 Scope of responsibility
1.2.3 Scope of supervision by Airworthiness Directorate (Ref: CAR Sec 2: Series A Part I)
1.3 Procedure for issue of car
1.3.1) Scope
1.3.2) Promulgation of CAR
1.3.3) Numbering of CAR
1.3.4) Procedure for issue and subsequent revisions
.

UNIT II: Preparation and use of cockpit and emergency check list, minimum equipment list(MEL), defect recording/reporting/investigation 8Hrs

2.1 Preparation and use of cockpit and emergency check list
2.1.1 Purpose and definition
2.1.2 Scope (Ref CAR Sec 2 series B-II)
2.2 Minimum equipment list (mel)
2.2.1) Applicability
2.2.2) Operators MEL
2.2.3Framing of MEL
2.2.4) Use of MEL (Ref CAR Section 2: Series B-I)
2.3 Defect recording/reporting/investigation
2.3.1 Definitions
2.3.2 Procedure for defect recording, reporting rectification and analysis
2.3.3 Initial Information
2.3.4 Review of defects
2.3.5 Report monitoring
2.3.6 Classification of defects (Ref CAR Sec: 2 series C-I)

UNTIII: Flight report, maintenance control by reliability method, aircraft maintenance programme and their approval, on condition maintenance of 'reciprocating engines 10Hrs

3.1 Flight report
3.1.1 Purpose
3.1.2 Procedure (Ref CAR Sec2: Series C-II)
3.2 Maintenance control by reliability method
3.2.1 Purpose and applicability
3.2.2 Details of program and functioning
3.2.3 Sources of Information
3.2.4 Information analysis and remedial measures
3.2.5 Establishing alert values
3.2.6 Reliability displays
3.2.7 Changes in MCR method (Ref CAR Sec 2: Series C part V)
3.3 Aircraft maintenance programme and their approval
3.3.1 Definitions
3.3.2 Purpose
3.3.3 Primary maintenance process
3.3.4 Approval of the system
3.3.5 Monitoring
3.3.6 Statistical reliability method
3.3.7 Explanation of hidden functions (Ref: CAR Sec 2 Series D-II)
3.4 ON condition maintenance of 'reciprocating engines
3.4.1 Background and scope
3.4.2 Procedure (Ref CAR Sec 2, Series D-III)

UNIT IV: Flight report, maintenance control by reliability method, aircraft maintenance programme and their approval, on condition maintenance of 'reciprocating engines 8Hrs

4.1 Fixing of routine maintenance periods-tbo
4.1.1) Applicability
4.1.2) Fixation of initial period
4.1.3) Revision of initial period s(Ref CAR Sec 2: Series D-VI)
4.2 Approval of organizations/operators
4.2.1) Introduction
4.2.2) Applicability
4.2.3) Procedure
4.2.4) Facility requirements
4.2.5) Manual requirements
4.2.6) Aircraft maintenance procedure
4.2.7) Approval in different categories (Ref CAR Sec 2: Series E)
4.2.8) CAR-145-Introduction and applicability
4.3 Registration/derecognizing of aircraft
4.3.1) Procedure relating to registration/derecognizing of aircraft
4.3.2) Introduction
4.3.3) Definitions
4.3.4) Change of ownership
4.3.5) Aircraft imported by Air
4.3.6) Registration certificate and validity
4.3.7) Location of nationality or common mark and registration
4.3.8) Measurement of Nationality and registration marks (Ref: CAR Sec F Part I)

UNIT V: issue/re validation of type certificate of aircraft, issue /validation and renewal of certificate of airworthiness, control system -duplicate inspection, approval of flight manual 10 Hrs

5.1 Issue/re validation of type certificate of aircraft**:**
5.1.1Applicability
5.1.2requirement for issue of type certificate
5.1.3requirement for re validation of type certificate (Ref: CAR section II F pt 2)
5.2 Issue /validation and renewal of certificate of airworthiness:
5.2.1 Introduction
5.2.2Issuance of C of A
5.2.3Validity of C of A
5.2.4renewal of C of A
5.2.5Short term of C of A
5.2.6 suspension of C of A (Ref: CAR section II F pt 3)
5.3 Control system -duplicate inspection
5.3.1 Applicability
5.3.2 Definition
5.3.3 Procedure (Ref: CAR section II F pt xi)
5.4 Approval of flight manual
5.4.1 Definition
5.4.2 Applicability
5.4.3 Format of flight manual (Ref: CAR section II F pt xvi)

UNIT VI: Age of aircraft to be imported, mandatory modification (inspection), Extended twin engine operations, flight testing of aircraft, aircraft log books 8Hrs

6.1 Age of aircraft to be imported
6.1.1 Introduction
6.1.2 Background
6.2.3 Applicability (Ref: CAR section II F pt xx)
6.2 Mandatory modification (inspection)

6.2.1 Applicability
6.2.2 Purpose
6.2.3 Definition
6.2.4 Procedure (Ref : CAR section II F pt I)
6.3 Extended twin engine operations
6.3.1 Introduction
6.3.2 Applicability
6.3.3 Definition
6.3.4 Procedure
6.3.5 ETOPS categories
6.3.6 Propulsion system monitoring (Ref: CAR section II o pt 8)
6.4 Flight testing of aircraft
6.4.1 Applicability
6.4.2 Definition
6.4.3 Circumstances necessitating flight testing
6.4.4 Procedure during flight testing
6.4.5 Flight test report (Ref: CAR section II T pt 2)
6.5 Aircraft log books
6.5.1 Introduction
6.5.2 Applicability
6.5.3 Format of journey log book
6.5.4 General requirements (Ref: CAR section II X pt VI)

TEXT BOOKS

1. Internet website: - dgca.gov.in
2. Civil aircraft regulations, vol. I & II.

Syllabus to be covered up to I.A-Chapters 1,2 &3

Elective 3.Aircraft Avionics

Theory: 4 periods per week **I.A : 50 Marks**
Examination: 3 hours **TOTAL MARKS : 100 Marks**

Topic-wise distribution of periods

S.L. No.	TOPICS	PERIODS
I	Introduction to Communication system	12
II	Types of communication systems	8
III	Navigation system of an aircraft	12
IV	Flight data recorder, cockpit voice Recorder systems of an aircraft	9
V	Introduction to RADAR systems	8
VI	Modern developments in Avionics and Radar field and Environmental issues	6

Rationale

To enable the students to gain a thorough knowledge about the working of Avionics and Aircraft Radio systems

Course Objectives:

To Introduction to Communication system
To Types of communication systems
To Navigation system of an aircraft
To Flight data recorder, cockpit voice Recorder systems of an aircraft
To Introduction to RADAR systems
To Modern developments in Avionics and Radar field and Environmental issues

COURSE CURRICULAM

UNITI: Introduction to Communication system 12 Hrs

1.1.1Radio Communication System Fundamentals –
1.12 EM waves, medium of propagation ,
1.1.3 Radio frequency spectrum, uses and limitation of R.F.bands.
1.1.4 Radio wave propagation – ground wave, sky wave, radiation angle, skip distance, diffraction, field strength, absorption, Scattering, reflection, fading, ducting, critical frequency,
1.1.5 Antenna Fundamentals -_ Dipole, half wave dipole, resonant & Non-resonant antenna. Antenna gain, directional power, Antenna Loses and efficiency, band width, beam width, band width, polarizat Grounding of antenna, loading of antenna, optimum and effective
Explanation of requirements of the avionic systems for aircraft like various channels in radio communication,(surface /taxying , air to ground/ATC, air to air, emergency radio communication, distress channel etc, their purpose and usage, the physical qualities required for withstanding the wide variation of temperature.

UNIT II: Types of communication systems 8Hrs

Very High Frequency(VHF), High Frequency(HF), Ultra High Frequency(UHF), Satellite communication(SATCOM), Intercom for pilots and the crew, Public address System(PA system) for air crew to passengers are explained to the students
VHF, HF, UHF Systems used ,their merits, demerits: Basic block level explanation for working of VHF, HF, UHF communication systems used In air craft, their frequency bands, limitations.

Aircraft PA systems, intercom and Passenger entertainment systems: Brief explanations of block level PA system, intercom and passenger entertainment system

UNIT III: Navigation system of an aircraft 12Hrs

Basic need for navigation in terms of safe route, economy, shortest possible are explained.
Block level explanation of working of Automatic Direction Finder(ADF) ,its merits, demerits.
Block level explanation of working of Very High Frequency Omni Range(VOR)
Equipment used for aircraft navigation ,its merits, demerits.
Block level explanation of working of Instrument Landing System(ILS), lay out diagram for ILS subsystems, advantages ,disadvantages of ILS system, purpose of ILS Navigation.
Brief explanation of working of Micro wave Landing System(MLS), its advantages over ILS and reasons for non implementation of MLS as a replacement of ILS (With the introduction of SATCOM Navigation)
Brief explanation of satcom navigation using GPS, advantages of sitcom GPS navigation over other navigation systems

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UNIT IV: Flight data recorder, cockpit voice Recorder systems of an aircraft 6Hrs

FDR:
Brief explanation of block diagram level working of FDR and its special construction.
List of important flight parameters which are recorded in FDR, Purpose and use of FDR in training , planning of spares, accident investigation, Validity of warranty etc.
Location of FDR and reason for it is explained.
CVR: - Brief explanation of working of a CVR, Purpose and use of CVR in accident investigation , air crew coordination training, location of CVR

UNIT V: Introduction to RADAR systems 8 Hrs

Explanation of basic working principles of RADAR with block diagram.
Radar range equation- statement of equation and explanation of the terms involved in
Radar range equation. Purpose and use RADAR in various fields.
Basic explanation of meaning of Primary RADAR, Secondary RADAR, advantages, disadvantages
Working of various types of RADARS: Secondary surveillance ,Doppler, INS, GPS:
Brief explanation of block diagram level working of secondary surveillance RADAR, Purpose and areas of use.
Brief explanation of block diagram level working of Doppler navigational RADAR, Purpose and areas of use. Brief explanation of block diagram level working of Inertial Navigation System(INS) Purpose and application areas for INS.
Brief explanation of working principles of satellite navigation system using GPS, Advantages, disadvantages of GPS.

UNIT VI: Modern developments in Avionics and Radar field and Environmental issues 6Hrs

Understanding modern developments in Avionics and radar and Environmental issues.

TEXT BOOKS

1. Modern radio communication, Kennedy
2 Introduction to Radar systems, Skollnik.McGrawHill,India
3 Principles of Avionics, Albert Helfrick

Syllabus to be covered up to I.A-Chapters 1,2 &3

PR.1. Aircraft Jet Engine Lab

Name of the Course: Diploma in Aeroneutics.			
Course code:		Semester	6th
Total Period:	60	Examination	NIL
Theory periods:	4 P/W	Sessional:	25
Maximum marks:	75	End Semester Examination:	50

Rationale:
To enable students to locate, identify and demonstrate various aircraft jet engine components, and functions

Practical/Exercise

1 Explanation of Jet propulsion theory and types of Jet engine

2 Identification of important components of a gas turbine engine

3 To demonstrate the constructional arrangement and operation of turboprop and turboshaft.

4 Identification of Rotor Blades, Stator Blades, Vanes, Study of shape of blade & vanes

5 Identification of combustion chamber, different types and flow pattern

6 Identification of turbine, Study of shape of Turbine blades

7 Identification and location of Exhaust cone, Nozzle and Tail pipe

8 Wall pressure measurements of a subsonic diffusers

9 Velocity profiles of free jets

10 Recognition of visual defects of jet engines.

PR.2. AIRCRAFT SYSTEM LAB

Name of the Course: Diploma in Aeroneutics.			
Course code:		Semester	6th
Total Period:	60	Examination	NIL
Theory periods:	4 P/W	Sessional:	25
Maximum marks:	50	End Semester Examination:	25

Rationale:

1. To familiarize the students with basic aircraft systems

Practical/Exercise:

1 Identification of the important systems in use of an aircraft and their function
2 Demonstration of basic–mechanical systems like push-pull rods, cable and pulley system
3 Demonstration of hydraulic and pneumatic systems
4 Aircraft “Jacking Up” procedure

5 Aircraft “Levelling” procedure

6 Control System “Rigging check” procedure

7 Aircraft “Symmetry Check” procedure

8 “Flow test” to assess of filter element clogging

9 “Pressure Test” To assess hydraulic External/Internal Leakage

10 “Pressure Test” procedure on fuel system components

PR.3. CAD/CAM lab

Name of the Course: Diploma in Aeroneutics.			
Course code:		Semester	6th
Total Period:	60	Examination	NIL
Theory periods:	4 P/W	Sessional:	25
Maximum marks:	50	End Semester Examination:	25

COURSE OBJECTIVES

Students will develop ability towards

1.To understand the fundamentals and use of CAD.

2.To conceptualize drafting and modelling in CAD.

3.To interpret the various features in the menu of solid modelling package.

4.To synthesize various parts or components in an assembly.

5.Toprepare CNC programmes for various jobs

COURSE CONTENTS

PART-A.

INTRODUCTION;

Part modelling, Datum plane, Datum plane; constraint; dimensioning; extrude; revolve; sweep; protrusion; extrusion; rib; shell; hole; round; chamfer; copy; mirror; assembly; align; orient.

EXERCISES:

2D Drawings of Rectangle, circle, polygon and its dimensioning

3D Drawings of;

1.Gib and cutter joint

2.Screw Jack;

3.Connecting Rod;

4.Bearing Block.

Print the orthographic view from the above assembled 3Ddrawing

PART-B.

CNC Programming and Machining

INTRODUCTION;

1.Study of CNC lathe, milling;

2.Study of international codes; G-Codes and M –Codes

3.Format –Dimensioning methods;

4.Programme writing –Turning Simulator-Milling simulator IS practice-commands menus

5.Editing the programme in the CNC MACHINES;

6.Execute the programme in the CNC machines;

Exercise;

Print the programme and make the component in the CNC machine;

7.Using canned cycle-create a part programme for thread cutting, grooving and produce component in the CNC Turning Machine

8.Using Linear interpolation and Circular Interpolation-Create a part programme for grooving and produce component in the CNC Milling Machine

Pr4. PROJECT Phase - II

Name of the Course: Diploma in Aeronautical Engineering			
Course code:		Semester	6th
Total Period:	90	Examination	3 hrs
Lab. periods:	6 P / week	Sessional	50
Maximum marks:	150	End Sem Examination	100

RATIONALE

Students' Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course covered in many subjects and Labs, by undertaking a project. The prime emphasis of the project work is to understand and apply the basic knowledge of the principles of Aeronautical engineering and practices in real life situations, so as to participate and manage a large Aeronautical engineering projects, in future. Entire Project spreads over 5th and 6th Semester. Part of the Project covered in 5th Semester was named as *Project Phase-I* and balance portion to be covered in 6th Semester shall be named as *Project Phase-II*.

OBJECTIVES

After undergoing the Project Work, the student will be able to:

- Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real practical working environment, preferably in an industrial environment.
- Develop software packages or applications and implement these for the actual needs of the community/industry.
- Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.
- To achieve real life experience in Project design.
- To develop the skill of writing Project Report

Project Phase-I and Phase-II

The Project work duration covers 2 semesters(5th and 6th sem). The Grouping of students, selection of Project, assignment of Project Guide to the Group was done in the beginning of 5th semester under Project Phase-I. The students were allowed to study literature, any existing system and then define the Problem/objective of the Project. Preliminary work and Design of the system also have to be complete in Phase-I. Development may also begin in this phase. Project Milestones are to be set so that progress can be tracked .

In Phase-II Development, Testing, Documentation and Implementation have to be complete. Project Report have to be prepared and complete in Phase-II. All Project reports should be organized uniformly in proper order, irrespective of group. Teacher Guides can make suitable alteration in the components of Task and schedule.

At the end of Project Phase-II in 6^{th} semester there shall be one presentation by each group on whole Project work undertaken by them.

A suggestive criterion for assessing student performance by the external (preferably person from industry) and internal (teacher) examiner is given in table below:

Sl. No.	**Performance Criteria**
1.	Selection of project assignment
2.	Planning and execution of considerations
3.	Quality of performance
4.	Providing solution of the problems or production of final product
5.	Sense of responsibility
6.	Self expression/ communication/ Presentation skills
7.	Interpersonal skills/human relations
8.	Report writing skills
9	Viva voce

The teachers are free to evolve other criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organisations to such an exhibition.

The Project Report need to be prepared as per standard format and following is the indicative format. The Teacher Guide may make minor alteration keeping the sense in tact.

Organization of Project Report

1. Cover page:
   It should contain the following (in order)
   (i) Title of the Project
   (ii) "Submitted in partial fulfillment of the requirements for the Diploma in <Branch Name>"
   (iii) By Name of the Student(s)
   (iv) Logo of the Institution
   (v) Branch Name/Depart Name and Institution Name with Address
   (vi) Academic Year
2. 1^{st} Inner page
   Certificate:

It should contain he following

"This is to certify that the work in this Project Report entitled <Project Title> by <Name of student(s)> has been carried out under my supervision in partial fulfillment of the requirements for the Diploma in <Branch Name>" during session <session > in <Branch /Department Name> of <Institute name> and this work is the original work of the above student(s).

Seal and signature of the Supervisor/Guide with date

3. 2nd Inner Page
   Acknowledgement by the Student(s)
4. Contents.
5. Chapter wise arrangement of Reports
6. Last Chapter: Conclusion
   It should contain
   (i) Conclusion
   (ii) Limitations
   (iii) Scope for further Improvement
7. References

Pr-5 LIFE SKILL

(Common to All Branches)

Practical	**2 Periods per week**	**Sessional**	**25 Marks**
Total Periods	**30 Periods**	**Total Marks**	**25 Marks**

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

- Develop team spirit i.e. concept of working in team
- Apply problem solving skills for a given situation
- Use effective presentation techniques
- Apply task management techniques for given projects
- Enhance leadership traits
- Resolve conflict by appropriate method
- Survive self in today's competitive world
- Face interview without fear

DETAIL CONTENTS:

1. SOCIAL SKILL

Society, Social Structure, Develop Sympathy and Empathy
Swot Analysis – Concept, How to make use of SWOT
Inter personal Relation**:** Sources of conflict, Resolution of conflict ,
Ways to enhance interpersonal relation

2. PROBLEM SOLVING

Steps of Problem solving**:**

- Identify and clarify the problem,
- Information gathering related to problem,
- Evaluate the evidence,
- Consider alternative solutions and their implications,
- Choose and implement the best alternative,
- Review
- Problem solving techniques:

1) Trial and error, 2) Brain storming, 3) Lateral (Out of Box) thinking

3. PRESENTATION SKILL

Body language , Dress like the audience
Posture, Gestures, Eye contact and facial expression. STAGE FRIGHT,
Voice and language – Volume, Pitch, Inflection, Speed, Pause
Pronunciation, Articulation, Language, Practice of speech.
Use of AV aids such as Laptop with LCD projector, white board etc.

4. GROUP DISCUSSION AND INTERVIEW TECHNIQUES

Group Discussion:
Introduction to group discussion, Ways to carry out group discussion,
Parameters— Contact, body language, analytical and logical thinking,
decision making
Interview Technique :
Dress, Posture, Gestures, facial expression, Approach
Tips for handling common questions.

5. WORKING IN TEAM

Understand and work within the dynamics of a groups.
Tips to work effectively in teams,
Establish good rapport, interest with others and work effectively with them to meet common objectives,
Tips to provide and accept feedback in a constructive and considerate way ,
Leadership in teams, Handling frustrations in group.

6. TASK MANAGEMENT

Introduction, Task identification, Task planning , organizing and execution, Closing the task

PRACTICAL

List of Assignment: *(Any Five to be performed including Mock Interview)*

a. SWOT analysis:-

Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT.

a) Your past experiences,
b) Achievements,
c) Failures,
d) Feedback from others etc.

b. Solve the True life problem assigned by the Teacher.

3. Working in a Team

Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slum area, social activities like giving cloths to poor etc.(One activity per group where Team work shall be exhibited)

4. Mock Interview

5. Discuss a topic in a group and prepare minutes of discussion.

6. Deliver a seminar for 5 minutes using presentation aids on the topic given by your teacher.

7. Task Management

Decide any task to be completed in a stipulated time with the help of teacher. Write a report considering various steps in task management (with Break up into sub tasks and their interdependencies and Time)

Note: -1. Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic.

Note: -2. The following Topics may be considered for Seminar/GD in addition to other Topics at the discretion of the Teacher.

(Comparison with developed countries, Occupational Safety, Health Hazard, Accident & Safety, First-Aid, Traffic Rules, Global Warming, Pollution, Environment, Labour Welfare Legislation, Labour Welfare Acts, Child Labour Issues, Gender Sensitisation ,Harassment of Women at Workplace)

METHODOLOGY:

The Teacher is to explain the concepts prescribed in the contents of the syllabus and then assign different Exercises under Practical to the students to perform.

Books Recommended:-

Sl.No	Name of Authors	Title of the Book	Name of the Publisher
01	E.H. Mc Grath , S.J	Basic Managerial Skills for All	PHI
02	Lowe and Phil	Creativity and problem solving	Kogan Page (I) P Ltd
03	Adair, J	Decision making & Problem Solving	Orient Longman
04	Bishop , Sue	Develop Your Assertiveness	Kogan Page India
05	Allen Pease	Body Language	Sudha Publications Pvt. Ltd.

EQUIPMENT LIST

Aircraft Jet Engine Lab

Sl.No.	Name of the Equipment	Quantity
1	Jet engine for demostration	1
2	Jet facility with compressor and storage tank	1
3	Multitube manometer	1
4	subsonic diffusers and pressure measurements facilities	1
5	Convergent nozzle	1

AIRCRAFT SYSTEM LAB

Sl.No.	Name of the Equipment	Quantity
1	One full scale aircraft	1
2	One full scale aircraft with control stick	1
3	One full scale aircraft with landing gear	1
4	jack up rig	2
5	Spirit Level Measuring Instrument	2
6	Flow measuring clogging system	1