

B.sc (Aviation)
SEMESTER-1
Syllabus

FAMILIARIZATION OF AIRPORT

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

UNIT 1: Buildings & Installations

Terminals, Security, Apron, Hangar, Taxiway, Runway, Fire Station, Airport Vehicles, Fuel depot
12

UNIT 2: Markings & Lightings

RWY & TWY markings, Lightings, Signboards, Declared distances, PCN, Lighting system, Aerodrome Beacon, Obstacle Lighting & Marking
12

UNIT 3: Facilities & Equipments

Navigational facilities: VOR, NDB, DME; Surveillance equipments: Primary Radar, SSR, Surface Movement Radar, ADS; GPS, VHF antennae, ILS
12

UNIT 4: Air Traffic Control

ATC Units, Concept of FIR, Role of FIC, Roles of Tower & SMC Controllers, Flight Plan, Flight Dispatch, ATC briefing
12

UNIT 5: Important Organizations

Ministry of Civil Aviation, ICAO, DGCA, AAI & its wings, BCAS, CISF, MLU
12

TOTAL 60Hrs

Reference:

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

AVIATION CALCULATION AND NUMERICAL

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

UNIT 1: Basic Trigonometry & Pythagoras theorem

Trigonometric Ratios and their applications 12

UNIT 2: Conversions

Metric Conversions, temperature Conversions and their applications 12

UNIT 3: Compass

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

UNIT 4: Relative Motion And Vertical Speed

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

UNIT 5: Time Calculation And Fuel Calculation

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

TOTAL 60Hrs

Reference Books:

Aviations Mathematics, Oxford Publications

RADIO TELEPHONY (THEORY)

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

UNIT-1: Regulations

Duties of ITU, ICAO, AAI, WPC, ICAO Annexure, Spelling of Alphabets and Transmission of numerical, Aircraft Identification, Location Indicators, Flight Information Regions, Identification of Ground Services. 12

UNIT 2: Radio Propagation

- (a) Relationship between wavelength, frequency and speed of light
- (b) Frequency bands and ranges
- (c) Ionosphere layers during day and night
- (d) Mode of Propagation MF, HF and VHF & above
- (e) Operation of Geostationary Satellites
- (f) Operation of Polar orbiting Satellites
- (g) Diving
- (h) Skip Distance
- (i) Choice of Frequencies during Day & Night 12

UNIT 3: Phraseology

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

- (a) Distress
- (b) Distress Relay
- (c) Wrench
- (d) Direction Finding
- (e) Flight Safety
- (f) Metrological
- (g) Flight regulatory 12

UNIT 4: 'Q' Codes

'Q' Codes used in Aeronautical Communication Services, QNH, QFE, Height, Elevation, Altitude, Flight Level 12

UNIT 5: Communication

Terminal Communication & En-route Communication, NOTAM and SNOWTAM, Need of
Primary and Secondary Frequencies. 12

TOTAL 60

Reference Books:

Radi telephony, K.D. Tuli

B.sc (Aviation)
SEMESTER-II
Syllabus
ENVIRONMENTAL SCIENCE

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

UNIT 1: Introduction to environmental studies&Ecosystems

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

- a) Forest ecosystem
- b) Grassland ecosystem
- c) Desert ecosystem
- d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) 15

UNIT 2: Natural Resources, Renewable, and Non-renewable Resources

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

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

Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies. 15

UNIT 3: Biodiversity and Conservation

Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots, India as a mega-biodiversity nation; Endangered and endemic species of India, Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological Invasions; Conservation of biodiversity: In-Situ and Ex-Situ conservation of biodiversity. Ecosystem and biodiversity services: ecological, economic, social, ethical, aesthetic, and Informational value
15

UNIT 4: Environmental Pollution

Environmental pollution: types, causes, effects and controls; Air, water, Soil and noise pollution. Nuclear hazards and human health risks

Solid waste management: Control measures of urban and industrial waste.10
Pollution case studies

UNIT 5: Environmental Policies & Practices

Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture

Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD)

Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context15

TOTAL 70Hrs

Reference Books:

1.Text book of Environment studies for UG-ErachBharucha

THEORY OF FLIGHT (AERODYNAMICS)

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

UNIT 1: Aerodynamics

Airflow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, up wash and downwash, vortices, stagnation; The terms: camber, chord mean aerodynamic chord, aerodynamic centre, centre of pressure, stagnation point, profile (parasite) drag, induced drag, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio; Thrust, Weight, Aerodynamic Resultant; Generation of Lift and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall; Aerofoil contamination including ice, snow, frost.15

UNIT 2: 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.15

UNIT 3: Flight Stability and Dynamics.

Longitudinal, lateral, and directional stability 15

UNIT 4: 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 antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels; Pressure measuring devices and systems; Pitot static systems, Altimeters; Vertical speed indicators; Airspeed indicators; Machmeter; Altitude reporting/alerting systems; Air data computers; rate of climb/vertical speed indicator, cabin pressure indicator 15

UNIT 5: High Speed Flight

Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number, compressibility effect, buffet, shock wave, aerodynamic heating, area rule; Factors affecting airflow in engine intakes of high speed aircraft; Effects of sweepback on critical Mach number. 15

TOTAL **75**

Reference Books:

Air Pilots Manual, Trevor Thom.

Aerodynamics by Clancey

Mechanics of Flight by A.C. Kermode

Aircraft instruments by E.H.J. Pallett

Aircraft Instruments by C.A. Williams

FAMILIARIZATION OF AIRCRAFT

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

UNIT 1: Understanding of Basic Mechanics, Thermodynamics and Fluid Mechanics

Speed, Velocity, Newton's laws of motion, Friction, Centre of Mass, Centre of Gravity, Torque, Work, Energy, Power, Pressure, Stress, Elasticity of Material, Principle of the Gyroscope; Laws of Thermodynamics, Charles' and Boyle's laws, Heat Transfer, Heat & Energy conversion, Specific Heat, Vapour locks, Calorific values of fuels, Kinetic Theory of gases; Viscosity, Fluid Resistance, Specific Gravity, Absolute and relative humidity, Pressure & Buoyancy in liquids, Pascal's law & its application in Hydraulic press, Hydraulic and Pneumatic system, Bernoulli's Theorem, Venturi's tube theory, Streamline, Laminar and turbulent flow. 15

UNIT 2: Airframe & systems

Types of Fuselage; Various Wing Structures; Control Surfaces; Airframe carburetor, fuel system, Oil System, Cooling System 15

UNIT 3: Landing Gear, Wheel brakes

Main Landing Gears and different types of Shock Strut; Brake System. 15

UNIT 4: Aircraft Engine (Piston)

Piston engine components: Crankcase, Crankshaft, Camshaft, Bearings, Connecting Rod, Piston, Piston Rings, Four-Stroke engine cycle, Engine Handling, Normally aspirated, Turbo charging, Supercharging. 15

UNIT 5: Aircraft Engine (Jet)

Propeller, Parts of Propeller, Types of Compressors: Axial, Centrifugal; Types of Combustion Chambers, gas turbine engine. 15

TOTAL 75

Reference Books:

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

BASIC ELECTRICITY & AIRCRAFT ELECTRICAL SYSTEM

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

UNIT 1: Static Electricity and Conduction

Static Electricity and distribution of electrostatic charges; Electrostatic laws of attraction and repulsion; Units of charge, Coulomb's Law; Conduction of electricity in solids, liquids, gases and vacuum. 15

UNIT 2: Electrical Terminologies

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

15

UNIT 3: DC Circuits

Ohms Law, Kirchhoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage and currents; Significance of the internal resistance of a supply 10

UNIT 4: Resistance/Resistor

Resistors in series and parallel; Calculation of total resistance using series, parallel and series parallel combinations; Operation and use of potentiometers and rheostats; Operation of Wheatstone Bridge. Positive and negative temperature coefficient conductance; Fixed resistors, stability, tolerance and limitations, methods of construction; Variable resistors, thermostats, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge. 15

UNIT 5: AC Theories and Aircraft Electrical System

Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power Triangular/Square waves; Single/3 phase principles. 10

TOTAL 65

Reference Books:

Electrical Technology by B. L. Theraja

Aircraft Electrical System by E.H.J. Pallett

AIR NAVIGATION

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

UNIT1: The Earth

The cardinal Points, The Earth Graticule, Great Circles, Meridians and Anti Meridians, Small Circles, The Equator, Latitude, Longitude, The Prime Meridian, Difference in Latitude and Longitude, Great Circle Tracks, Rhumb Line Tracks.,360 degree notation, True Direction, Magnetic Direction and Variation, Isogonals, Magnetic Direction, Compass Direction and Deviation, Convergency, Grid Direction and Grivation ,Isogrivs. 15

UNIT2: Speed Conversions

Statute Mile, Nautical Mile, Kilometre, Conversion between Units, Departure, Metres and Feet, Basic principles of Circular Slide Rule., units of Speed, Knots, Miles per Hour, Kilometers per Hour, Indicated Airspeed, Rectified Airspeed, True Airspeed, Equivalent Airspeed, Ground Speed, Mach Number, Calibrated Airspeed, Correct Outside Air Temperature, Conversion of Rectified Airspeed to True Airspeed, Conversion of Mach number to True Airspeed, Speed, Distance and Time; Relationships and Calculations.15

UNIT3: Triangle of Velocities

The Three basic velocity vectors- Drift- The Basic Vector Triangle Problems, Geometrical Solution and Solutions on the Navigation Computer, Finding the wind Velocity at a turning point, Head and Crosswind on a Runway, 1 in 60 Rule. 10

UNIT4: Maps and Charts

Mercator projection, Lambert Conical, Polar stereographic projection,Orthomorphism, Scale, The Reduced Earth, Topographical Maps10

UNIT5: 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, Payload 15

TOTAL 65

Reference Books:

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

METEOROLOGY-1

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

UNIT 1: The Atmosphere

Composition, extent, vertical division, physical properties of air, atmosphere, pressure, temperature, density, humidity, Newton law of motion, Bernoulli's principles 12

UNIT 2: Temperature

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

12

UNIT 3: Atmospheric Density and Wind

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

12

UNIT 4: Winds

Local winds, Anabatic and Catabatic, Land and sea breezes, Vertical movements, Mountain waves, Windshear, Turbulence, Ice Accretion. 12

UNIT 5: Visibility

Visibility, Visibility reducing phenomenon, Reduction and visibility caused by mist, smoke, dust, sand and precipitation, Reduction of visibility caused by low drifting and blowing snow. 12

TOTAL **60**

Reference Books:

1. Meteorology for Pilots by Mike Wickson.
2. Weather by R.S. Scorer.

3. Ground studies for pilots by R.B underdown& john Standan

PISTON ENGINES& PROPELLERS

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

UNIT 1: Piston Engine

Fundamentals, Mechanical, thermal and volumetric efficiencies operating principles – 2 stroke, 4 stroke, Otto and Diesel, Piston displacement and Compression ratio, Engine configuration and firing order. 10

UNIT 2: Engine Construction and Performance

Crank case, Crank shaft, Cam shafts, Sumps, Accessory gearbox, cylinder and piston assemblies, connecting rods, inlet and exhaust manifolds, valve mechanism, power calculation measurement, factors affecting engine power , mixture rich-lean, pre-ignition. 15

UNIT 3: Supercharging and Turbo charging

Principle and purpose of supercharging and its effects on engine parameters, construction and operation of supercharging / turbo charging systems terminology, control system, system protection. 15

UNIT 4: Lubricants and Fuel and Powerplant Installation

Properties and Specifications, fuel additives, safety precautions, Configuration of firewalls, cowlings , acoustic panels , engine mounts , anti-vibration mounts , hoses, pipes , feeders, connectors , wiring looms, control cables and rods, lifting points and drains. 10

UNIT 5: Propeller

Fundamentals, blade element theory, high-low blade angels, reverse angel , angle of attack , rotational speed, propeller slip, aerodynamic, centrifugal and thrust forces, torque, relative airflow on blade angle of attack , vibrations and resonance, Propeller construction methods and materials used in wooden, composite and metal propellers, bladestation, blade phase, blades hank, blade back and hub assembly, fixed pitch control pitch, constant speeding propeller, Propeller pitch control, propeller ice protection. 15

TOTAL

65

Reference Books:

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

HUMAN FACTORS

Course Objective: Understand the role of human cognition and physiological effects affecting performance in aviation.

UNIT 1: Basic Physiology

The need to take human factors into account; Incidents attributable to human factors/human error; ‘Murphy’s Law’. Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access. Hyperventilation, Hypoxia, Decompression Sickness anatomy & physiology of the ear, Vision. 12

UNIT 2: Social Psychology

Responsibility: individual and group; Motivation and de-motivation; Peer pressure; ‘Culture’ issues; Team working; Management, supervision and leadership, Interacting with ATC, Cabin Crew, Passengers. 12

UNIT 3: Factors Affecting Performance

Fitness/health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and under-load; Sleep and fatigue, shift work; Alcohol, medication, drug abuse. 12

UNIT 4: Cognition in Aviation

Error models and theories; Types of error in maintenance tasks; Implications of errors (i.e. accidents); avoiding and managing errors. 12

UNIT 5: Human Information Processing.

Introduction, Basic plan, Sensation & Sensory memory, perception & mental models, working of long term memory, motor memory (Skills). 12

TOTAL

60

Reference Books:

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

ATC COMMUNICATION & ITS UNITS (PRACTICAL)

Course Objective: Understand the Air Traffic control operations, their role in maintaining safety and easy flow of traffic, different units that work closely with ATC.

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

TOTAL 60Hrs

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AIR REGULATION-2

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

UNIT 1: Rules of the Air

Collision avoidance in the air, approaching head-on, overtaking, converging, right of way, flight in the vicinity of an aerodrome, light on aircraft, low flying regulations 12

UNIT 2: Interceptions of Civil Aircraft

Interceptions of civil aircraft, procedure, signals from intercepting aircraft, signals from intercepted aircraft, radio communication, signals from the ground, restricted area, prohibited area, danger area 12

UNIT 3: Aerodromes

Aeronautical light beacon, right of way on the ground, water on the runway, wind direction indicator, runway markings, taxiway markings, runway threshold and wingbar lights, aerodrome signal and markings, displaced threshold marking, light signals and marshalling signals. 12

UNIT 4: Airspace

FIR, controlled airspace, classification of airspace, crossing an airway, uncontrolled air space, advisory routes, aerodrome traffic zones 12

UNIT 5: ICAO Annexure Terminology

Various definitions, terminologies used in aviation. 12

TOTAL 60

Reference Books:

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

RADIO AIDS

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

UNIT1:Direction Finding Aids

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. 15

UNIT2: Basic RADAR

Introduction to RADAR principles, Terminology, RADAR parameters, use of RADAR, Types of ground radar services, Use of Surveillance RADAR, Types of radar approaches. 10

UNIT3: Airborne Weather RADAR and Cockpit Displays

Introduction to CRT and LCD Head-up display, Principle of operation and functions of airborne weather Radar, weather displays, Mapping display, hazard detections. 10

UNIT4: Secondary RADAR Theory and DME

Introduction to Secondary Radar principle, Transponder, airborne equipment, slant range, co-located VOR and DME, ILS paired DME, Use of the equipment. 15

UNIT5: Secondary Surveillance RADAR

Principle, current modes and codes, Mode ‘C’ and ‘S’ interrogation, SQUAWK codes, advantages and disadvantages of SSR 15

TOTAL 65

Reference Books:

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

AERO ENGINES

COURSE OBJECTIVE: Understand the principle behind Gas Turbine Engine operation, their working, types and components.

UNIT1: GAS TURBINE THEORY

Introduction, Jet engine types, principle of jet thrust, engine efficiency, factors affecting thrust, internal engine parameter change, The gas turbine cycle, effects of Ram, density, and Temperature. 10

UNIT2: GAS TURBINE ENGINE STRUCTURES

Intake design, Intakes for supersonic flight, Intake shapes, Types of inlet, Critical conditions, Variable intakes. 10

UNIT3: COMPRESSORS

Introduction, design, Centrifugal compressor airflow, Compressor design variations, diffuser system, multi stage centrifugal compressor, Axial flow compressor, Compressor rotor, Airflow through an axial compressor, Reverse flow compressor, The main features of axial flow compressors, compressor surging, axial compressor surging, effects of compressor surge, variable position guide vanes, air release valves (Bleed valves), multi spool engines, compressor icing, comparison of axial flow and centrifugal flow compressor engines,TU. 15

UNIT4: COMBUSTION SYSTEMS

Introduction, Basic types of combustion chambers, multiple combustion chambers, The direct flow type combustion chamber, The annular combustion chamber, Cannular combustion chamber, Fuel injection and vaporization, Atomization of fuel, Burners. 10

UNIT5: TURBINES

Introduction, turbine principle of operation, turbine losses, construction, reduction in loss efficiency, compressor and turbine machine, turbine blade creep, free turbines, turbine blades, nozzle guide vanes (NGV), exhaust nozzles, basic exhaust systems, *Turbofan Engines*: Turbofan engine layout, Bypass ratio, Turbofan engine performance, *Turboprop Engines*: principle of operation, types of turboprop engines, turboprop reduction gearing, propeller and engine control, turboprop performance, Introduction, TurboProp aircraft, principle of operation. **15**

TOTAL 60

Reference Books:

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

QUANTITATIVE APTITUDE, LOGICAL REASONING & DATA INTERPRETATION

Course Objective: To enhance abstract reasoning, manual deftness, verbal and numerical skills, clerical work, mechanical ability and speed.

UNIT 1: Quantitative Aptitude-1

Number Systems, Basic Formulae of Algebra, Percentages, Profit and Loss, Interests, Trigonometry, Speed, Time and Distance, Time and Work, Averages, Mixture and Alligation, Ratio and Proportion 12

UNIT 2: Quantitative Aptitude-2

Linear Equations, Quadratic Equations, Progressions, Functions, Binomial Theorem, Indices and Surds, Inequalities, Logarithms, Permutation & Combination, Probability 12

UNIT 3: Quantitative Aptitude-3

Geometry Basics, Triangles, Quadrilateral, Circles, Mensuration 12

UNIT 4: Logical Reasoning

Number and Letter Series, Calendars, Clocks, Cubes, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Sequence, Logical Matching, Logical Connectives, Syllogism, Blood Relations 12

UNIT 5: Data Interpretation

Data, Variables, Tables, Bar Charts, X-Y Charts, Pie Chart, Cases 12

TOTAL 60Hrs

Reference:

1. Quantitative Aptitude by R. S. Aggarwal

2. Data Interpretation and Logical Reasoning by Arun Sharma

PRACTICAL HANGAR WORKSHOP- 1

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

List of Topics:

1. Familiarization of general hand tools

General Purpose Tools, Hummers and Mallets, Screwdrivers, Pilers and Plier-Type Cutting Tools. Punches Wrenches, Special Wrenches, Torque Wrench, Strap Wrenches. Impact Drivers, Metal Cutting Tools. Hand Snips, Hacksaws, Chisels, Vices, Files, Files—care and Use, Most Commonly Used Files, Care of files. Drills. Twist Drills, Reamers, Countersink, Taps and Dies, Layout and Measuring Tools, Rules. Combination Sets, Scribe, Dividers and Pencil Compasses, Calipers, Micrometer Calipers, Micrometer Parts. Reading a Micrometer, Vernier Scale, Using a Micrometer, Vernier Scale, Using a Micrometer, calipers. 30

2. Fire Training.

- a. Different Types & class of fire.
- b. Different types of fire-extinguishers.
- c. Procedure of use of fire extinguishers, fire-alarm bell. 30

TOTAL 60Hrs

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

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SEMESTER-V
Syllabus

FLIGHT PERFORMANCE AND PLANNING

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

UNIT1: Take-Off Performance

Using performance data, effects of weight and altitude, Take- Off performance, wind factors, Take- Off flap setting, factors affecting take-off performance, recommended safety factor for take-off, using take- off performance charts. 12

UNIT2: Landing Performance

Landing performance data, factors affecting landing performance, effects of weight and altitude, wind factors, runway surface, runway slope, flap setting, recommended safety factors for landing, using landing performance charts, approach speeds, performance considerations. 12

UNIT3: Runway Characteristics

Take-off distance available (TODA), Take-Off run available (TORA), clearway, rejected Take-Offs, emergency distance, stop way, landing distance available (LDA)
12

UNIT4: En Route Performance

Power required and power available curves, range and endurance, best -range speed, maximum-range speed, best endurance speed, en route performance charts. 12

UNIT5: Weight and Balance

Definitions, types of weight, weight of fuel, weight restrictions, effect of CG position on airplane handling, movement of CG position, mathematical approaches to weight and balance, graphical approach to weight and balance, dangerous goods, baggage and cargo restraint. 12

TOTAL 60 Hrs

Reference Books:

Aeroplane Technical, Trevor Thom.

AIRCRAFT INSTRUMENTS

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

UNIT 1: Pressure Instruments

Pressure altimeter, simple altimeter, sensitive altimeter, servo-assisted altimeter- its principle, working, altimeter errors, and altimeter tolerance. 10

UNIT 2: Airspeed Indicators

Principle, working, conversion, error, tolerance. Mach meter, its principle, mach/TAS calculations, mach meter errors. 10

UNIT 3: Vertical speed indicator

Principle, working, error 10

UNIT 4: Gyroscopic Instruments and Compasses.

Properties, fundamentals, types of gyros, drift and topple, gyro drives, Working, Horizontality, sensitivity, aperiodicity, turning error, acceleration error, variation and deviation 15

UNIT 5: Gyro Instruments

Directional gyro-Principle of operation, adjustment procedure, erection system, gimbal error, Drift calculation, Drift compensation
Attitude Indicator- Principle and construction, erection mechanism, acceleration errors, turning errors, electrically driven attitude indicator and its errors
Turn and bank Indicator- Principle and construction, bank indication, turn coordinator. 15

TOTAL 60

Reference Books:

1. GSP – Flight instruments by David Harris.

METEOROLOGY-2

Course Objective: To know the various aspects of weather

UNIT 1: Clouds

Types of clouds, Precipitation, Humidity, Dew point temperature, Adiabatic process, the Fohn wind effect, Precipitation associated with cloud 10

UNIT 2: Thunderstorm and Air Masses

Necessary conditions for thunderstorm, life cycle of a thunderstorm, the danger of thunderstorm Air masses, the origin of an air mass, its path, divergence and convergence, the warm front, observation from the ground, observation from the air, the cold front, observation from the ground, observation from the air, the occluded front, depressions, weather associated with it, trough of low pressure, the wave of frontal depression, the cyclone storm, anti cyclone, weather associated with it, a ridge of high pressure. 15

UNIT 3: Icing

The dangers of icing, the formation of ice, super-cooled water drops, clear ice, Rime ice, cloudy ice, hoar frost, structural icing and cloud type, carburetor icing, pitot static system icing. 10

UNIT 4: Weather Forecast and Reports

Dissemination of weather information, AIR MET service, types of weather information, meteorological forecast, special forecast, aerodrome forecast, TAF, METAR, TRENDS, Cloud base, VFR- in flight weather report, ATIS. 15

UNIT 5: Symbols and Abbreviations

Symbols for significant weather on MET charts, weather abbreviations (Cloud Type), Cloud amount, CB amount, common MET abbreviations, CAVOK, TEMPO, lasting change, Synoptic charts, wind symbols, visibility. 10

TOTAL 60

Reference Books:

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

AIRCRAFT SYSTEMS**UNIT1: Air Conditioning and Cabin Pressurization**

Air Supply-sources of air supply including engine bleed, APU and ground cart; Air conditioning systems; Air cycle and vapor cycle machines distribution systems; Flow, temperature and humidity control system.Pressurization- Pressurization systems; control and indication including control and safety valves; cabin pressure controllers, safety and warning devices; protection and warning devices 15

UNIT2: Pneumatic/Vacuum

System lay-out; sources: engine/APU, compressors, reservoirs, ground supply, pressure control; distribution, indications and warnings, interface with other systems. 10

UNIT3: Fuel Systems

System lay-out, fuel tanks, supply systems, dumping, venting and draining, cross-feed and transfer, indications and warnings, refueling and defueling, longitudinal balance fuel systems 10

UNIT4: Landing Gear

Construction, shock absorbing, extension and retraction systems, normal and emergency, Indications and warning, wheels, brakes, antiskid and auto braking, tyres , steering, air-ground sensing, skids, floats.10

UNIT5: Engine Fuel Systems

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

out and components.

15

TOTAL 60

Reference Books:

Professional Pilot Study Guide (Mike Burton)

CIVIL AVIATION REQUIREMENTS (CAR) AND SAFETY MANAGEMENT SYSTEMS

COURSE OBJECTIVE: Understanding the various laws and regulations pertaining to aviation safety and standards.

UNIT1: Introduction

Purpose of CAR, purpose of safety management systems, applications, circulars, sections pertaining to various operations 12

UNIT 2: Aviation Environmental Protection

Noise management of aircraft, aircraft operations at airport, climate change initiatives and local air quality monitoring in civil aviation 12

UNIT 3: Civil Aviation Requirements (CAR)

Section 1 to Section 11 12

UNIT 4: Safety Management System (SMS)

Indian safety policy, Indian safety plan, SMS, SSP, ICAO ANNEX 19- Safety management, establishment of safety management system, applicability of SMS, safety policy and objective, coordination of emergency response planning, documentation, safety management system manual, safety risk management, safety assurance, safety promotions, quality policy 12

UNIT 5: Case Studies

Description, error, cause and solution 12

TOTAL 60Hrs

Reference Documents:

DGCA website for latest CAR updates.
AIP

PRACTICAL HANGAR WORKSHOP -2

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

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

2. Familiarization on Cessna 172
 - a. Airframe familiarization
 - b. Engine familiarization
 - c. Cessna 172 Electrical system
 - d. Cessna 172 Hydraulic system
 - e. Cessna 172 Landing gear system
 - f. Cessna 172 Aircraft Instrument system 30 Hrs

TOTAL 60 Hrs

Reference Books:

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

B.sc (Aviation)
SEMESTER-VI
Syllabus

FLIGHT PLANNING (PRACTICAL)

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

FLIGHT OPERATIONS (PRACTICAL)

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

MAINTENANCE WORKSHOP (PRACTICAL)

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

FLYING SYNTHETIC (PRACTIAL)

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