SRIDEV SUMAN UTTARAKHAD UNIVERSITY

BADSHAHITHAUL TEHRI GARHWAL

SYLLABUS FOR

B.SC (H) AIRCRAFT MAINTANENCE

B. Sc. Honours (Aircraft Maintenance)
Semester - I

Subject: Aviation Legislation **Credits - Theory-05, Tutorial-01**
Subject Code: DSE5

Theory Lecture 75 Hours

DSE5.1 Regulatory Framework **6**

Role of International Civil Aviation Organization; Introduction to Chicago Convention, 1944; Introduction to ICAO, Convention, Standards and Recommended Practices; The Aircraft Act, 1934; The Aircraft Rules, 1937 - Part I, II, III, IV, VI, VII, IX, XIIA, XIIB,XIIC, XIII, XIV
Role of the DGCA; Relationship between CAR-21, CAR-M, CAR-145, CAR-66, CAR 147; Aeronautical Information Circulars (Applicable to Aircraft Maintenance and Release); CAR - Sections 1 and 2

DSE5.2 CAR-M **15**

Detail understanding of CAR M provisions related to Continuing Airworthiness; Detailed understanding of CAR-M.

DSE5.3 CAR-145 — Approved Maintenance Organisations **15**

Detailed understanding of CAR-145 and CAR M Subpart F

DSE5.4 CAR-66 Certifying Staff - Maintenance 5

Detailed understanding of CAR-66.

DSE5.5 CAR-147 Approved Maintenance Training Organization **5**

Detailed understanding of CAR-147.

DSE5.6 Aircraft Operations **5**

Commercial Air Transport/Commercial Operations; Air Operators Certificates; Operators Responsibilities, in particular regarding continuing airworthiness and maintenance; Documents to be carried on board; Aircraft Placarding (Markings);

DSE5.7 Aircraft Certification **10**

(a) General - Certification rules: such as FAA & EACS 23/25/27/29; Type Certification
Supplemental Type Certification; Type Approval; CAR-21 Sub-Part F, G, H, I, M, P & Q
Aircraft Modifications and repairs approval and certification; permit to fly

requirements
(b) Documents - Certificate of Airworthiness; Certificate of Registration; Noise Certificate; Weight Schedule; Radio Station Licence and Approval.

DSE5.8 Applicable National and International Requirements **5**

Introduction to ICAO, FAR, EASA Regulations - Aircraft Maintenance and certification
(a) Maintenance Programme, Maintenance checks and inspections; Master Minimum Equipment Lists, Minimum Equipment List; Dispatch Deviation Lists; Airworthiness Directives; Service Bulletins, manufacturers service information;

Modifications and repairs;
Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.;
(b) Continuing airworthiness; Test flights; ETOPS /EDTO, maintenance and dispatch requirements; RVSM, maintenance and dispatch requirements; RNP, MNPS Operations
All Weather Operations; Category 2/3 operations and minimum equipment, maintenance, training and certification requirements.

DSE5.9 Safety Management System — 10

State Safety Programme; Basic Safety Concepts; Hazards & Safety Risks; SMS Operation; SMS Safety performance; Safety Assurance.

DSE5.10 Fuel Tank Safety — 4

Special Federal Aviation Regulations (SFARs) from 14 CFR SFAR 88 of the FAA and of JAA TGL 47; Concept of CDCCL, Airworthiness Limitations Items (ALI).

Reference Books:

The Aircraft Act, 1934
The Aircraft Rules, 1937 VOL 1
The Aircraft Rules, 1937 VOL 3

Aeronautical Information Circular
CAR - Section - 1, 2, & 8 SMS
CAR - 21, M, 145, 66 & 147
Special Federal Aviation Regulations (SFARs) - 14 CFR, SFAR 88 & JAA TGL 47
Airworthiness Procedure Manual

B. Sc. Honours (Aircraft Maintenance)

Subject: Aviation Legislation

Credits - Theory-04, Practicals-02
Subject Code: DSEP5
Tutorial 15

1 AME licencing procedure in various categories
2 Approval of a typical continuing airworthiness management organisation
3 Approval of a typical maintenance organisation
4 Registration of an Aircraft
5 Obtaining C of A for a new aircraft
6 Renewal of ARC
7 Approval of Aircraft Maintenance programme
8 Approval of MEL
9 Aircraft defect recording, reporting, rectification and certification

Core Course – B.Sc Honours (Aircraft Maintenance)
Subject: Aerodynamics
Credits - Theory-04, Practicals-02
Subject Code: C2
Theory Lecture 60 Hours

C2.1 Physics of the Atmosphere — 2

International Standard Atmosphere (ISA), application to aerodynamics.

C2.2 Aerodynamics — 12

Airflow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, upwash 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.

C2.3 Theory of Flight — 10

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.

C2.4 Flight Stability and Dynamics — 3

Longitudinal, lateral and directional stability (active and passive

C2.5 Theory of Flight - Aeroplane Aerodynamics and Flight Controls — 16

Operation and effect of:
— roll control: ailerons and spoilers;
— pitch control: elevators, stabilators, variable incidence stabilisers and canards;
— yaw control, rudder limiters;
Control using elevons, ruddervators; 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;

C2.6 Basic Instrument Systems

Classification; Atmosphere; Terminology; 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, pneumatic systems instruments;

C2.7 High Speed Flight — 8

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.

C2.8 Rotary Wing Aerodynamics 4

Elementary rotary wing and aerodynamic Terminology;
Basic operation and effect of cyclic, collective and anti-torque controls.

Reference Books:

Aerodynamics - By Clancey
Mechanics of Flight By - A.C.Kermode
Force measurement on symmetric airfoil.
Force measurement on cambered airfoil.
Aircraft Instruments-by E.H.J.Pallett
Aircraft Instruments-by C.A.Williams

Core Course – B.Sc Honours (Aircraft Maintenance)
Subject: Aerodynamics
Credits - Theory-04, Practicals-02
Subject Code: CP2
Practical Lecture 60 Hours

1 Flow around various objects in a 'Water Channel' - Square, Cylinder, Aerofoil - Understanding laminar flow, turbulent flow, stagnation point, flow separation, boundary layer,	**4**
2 Fabricate Aerofoil Model - Understanding associated terms	4
3 Water Channel - Effect of vortex generator on boundary layer control	4
4 Effect of angle of attack and airflow velocity on lift and Stalling	4
5 Study of flow over streamlined bodies with different angle of attack by flow visualization technique	4
6 Identification of flight control surfaces and their effect on flight control - Aircraft Model	4
7 Identifying High lift devices and practical understanding of their effect on lift with respect to aircraft speed (Air flow)	**4**
8 Practical understanding of lift spoiling devices.	**4**
9 Removal / installation of Pitot Static Instruments.	4
10 Calibration of a Pitot Static System using a Pitot Static Leak tester.	4
11 Fabrication of model - high speed flight	4
12 Practical study of various factors affecting lift and drag on an aerofoil.	4
13 Factors affecting flow of fluid over an aerofoil surface and demonstrate the venturi Effect	4
14 Identify various type of flap surfaces and their effect on high lift and high drag Characteristic	**4**
15 Identification of various parts of Rotary wing	**4**

Core Course – B.Sc Honours (Aircraft Maintenance)
Subject: AIRCRAFT MAINTENANCE PRACTICES
Credits - Theory-04, Practicals-02
Subject Code: C9
Theory Lecture 60 Hours

C9.1 Safety Precautions-Aircraft and Workshop — 4

Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals; Instructions on the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.

C9.2 Workshop Practices — 4

Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards.

C9.3 Tools — 4

Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods. Operation, function and use of electrical general test equipment;

C9.4 Engineering Drawings, Diagrams and Standards — 4

Drawing types and diagrams, their symbols, dimensions, tolerances and projections;
Identifying title block information; Microfilm, microfiche and computerized presentations;
Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams.

C9.5 Fits and Clearances — 4

Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist and wear;
Standard methods for checking shafts, bearings and other parts.

C9.6 Corrosion — 6

a) Chemical fundamentals; Formation by, galvanic action process, microbiological, stress;
(b) Types of corrosion and their identification; Causes of corrosion;
Material types, susceptibility to corrosion.

C9.7 Welding, Brazing, Soldering and Bonding — 5

(a) Soldering methods; inspection of soldered joints.
(b) Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints.

C9.8 Disassembly, Inspection, Repair and Assembly Techniques — 9

(a) Types of defects and visual inspection techniques. Corrosion removal, assessment and re-protection.

(b) General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programs;
(c) Non-destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and borescope methods.
(d) Disassembly and re-assembly techniques.
(e) Trouble shooting techniques

C9.9 Maintenance Procedures **3**

Maintenance planning; Modification procedures; Stores procedures; Certification/release procedures; Interface with aircraft operation; Maintenance Inspection/Quality Control/Quality Assurance; Additional maintenance procedures; Control of life limited components

C9. 10 Bearings **3**

Purpose of bearings, loads, material, construction; Types of bearings and their application. Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes.

C9.11 Transmissions **3**

Gear types and their application; Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns; Belts and pulleys,

chains and sprockets. Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems.

C9.12 Control Cables **3**

Types of cables; End fittings, turnbuckles and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems. Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems.

C9.13 Pipes and Unions **3**

(a) Identification of, and types of rigid and flexible pipes and their connectors used in aircraft;
(b) Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.

C9.14 Pipes and Hoses **3**

Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes.

C9.15 Springs **2**

Types of springs, materials, characteristics and applications. Inspection and testing of springs.

Core Course – B.Sc Honours (Aircraft Maintenance)
Subject: :AIRCRAFT MAINTENANCE PRACTICES
Credits - Theory-04, Practicals-02
Subject
Code: CP9
Practical Lecture 60
Hours

1 Draw different projections of a given object – Three View Diagram simple object, structural member, and joints	12
2 Fit and remove thread inserts.	4
3 Use of precision measuring instruments, selection, handling of instruments and Marking	6
4 Removal and installation of hydraulic system pressurized / unpressurized components – safety, handling precautions, selection of appropriate tools and manuals. Use zonal numbers to record location. Use parts catalog & component location manual to locate components. Identify pipes and hoses	6
5 Removal and installation of pneumatic system pressurized / unpressurized components – safety, handling precautions, selection of appropriate tools and manuals. Use zonal numbers to record location. Use parts catalog & component location manual to locate components. Identify pipes and hoses	6
6 Removal and installation of oxygen system components – safety, handling precautions, selection of appropriate tools and manuals. Use zonal numbers to record location. Use parts catalog & component location manual to locate components. Identify pipes and hoses	4
7 Visual inspection of various types of surface defects of aircraft structure using simple aids like magnifying glass, light and mirror. Use zonal and station numbers to record defect location	8
8 Visual inspection of various types of surface defects of aircraft structure and system components like bearings, gears, chain, pulley, spring and cables using simple aids like magnifying glass, light and mirror and record defects.	8
10 Selection and use of lubrication technique of bearings, flight / engine / propeller controls and undercarriages. Identifying lubricants.	

B. Sc. Honours (Aircraft Maintenance)
Semester - I

Subject: English Communication

Credits - (02 papers) (Credit: 04 each)
Subject Code: AEEC1
Theory Lecture 60 Hours

Preamble

The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions. One of the critical links among human beings and an important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal. In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.

The present course hopes to address some of these aspects through an interactive mode of teaching-learning process and by focusing on various dimensions of communication skills. Some of these are:

Language of communication, various speaking skills such as personal communication, social interactions and communication in professional situations such as interviews, group discussions and office environments, important reading skills as well as writing skills such as report writing, notetaking etc.

While, to an extent, the art of communication is natural to all living beings, in today's world of complexities, it has also acquired some elements of science. It is hoped that after studying this course, students will find a difference in their personal and professional interactions.

The recommended readings given at the end are only suggestive; the students and teachers have the freedom to consult other materials on

various units/topics given below. Similarly, the questions in the examination will be aimed towards assessing the skills learnt by the students rather than the textual content of the recommended books.

AECC 1.1 Introduction — 5

Theory of Communication, Types and modes of Communication

AECC 1.2 Language of Communication — 15

Verbal and Non-verbal (Spoken and Written), Personal, Social and Business Barriers and Strategies Intra-personal, Inter personal and Group communication

AECC 1.3 Speaking Skills — 20

Monologue, Dialogue, Group Discussion, Effective Communication/ Mis-Communication, Interview, Public Speech

AECC 1.4 Reading and Understanding — 15

Close Reading, Comprehension, Summary Paraphrasing, Analysis and Interpretation, Translation (from Indian language to English and vice-versa), Literary/Knowledge Texts

AECC 1.5 Writing Skills **15**

Documenting, Report Writing, Making notes, Letter writing

Reference Books

Fluency in English - Part II, Oxford University Press, 2006
V.R. Narayanaswami, Strengthen Your Writing, 3rd Edition, Orient Longman, 2005.
Andrea J. Rutherford, Basic Communication Skills for Technology, 1st Edition, Pearson
Business English, Pearson, 2008
Language, Literature and Creativity, Orient Blackswan, 2013

Education Asia (Singapore) Pvt. Ltd., Bangalore, 2001.
4. Language through Literature (forthcoming) ed. Dr. GauriMishra,Dr RanjanaKaul, DrBrati Biswas
Nell Ann Pickett, Ann A. Laster, Katherine E. Staples, Technical English (Writing, Reading and Speaking), 8th Edition, Pearson Education, USA, Addison Wesley Longman Inc., 2001

Core Course – B.Sc Honours (Aircraft Maintenance)
Semester - I

Subject: Electrical Fundamentals 1

Credits - Theory-04, Practicals-02
Subject Code: C3
Theory Lecture 60 Hours

C3.1 Electron Theory — 3

Structure and distribution of electrical charges within: atoms, molecules, ions, compounds
Molecular structure of conductors, semiconductors and insulators.

C3.2 Static Electricity and Conduction — 3

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 a vacuum.

C3.3 Electrical Terminology — 2

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

C3.4 DC Circuits — 4

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

C3.5 Resistance/Resistor — 5

(a) Resistance and affecting factors; Specific resistance; Resistor colour code, values and tolerances, preferred values, wattage ratings; 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.
(b) Positive and negative temperature coefficient conductance; Fixed resistors, stability, tolerance and limitations, methods of construction; Variable resistors, thermistors, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge;

C3.6 Capacitance/Capacitor — 4

Operation and function of a capacitor; Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric constant, working voltage, voltage rating; Capacitor types, construction and function; Capacitor colour coding;
Calculations of capacitance and voltage in series and parallel circuits; Exponential charge and discharge of a capacitor, time constants; Testing of capacitors.

C3.7 Magnetism — 5

Theory of magnetism; Properties of a magnet Action of a magnet suspended in the Earth's magnetic field; Magnetisation and demagnetisation; Magnetic shielding; Various types of magnetic material; Electromagnets construction and principles of operation; Hand clasp rules to determine: magnetic field around current carrying conductor.

Magneto motive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents; Precautions for care and storage of magnets.

C3.8 Inductance/Inductor **6**

Faraday's Law; Action of inducing a voltage in a conductor moving in a magnetic field;
Induction principles; Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductor turns; Mutual induction; The effect the rate of change of primary current and mutual inductance has on induced voltage; Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other; Lenz's Law and polarity determining rules; Back emf, selfinduction; Saturation point; Principle uses of inductors;

C3.9 AC Theory **8**

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.

C3. 10 Resistive (R), Capacitive (C) and Inductive (L) Circuits **8**

Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel; Power dissipation in L, C and R circuits; Impedance, phase angle, power factor and current calculations; True power, apparent power and reactive power calculations.

C3.11 Transformers **6**

Transformer construction principles and operation; Transformer losses and methods for overcoming them; Transformer action under load and no-load conditions;
Power transfer, efficiency, polarity markings; Calculation of line and phase voltages and currents; Calculation of power in a three phase system; Primary and Secondary current, voltage, turns ratio, power, efficiency; Auto transformers.

C3.12 Filters **6**

Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.

Reference Books:

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

Core Course – B.Sc Honours (Aircraft Maintenance)

Subject: Electrical Fundamentals 1

Credits - Theory-04, Practicals-02
Subject Code: CP3
Practical Lecture 60 Hours

1 Simple experiments with static electricity and the coulomb's law	**4**
2 Application of Electromotive forces and Potential difference Ballistic Galvanometer: (i) Measurement of charge and current sensitivity	4
3 Measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d) checking electrical fuses and connection	4
4 Use of a range of test meters to measure volts, amps and resistance.	4
5 Resistor colour codes - Calculation of resistance value using colour codes	4
6 Potentiometer , rheostat and wheat stone bridges and determine unknown Resistance	4
7 Use a Multimeter for measuring Resistances, checking electrical fuses Identify various types of resistance	**4**
8 Identify various types of capacitances	**4**
9 Measurement of magnetic field strength. Magnetic field density and permeability using flux meter.	4
10 Production of electricity by inductance methods	4
11 Single phase and three phase power supply distribution using star and delta Connection	4
12 Construct series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor,	4
13 Construct parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q	4
14 Use of transformer in power distribution and measurements.	**4**
15 Make filters circuit to study function of low pass, high pass, band pass and band stop.	4

Core Course – B.Sc Honours (Aircraft Maintenance)
Semester - II

Subject: Electrical Fundamentals 2
Credits - Theory-04, Practicals-02

Subject Code: C6
Theory Lecture 60 Hours

Theory

C6.1 Generation of Electricity **4**

Elementary knowledge on generation of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion

C6.2 DC Sources of Electricity **4**

Construction and basic chemical action of: primary cells, secondary cells, lead acid cells, nickel cadmium cells, other alkaline cells; Cells connected in series and parallel; internal resistance and its effect on a battery; Construction, materials and operation of thermocouples; Operation of photo-cells.

C6.3 DC Motor/Generator Theory **9**

Basic motor and generator theory; Construction and purpose of components in DC generator; Operation of, and factors affecting output and direction of current flow in DC generators; Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors; Series wound, shunt wound and compound motors; Starter Generator construction**.**

C6.4 AC Generators **9**

Rotation of loop in a magnetic field and waveform produced; Operation and construction of revolving armature and revolving field type AC generators; Single phase, two phase and three phase alternators; Three phase star and delta connections advantages and uses;
Permanent Magnet Generators.

C6.5 AC Motors **8**

Construction, principles of operation and characteristics of: AC synchronous and induction motors both single and polyphase; Methods of speed control and direction of rotation;
Methods of producing a rotating field: capacitor, inductor, shaded or split pole.

C6.6 Power **8**

Power, work and energy (kinetic and potential); Dissipation of power by a resistor;

Power formula; Calculations involving power, work and energy

C6.7 Aircraft Electrical Cables and Connectors **8**

a). Cable types, construction and characteristics; High tension and co-axial cables; Crimping; Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes. .
B). Electrical Wiring Interconnection System (EWIS) Continuity, insulation and bonding techniques and
Testing; Use of crimp tools: hand and hydraulic operated; testing of crimp joints; Connector pin removal and insertion; Co-axial cables: testing and installation Precautions; Identification of wire types, their inspection criteria and damage tolerance
Wiring protection techniques: Cable looming and loom support, cable clamps, and protective
Sleeving techniques including heat shrink wrapping, shielding. EWIS installations,

Inspection, repair, maintenance and cleanliness standards

C6.8 Electromagnetic Environment **6**

Influence of the following phenomena on maintenance practices for electronic system:
EMC-Electromagnetic Compatibility; EMI-Electromagnetic Interference; HIRF-High Intensity Radiated Field; Lightning/lightning protection

C6.9 Electro sensitive Devices **4**

Special handling of components sensitive to electrostatic discharges;
Awareness of risks and possible damage, component and personnel anti-static protection devices.

Reference Books:

Electrical Technology- by B.L.Theraja
Aircraft Electrical System- by E.H.J.Pallett
Aircraft Electricity and electronics-by Bent McKinley and also by Eismin/Bent McKinley

Core Course – B.Sc Honours (Aircraft Maintenance)

Subject: Electrical Fundamentals 2

Credits - Theory-04, Practicals-02
Subject Code: CP6
Practical Lecture 60 Hours

1 Generation of electricity by light , heat, chemical action, magnetism, and motion	**4**
2 Construct power sources using primary and secondary cells	4
3 Construct a model to study usage of thermo-cell and photo-cell	4
4 Construct a model to generate DC power using different method of coil arrangements (Series, shunt) to understand their Usage.	4
5 Construct a model of DC motor using different method of coil arrangements (Series, shunt) to understand their Usage.	4
6 Construct a model to generate single/Poly-phase AC power to understand their Usage.	4
7 Construct a model of AC motor using single/ Poly-phase l arrangements to understand their Usage.	**4**
8 Measure amount of power dissipated by various resistors; calculation of power	**4**
9 Using at least two crimping systems, select appropriate cable crimping tools and crimp cables to prepare cable ends or plug / socket terminals.	4
10 Check an aircraft electrical circuit for continuity in conjunction with an electrical wiring diagram.	4
11 Identify cables and cables values by reference to the maintenance manuals. Identify a range of electrical component symbols.	4
12 Inspection of electrical cable looms / bundles and cable trunking.	4
13 Select and use appropriate cable stripping tools and solder cables to single and multipin connectors / tag boards	4
14 Prepare, and install a simple loom, using at least two binding methods	**4**
15 Identification of various fasteners and locking devices used in aircraft.	**4**

B. Sc. Honours (Aircraft Maintenance)

Semester - II

Subject: Human Factors

Credits - Theory-05, Tutorial-01

Subject Code: DSE3

Theory	**Lecture 75 Hours**
DSE3.1 General The need to take human factors into account; Incidents attributable to human factors/human error; 'Murphy's' law.	**5**
DSE3.2 Human Performance and Limitations Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access.	**5**
DSE3.3 Social Psychology Responsibility: individual and group; Motivation and de-motivation; Peer pressure; 'Culture' issues; Team working; Management, supervision and leadership	**5**
DSE3.4 Factors Affecting Performance Fitness/health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and under-load; Sleep and fatigue, shiftwork; Alcohol, medication, drug abuse.	**5**
DSE3.5 Physical Environment Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment.	**5**
DSE3.6 Tasks Physical work; Repetitive tasks; Visual inspection; Complex systems.	**5**
DSE3.7 Communication Within and between teams; Work logging and recording; Keeping up to date, currency; Dissemination of information.	**5**
DSE3.8 Human Error Error models and theories; Types of error in maintenance tasks; Implications of errors (i.e. accidents); Avoiding and managing errors.	**5**
DSE3.9 Hazards in the Workplace Recognising and avoiding hazards; Dealing with emergencies.	**5**
DSE3.10 Human Factors in Aircraft Maintenance and Inspection Human Factors — Aircraft Maintenance and Inspection; Contemporary Maintenance Problems; the SHEL Model; the Reason Model; Human Error	**5**
DSE3.11 Human Error in Aircraft Maintenance and Inspection (an organizational perspective)	**5**
DSE3.12 Human Error in the Maintenance Environment Human Factors Issues Affecting Aircraft Maintenance and Dirty Dozen; Information Exchange and Communication; Training; Aircraft Maintenance Technician Facilities and Work Environment	**5**
DSE3.13 Teams and Organizational Issues in Aircraft Maintenance Team Work; Job Design; Reward Systems; Selection and Staffing; Training	**5**

DSE3.14 Automation and Advanced Technology System **5**

Automation and Computerization; Advanced Job Aid Tools

DSE3.15 Error Prevention, Considerations and Strategies **5**

Reference Books:

CAP 715 - An Introduction to Aircraft Maintenance Engineering Human Factors for JAR 66, Civil Aviation Authority, UK.

CAP 718 - Human Factors in Aircraft Maintenance and Inspection, Civil Aviation Authority, UK.

FAA-H-8083-30 - Aircraft Maintenance Technician Handbook - General, US Department of Transportation, Federal Aviation Administration

ICAO Doc 9806

B. Sc. Honours (Aircraft Maintenance)
Subject: Human Factors
Credits - Theory-04, Practicals-02
Subject
Code: DSEP3
Tutorial 15
Hours

1 Application of Human Factors in development of Aircraft Maintenance Programme and Inspection Schedule

2 Application of Human Factors in Aircraft Maintenance Planning and Execution

3 Application of Human Factors in Aircraft Maintenance

4 Detail study of Murphy's' law.

5 To study Shel Model

6 Study of Dirty Dozen

7 Stress Management in Aircraft Maintenance environment

8 To study human behavior in performing aircraft inspection in adverse weather conditions.

9 Develop procedure and environment for aircraft inspection for error prevention, considerations and strategies.

10 Study of social impact on aircraft maintenance engineer

B. Sc. Honours (Aircraft Maintenance)

Semester - II

Subject: Mathematics 1

Credits - Theory-05, Tutorial-1
Subject Code: GE1
Theory Lecture 75 Hours

GE1.1 Linear Algebra: **10**

Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix,

GE1.2 Trigonometry Functions: **5**

Elementary trigonometry, sine, cosine and tan functions, reciprocals of trig functions, angle values of trig functions, geometrical problems, trigonometric inverse functions

GE1.3 Multivariable Differential calculus **20**

Functions of 2 Variables, Limits and continuity, Partial differentiation, Euler's Theorem, Maxima and Minima of two variables, Method of Lagrange Multipliers, Taylor Series and Maclaurin Series of two variables, Jacobian.

GE1.4 Multivariable Integral calculus **20**

Multiple Integrals-Double integrals, Change of order, Applications to areas, volumes, Triple Integral.

GE1.5 Vector Calculus **20**

Gradient, Divergence, Curl, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).

References:

Differential Calculus by Shanti Narain
Integral Calculus by Shanti Narain
Linear Algebra- Schaum Outline Series.
Engineering Mathematics by B.S. Grewal

B. Sc. Honours (Aircraft Maintenance)
Semester - II

Subject: Physics

Credits - Theory-04, Practicals-02
Subject Code: GE2
Theory Lecture 60 Hours

GE2.1 PART 1 **4**

Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter."

GE2.2 PART 2 **14**

Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion - Torsional pendulum- Determination of Rigidity modulus and moment of inertia - q, η and sby Searle's method

GE2.3 PART 3 **12**

Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets.
Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum.
Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a System of particles. Centre of Mass."

GE2.4 PART 4 **10**

"Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications.
Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS).

GE2.5 PART 5 **10**

Oscillations: Simple harmonica motion. Differential equation of SHM and its solutions.
Kinetic and Potential Energy, Total Energy and their time averages. Damped Oscillations.

GE2.6 PART 6 **10**

Special Theory of Relativity: Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of Velocities. "

Reference Books

University Physics. FW Sears, MW Zemansky and HD Young13/e, 1986. Addison Wesley
Mechanics Berkeley Physics course,v.1: Charles Kittel, et. Al. 2007, Tata McGraw-Hill

B. Sc. Honours (Aircraft Maintenance)

Subject: Physics

Credits - Theory-04, Practicals-02
Subject Code: GE2

Practical **Lecture 60 Hours**

1	Measurements of length (or diameter) using Vernier caliper, screw gauge and	6
2	Travelling microscope.	6
3	To determine the Height of a Building using a Sextant.	6
4	To determine the Moment of Inertia of a Flywheel.	6
5	To determine the Young's Modulus of a Wire by Optical Lever Method.	6
6	To determine the Modulus of Rigidity of a Wire by Maxwell's needle.	6
7	To determine the Elastic Constants of a Wire by Searle's method.	6
8	To determine g by Bar Pendulum.	6
9	To determine g by Kater's Pendulum.	6
10	To determine g and velocity for a freely falling body using Digital Timing Technique	

Core Course – B.Sc Honours (Aircraft Maintenance)

Semester - II

Subject: Electronic Fundamentals And Digital Techniques

Credits - Theory-04, Practicals-02

Subject Code: C4

Theory Lecture 60 Hours

C4.1 Semiconductors — 8

Diode symbols; Diode characteristics and properties; Diodes in series and parallel; Main characteristics and use of silicon controlled rectifiers (thyristors), light emitting diode, photo conductive diode, varistor, rectifier diodes; Functional testing of diodes.

Materials, electron configuration, electrical properties; P and N type materials: effects of impurities on conduction, majority and minority characters; PN junction in a semiconductor, development of a potential across a PN junction in unbiased, forward biased and reverse biased conditions; Operation and function of diodes in the following circuits: clippers, clampers, full and half wave rectifiers, bridge rectifiers, voltage doublers and triplers; Detailed operation and characteristics of the following devices: silicon controlled rectifier (thyristor), light emitting diode, Shottky diode, photo conductive diode, varactor diode, varistor, rectifier diodes, Zener diode.

C4.2 Transistors — 8

Transistor symbols; Component description and orientation; Transistor characteristics and properties.

Construction and operation of PNP and NPN transistors; Base, collector and emitter configurations; Testing of transistors. Basic appreciation of other transistor types and their uses. Application of transistors: classes of amplifier (A, B, C); Simple circuits including: bias, decoupling, feedback and stabilization; Multistage circuit principles: cascades, push-pull, oscillators, multi-vibrators, flipflop circuits.

C4.3 Integrated Circuits — 8

Description and operation of logic circuits and linear circuits/operational amplifiers.

Description and operation of logic circuits and linear circuits; Introduction to operation and function of an operational amplifier used as: integrator,

differentiator, voltage follower, comparator; Operation and amplifier stages connecting methods: resistive capacitive, inductive (transformer), inductive resistive (IR), direct;

Advantages and disadvantages of positive and negative feedback

Operation and use of encoders and decoders. , functions of encoders type. Uses of medium, large and very large scale integration.

C4.4 Printed Circuit Boards — 4

Description and use of printed circuit boards.

C4.5 Servomechanisms — 10

Understanding of the following terms: Open and closed loop systems, feedback, follow up, analogue transducers; Principles of operation and use of the following

synchro system components/features: resolvers, differential, control and torque, transformers, inductance and capacitance transmitters.
Understanding of the following terms: Open and closed loop, follow up, servomechanism, analogue, transducer, null, damping, feedback, dead band;
Construction operation and use of the following synchro system components: resolvers, differential, control and torque, E and I transformers, inductance transmitters, capacitance transmitters, synchronous transmitters;
Servomechanism defects, reversal of synchro leads, hunting.

C4.6 Numbering Systems **3**

Numbering systems: binary, octal and hexadecimal; Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa.

C4.7 Data Conversion **3**

Analogue Data, Digital Data; Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.

C4.8 Data Buses **3**

Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications.

C4.9 Logic Circuits **3**

(a) Identification of common logic gate symbols, tables and equivalent circuits; Applications used for aircraft systems, schematic diagrams.
(b) Interpretation of logic diagrams.

C4. 10 Microprocessors **6**

Functions performed and overall operation of a microprocessor;
Basic operation of each of the following microprocessor elements: control and processing unit, clock, register, arithmetic logic unit.

C4.11 Fiber Optics **4**

Advantages and disadvantages of fiber optic data transmission over electrical wire propagation; Fibre optic data bus; Fiber optic related terms; Terminations; Couplers, control terminals, remote terminals; Application of fiber optics in aircraft systems.

Reference Books

Basic Electronics-BemardGrob
Digital Fundamentals by Malvino and Leech
Principles of Electronics by V K Mehta

Core Course – B.Sc Honours (Aircraft Maintenance)

Subject: Electronic Fundamentals And Digital Techniques

Credits - Theory-04, Practicals-02

Subject Code: CP4

Practical Lecture 60 Hours

Practical

1 Identification of basic electronic components (diodes, transistors),digital Multimeter, Function Generator and Oscilloscope	**4**
2 Practical on I-V Characteristics of (a) p-n junction Diode, and (b) Zener diode.	4
3 Study of Clipping and Clamping circuits	4
4 Conversion of A C Voltage using (a) Half wave rectifier and (b) Full wave rectifier (FWR).	4
5 Uses of basic electronic components (diodes, transistors),digital Multimeter, Function Generator and Oscilloscope	4
6 Construct a model to study fixed Bias and Voltage divider bias configuration for CE transistor.	4
7 Construct a model to study Single Stage CE amplifier of given gain.	**4**
8 Construct a model to study correlation between different numbering systems.	**4**
9 Construct a model to study digital to analogue converters	4
10 Construct a model to study typical data buses used in aircraft system.	4
11 Functions performed and overall operation of a microprocessor;	4
12 Demonstrate fiber optic data transmission over electrical wire propagation;	4
13 Construct a Universal Gates and test	4
14 Construct a flip flop circuit using elementary gates	**4**
15 Construct a seven segment display driver	**4**

Core Course – B.Sc Honours (Aircraft Maintenance)
Semester - III
Subject: GAS TURBINE ENGINE
Credits - Theory-04, Practicals-02
Subject Code: C7
Theory Lecture 60 Hours

Theory

C7.1 Fundamentals Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle; The relationship between force, work, power, energy, velocity, acceleration; Constructional arrangement and operation of turbojet, turbofan, turbo shaft, turboprop.	**3**
C7.2 Engine Performance Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption; Engine efficiencies; By-pass ratio and engine pressure ratio; Pressure, temperature and velocity of the gas flow; Engine ratings, static thrust, influence of speed, altitude and hot climate, flat rating, limitations.	**3**
C7.3 Inlet Compressor inlet ducts; Effects of various inlet configurations; Ice protection.	**2**
C7.4 Compressors Axial and centrifugal types; Constructional features and operating principles and applications; Fan balancing; Operation: Causes and effects of compressor stall and surge; Methods of air flow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades; Compressor ratio.	**4**
C7.5 Combustion Section Constructional features and principles of operation	**2**
C7.6 Turbine Section Operation and characteristics of different turbine blade types; Blade to disk attachment; Nozzle guide vanes; Causes and effects of turbine blade stress and creep.	**3**
C7.7 Exhaust Constructional features and principles of operation; Convergent, divergent and variable area nozzles; Engine noise reduction; Thrust reversers.	**2**
C7.8 Bearings and Seals Constructional features and principles of operation and handling .	**2**
C7.9 Lubricants and Fuels Properties and specifications; Fuel additives; Safety precautions	**1**
C7. 10 Lubrication Systems System operation/lay-out and components.	**2**

C7.11 Fuel Systems **3**

Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components.

C7.12 Air Systems **3**

Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services.

C7.13 Starting and Ignition Systems **3**

Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements.

C7.14 Engine Indication Systems **4**

Exhaust Gas Temperature/ Inter-stage Turbine Temperature; Engine Thrust Indication: Engine Pressure Ratio, engine turbine discharge pressure or jet pipe pressure systems;
Oil pressure and temperature; Fuel pressure and flow; Engine speed, Propeller Speed; Vibration measurement and indication; Torque; Power.

C7.15 Power Augmentation Systems **2**

Operation and applications; Water injection, water methanol; Afterburner systems.

C7.16 Turbo-prop Engines **3**

Gas coupled/free turbine and gear coupled turbines; Reduction gears; Integrated engine and propeller controls; Over-speed safety devices.

C7.17 Turbo-shaft engines **3**

Arrangements, drive systems, reduction gearing, couplings, control systems.

C7.18 Auxiliary Power Units (APUs) **3**

Purpose, operation, protective systems.

C7.19 Powerplant Installation **3**

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.

C7. 20 Fire Protection Systems **2**

Operation of detection and extinguishing systems.

C7.21 Engine Monitoring and Ground Operation **4**

Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Trend (including oil analysis, vibration and boroscope) monitoring;
Inspection of engine and components to criteria, tolerances and data specified by engine manufacturer; Compressor washing/cleaning; Foreign Object Damage.

C7.22 Engine Storage and Preservation **3**

Preservation and depreservation for the engine and accessories/ systems.

Reference Books:

Aircraft Gas Turbine Technology by IRWINE TREAGER
The Jet Engine' by ROLLS ROYCE
Power plant Section Text book- (EA-ITP-P)
Aviation Maintenance Technician Series by Dale Crane
Jet Aircraft power Systems' by JACK V. CASAMASSA and RALPH D.BENT
Gas Turbine Engines' by Turbomeca, Bordes,France.
Hydraulic Servo Systems' by M.GUILLON
Introduction to Flight by JOHN ANDERSON:
Civil Aircraft Inspection Procedure (CAP459) Part- II Aircraft
Aircraft Power Plants by M.J.KROES, T.W.Wild, R.D.Bent and J.L.McKINLEY;

Course – B.Sc Honours (Aircraft Maintenance)
Semester - III
Subject: :GAS TURBINE ENGINE
Credits - Theory-04, Practicals-02
Subject Code: CP7
Practical Lecture 60 Hours

Practical

1 Identify engine types, modules and subassemblies and components of turbine engines .	**2**
2 Identify various parts of thrust management and bypass system of turbine engine.	2
3 Identification and inspection of compressors stages.	2
4 Engine compressor surge and stall management components and control.	2
5 Identification various components of combustion systems and methods of cooling's.	2
6 Identification of exhaust system and methods of noise reduction	2
7 Identification and inspection of components of thrust reversal system.	**2**
8 Identify normal & electronic fuel control, monitoring and indication system	**6**
9 Familiarization with methods of engine starting and ignition systems.	4
10 Operation check of Engine indicating systems.	4
11 Familiarization of APU starting and shutdown procedure	4
12 Familiarization with power plant removal & installation	8
13 Visual Inspection of engines	4
14 Typical engine control rigging.	**6**
15 Familiarization with engines and airframe interface.	**4**
16 Testing of engine fire monitoring and extinguishing operation	**4**
17 Study engine storage and preservation.	**2**

Course – B.Sc Honours (Aircraft Maintenance)

Semester - III

Subject: WORKSHOP PRACTICES

Credits - Theory-04, Practicals-02

Subject Code: C11

Theory **Lecture 60 Hours**

C11.1 Safety & Precautions to be taken while working in the Machine shop. Various type of aids to be used while working on machines. Basic Machining **4**

C11.2 Material handling - Sheet Metal **6**
Marking out and calculation of bend allowance; Sheet metal working, including bending and forming; Inspection of sheet metal work.

C11.3 Various types of gears and usage and inspection **8**
Various Hand tools for working on bench

C11.4 Drills and drilling procedures. Simple Turning and Taper turning. **6**
Various types of measuring and layout tools

C11.5 Welding Techniques: Preparation of arc welding of butt joints, lap joints and tee joints. Gas welding practice; **8**
Metric Measurement

C11.6 Various forms of Surface Finish and Surface measurement **16**
Various forms of Heat Treatment & Testing of Materials
Various forms of Taps & Dies

C11.7 (a) Smithy operations, upsetting, swaging, setting down and bending **8**
(b) Foundry operations like mould preparation for gear and step cone pulley

C11.8 Hoses and Pipes **4**
Pneumatic, Hydraulic pipes and end fitting identification, pipe bending and flaring, pipe inspection.
Types of hoses, identification, hose end fittings, house routing and inspection

Reference Books

Workshop technology By: K.P. Roy , A.K. HAJRA CHOWDHARY 2000 edition;
Shop Theory By: James Anderson

Core Course – B.Sc Honours (Aircraft Maintenance)
Subject: :WORKSHOP PRACTICES
Credits - Theory-04, Practicals-02
Subject Code: CP11
Lecture 60 Hours

Practical	
1 Sheet metal marking, cutting, sheet metal structural defects	4
2 Practice of 1st model. Butt Joint and inspect	4
3 Practice of 2nd model. Lap Joint and inspect	4
4 Practice of 3rd model. V-Joint and inspect	4
5 Practice of 3rd model. T-Joint and inspect	4
6 Demonstration of 1st model - Dovetail	4
7 Demonstration of 2nd model- Radius Gauge	4
8 Inspection of various welded samples with / without defects and record Observation	4
9 Soldering Exercises, inspection and defects	4
10 Cable splicing and swaging	4
11 Pipe bending and inspection of pipe assembly	4
12 Taps and Dies, thread cutting and inspection	4

Core Course – B.Sc Honours (Aircraft Maintenance)

Semester - III

Subject: Aircraft Structure and Associated Systems

Credits - Theory-04, Practicals-02

Subject Code: C1

Theory **Lecture 60 Hours**

Aircraft rivets

Types of solid and blind rivets: specifications and identification, heat treatment.

Riveting

Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints.

C1.5 Structural Assembly — 4

Structural assembly techniques: riveting, bolting, bonding methods of surface protection, such as chromating, anodising, painting; Surface cleaning.
Airframe symmetry: methods of alignment and symmetry checks. Complete airframe for symmetry fuselage for twist and bending, vertical stabiliser for alignment wings and horizontal stabilisers for dihedral and incidence

C1.6 Airframe Structures — Aeroplane — 10

Fuselage (ATA 52/53/56) :Construction and pressurisation sealing; Wing, stabiliser, pylon and undercarriage attachments; Seat installation and cargo loading system; Doors and emergency exits: construction, mechanisms, operation and safety devices; Windows and windscreen construction and mechanisms.

C1.7 Wings (ATA 57) — 4

Anhedral, dihedral incidence angle interplane struts longitudinal dihedral rigging position, stagger, wash in, washout Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.

C1.8 Stabilizers — 4

Construction; Control surface attachment.

C1.9 Flight Control Surfaces (ATA 55/57) — 4

Construction and attachment; Balancing — mass and aerodynamic.

C1.10 Nacelles/Pylons (ATA 54) — 2

Construction; Firewalls; Engine mounts.

Reference Books:

Dictionary of Aeronautical terms (Dale Crane)
Aircraft handbook FAA (AC 65-15 A)
Aircraft structure Ch. 01 (FAA)
Aircraft Construction Repair and Inspection-By Joe Christy
Aviation Maintenance Technician Hand book by FAA
Aircraft Maintenance and Repair- Delp/Bent/McKinley,
AC 43.1B

Core Course – B.Sc Honours (Aircraft Maintenance)

Subject: Aircraft Structure and Associated Systems

Credits - Theory-04, Practicals-02

Subject Code: CP1

Practical	**Lecture 60 Hours**
1. Identifying aircraft reference lines, station and zone numbers	4
2. Identification of major structural members of fixed wing aircraft. Loads on major structural members.	4
3. Identification of detail structural members of aircraft and loads acting on these structural members	4
4. Aircraft structure construction	4
5. Aircraft structural assembly, joints and lightning protection	4
6. Identification of components of flight control surfaces and methods of mass balancing.	4
7. Control surface, landing gear and engine attachment	4
8. Identification of type of Fuselage and method of pressure sealing. Identification of Pressure bulkheads and unpressurised bulkheads	4
9. Common structural defects, simple inspection technique and recording	8
10. Types of rivets, defects. Inspection of riveted joints and structure	8
11. Construction (Modelling) of various types structural joints	8
12. Check aircraft symmetry	4

B. Sc. Honours (Aircraft Maintenance)
Semester - III

Subject: Chemistry

Credits - Theory-04, Practicals-02
Subject Code: GE3
Theory Lecture 60 Hours

Theory

GE3.1 MODULE I: WATER TECHNOLOGY **12**

Introduction and specifications of water, Hardness and its determination (EDTA method only), Alkalinity, Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, Boiler problems – caustic embrittlement & corrosion: causes & prevention, Carbonate & phosphate conditioning, colloidal conditioning &calgon treatment, Water softening processes: Lime – soda process, Ion exchange method, Water for domestic use.

GE3.2 MODULE II: FUELS **12**

Classification, calorific value of fuel, (gross and net), Determination of calorific value of fuels, bomb calorimeter, Solid fuels - Proximate and ultimate analysis, Octane &Cetane No. and its significance. Numerical on combustion.

GE3.3 MODULE III: INSTRUMENTAL METHODS OF ANALYSIS **12**

Introduction; Principles of spectroscopy; Laws of absorbance
IR : Principle, Instrumentation, Application
UV : Principle, Instrumentation, Application
NMR : Principle, Instrumentation, Application

GE3.4 MODULE IV: LUBRICANTS **12**

Introduction; Mechanism of Lubrication;
Types of Lubricants; Chemical structure related to Lubrication;
Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

GE3.5 MODULE V: CORROSION **12**

Introduction, Mechanism of dry and wet corrosion, Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity. Factors influencing corrosion. Corrosion control

Reference Books

Engineering Chemistry- Jain and Jain, Engineering Chemistry- Sunita Rattan

B. Sc. Honours (Aircraft Maintenance)
Subject: Chemistry
Credits - Theory-04, Practicals-02
Subject Code: GE4
Practical Lecture 60 Hours

Practical

1 To determine the ion exchange capacity of a given cation exchanger.	6
2 To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.	6
3 To determine the type and extent of alkalinity of given water sample.	6
4 Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.	6
5 To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter. (a) To find the cell constant of conductivity cell. (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically	6
6 Determination of Dissolved oxygen in the given water sample	6
7 To determine the total residual chlorine in water.	6
8 Determination of viscosity of given oil by means of Redwood viscometer I.	6
9 To determine flash point and fire point of an oil by Pensky Martin's Apparatus	6
10 Final Lab	6

Core Course – B.Sc Honours (Aircraft Maintenance)

Semester - IV

Subject: ELECTRONIC FUNDAMENTALS AND DIGITAL TECHNIQUE 2

Credits - Theory-04, Practicals-02

Subject Code: C8

Theory Lecture 60 Hours

C8.1 Basic Computer Structure **9**

(a) Computer terminology (including bit, byte, software, hardware, CPU, IC, and various memory devices such as RAM, ROM, PROM); Computer technology (as applied in aircraft systems).
(b) Computer related terminology; Operation, layout and interface of the major components in a microcomputer including their associated bus systems; Information contained in single and multi-address instruction words; Memory associated terms;
Operation of typical memory devices; Operation, advantages and disadvantages of the various data storage systems.

C8.2 Multiplexing **3**

Operation, application and identification in logic diagrams of multiplexers and demultiplexers.

C8.3 Electronic Displays and Instrument Systems **18**

Principles of operation of common types of displays used in modern aircraft, including
Cathode Ray Tubes, Light Emitting Diodes and Liquid Crystal Display. Electronic Flight Instrument Systems;
Typical systems arrangements and cockpit layout of electronic instrument systems ECAM-Electronic Centralized Aircraft Monitoring; EFIS-Electronic Flight Instrument System; EICAS-Engine Indication and Crew Alerting System Instrument warning systems including master warning systems and centralized warning panels;

C8.4 Typical Electronic/Digital Aircraft Systems **10**

General arrangement of typical electronic/digital aircraft systems and associated BITE(Built in Test Equipment) testing such as: ACARS-ARINC Communication and Addressing and Reporting System; Integrated modular Avionics;

C8.5 Integrated Modular Avionics (ATA 42) **12**

Functions that may be typically integrated in the Integrated Modular Avionic (IMA)

modules are, among others: Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication,
Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc.; Core System; Network Components.

C8.6 Cabin Systems (ATA 44) **8**

The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data

System) and between the aircraft cabin and ground stations (Cabin Network Service) - Includes voice, data, music and video transmissions; The Cabin Intercommunication Data System provides an interface between cockpit/ cabin crew and cabin systems. These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels.
The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems: Data/Radio Communication; In-Flight Entertainment System;
The Cabin Network Service may host functions such as:
— Access to pre-departure/departure reports; E-mail/intranet/Internet access; Passenger database; Cabin Core System; In-flight Entertainment System; External Communication System; Cabin Mass Memory System; Cabin Monitoring System; Miscellaneous Cabin System.

Reference Books

Basic Electronics-BemardGrob
Digital Fundamentals by Malvino and Leech
Principles of Electronics by V K Mehta

Core Course – B.Sc Honours (Aircraft Maintenance)
Subject: ELECTRONIC FUNDAMENTALS AND DIGITAL TECHNIQUE 2
Credits - Theory-04, Practicals-02
Subject Code: CP8
Practical Lecture 60 Hours

1 Familiarization with computer architecture and its components	4
2 Identification of components of Display systems	4
3 Operation check of Display system.	4
4 Familiarization with CRT and various components associated with EFIS	4
5 Identification of components in engine display systems	4
6 Bite / self-test of EFIS system.	4
7 BITE on different aircraft systems.	4
8 Familiarization with components of system associated with Integral modular avionics systems such Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication.	4
9 Operation check of ventilation control system.	4
10 Operation check of IFE system.	4
11 Operation check of intercom system .	4
12 Operation check of cabin systems.	4
13 Inspection of IFE system, intercom system and other cabin systems.	4
14 Operation of temperature control system	4
15 Identify ECAM system components and carry out test	4

Core Course – B.Sc Honours (Aircraft Maintenance)

Semester - IV

Subject: AIRCRAFT MATERIALS AND HARDWARE

Credits - Theory-04, Practicals-02
Subject Code: C5
Theory Lecture 60 Hours

Theory

C5.1 AIRCRAFT MATERIALS AND HARDWARE **12**

Aircraft Materials — Ferrous

(a) Characteristics, properties and identification of common alloy steels used in aircraft; Heat treatment and application of alloy steels;
(b) Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance.

C5.2 Aircraft Material — Non-Ferrous **12**

(a) Characteristics, properties and identification of common non-ferrous materials used in aircraft; Heat treatment and application of non-ferrous materials;
(b) Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance.

C5.3 Aircraft Materials - Composite and Non- Metallic **10**

(a) Characteristics, properties and identification of common composite and nonmetallic materials, other than wood, used in aircraft; Sealant and bonding agents.
(b) The detection of defects/deterioration in composite and non-metallic material. Repair of composite and non-metallic material.

C5.4 Wooden structures **8**

Construction methods of wooden airframe structures; Characteristics, properties and types of wood and glue used in airplanes; Preservation and maintenance of wooden structure; Types of defects in wood material and wooden structures; The detection of defects in wooden structure; Repair of wooden structure.

C5.5 Fabric covering & Non Metals **4**

Characteristics, properties and types of fabrics used in aeroplane; Inspections methods for fabric; Types of defects in fabric; Repair of fabric covering. Composite and non-metallic Bonding practices; Environmental conditions
Inspection methods

C5.6 Fasteners, Screw threads **2**

Screw nomenclature; Thread forms, dimensions and tolerances for standard

threads used in aircraft; measuring screw threads;

C5.7 Bolts, studs and screws **2**

Bolt types: specification, identification and marking of aircraft bolts, international standards;
Nuts: self-locking, anchor, standard types; Machine screws: aircraft specifications;
Studs: types and uses, insertion and removal; Self tapping screws, dowels.

C5.8 Locking devices **2**

Tab and spring washers, locking plates, split pins, palnuts, wire locking, quick

release fasteners, keys, circlips, and cotter pins and techniques.

C5.9 Aircraft rivets **4**

Types of solid and blind rivets: specifications and identification, heat treatment.

C5.10 Riveting **4**

Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling;
Inspection of riveted joints.

Reference Books:

Aircraft handbook FAA (AC 65-15 A)
Civil Aircraft Inspection Procedures (CAIP 459-Part I, Basic)
Airframe &Powerplant Mechanics (General Handbook EA-AC 65-9A) FAA
Aircraft Materials & Processes by Titterton
Machine Drawing by AC Parkinson
Advanced Composites (EA-358) by Cindy Foreman Electricity,
CAIP 562

Core Course – B.Sc Honours (Aircraft Maintenance)
Subject: AIRCRAFT MATERIALS AND HARDWARE
Credits - Theory-04, Practicals-02
Subject Code: CP5
Practical Lecture 60 Hours

1 Testing of Non -Ferrous materials for hardness, tensile , Fatigue strength	**4**
2 Testing of ferrous materials for hardness, tensile , Fatigue strength	4
3 Identification of the characteristics and properties of common composite and nonmetallic materials other than wood, used in aircraft.	4
4 Detection of defects/deterioration in composite and nonmetallic material.	4
5 Identification of the characteristics and properties of common types of wood and glue used in aircraft.	4
6 Identification and detection of defects in wood material and wooden structures.	4
7 Simple repair of composite and non-metallic materials and structures	**4**
8 Inspection and Repair of wooden structures.	**4**
9 Identification of the characteristics and properties of common fabrics and adhesives used in wooden structure aircraft.	4
10 Identification of defects and Repair of fabric covering.	4
11 Use of basic tools and equipment for: cutting, forming and joining commonly used materials.	4
12 Identification of Aircraft metallic materials	4
13 Identification of aircraft non-materials used on aircraft	4
14 Identification of various rivets and use of any one riveting technique	**4**
15 Identification of various fasteners and locking devices used in aircraft.	**4**

Core Course – B.Sc Honours (Aircraft Maintenance)
Semester - IV
Subject: AIRCRAFT SYSTEMS 1
Credits - Theory-04, Practicals-02
Subject Code: C10
Theory Lecture 60 Hours

C10.1 Aircraft Weight and Balance **4**
(a) Centre of Gravity/Balance limits calculation: use of relevant documents;
(b) Preparation of aircraft for weighing; Aircraft weighing;

C10.2 Aircraft Handling and Storage **5**
Aircraft taxiing/towing and associated safety precautions; Aircraft jacking, chocking, securing and associated safety precautions; Aircraft storage methods; Refuelling /defueling procedures; De-icing/anti-icing procedures; Electrical, hydraulic and pneumatic ground supplies. Effects of environmental conditions on aircraft handling and operation.

C10.3 Pneumatic/Vacuum (ATA 36) **8**
System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.

C10.4 Air Conditioning and Cabin Pressurization (ATA 21) **8**
Air supply- Sources of air supply including engine bleed, APU and ground cart;
Air Conditioning- 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.

C10.5 Equipment and Furnishings (ATA 25) **6**
Emergency equipment requirements; Seats, harnesses and belts, electronic emergency equipment requirements
Cabin lay-out, cargo retention; Equipment lay-out; Cabin Furnishing Installation; Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment;
Airstairs. Lifting system; Emergency flotation systems;

C10.6 Flight Controls (ATA 27) **8**
Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control;
High lift devices; Lift dump, speed brakes; System operation: manual, hydraulic, pneumatic, electrical, fly-by-wire; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks systems; Balancing and rigging; Stall protection/warning system.

C10.7 Fuel Systems (ATA 28) **8**
System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Crossfeed and transfer; Indications and warnings; Refuelling and defueling; Longitudinal

balance fuel systems.

C10.8 Hydraulic Power (ATA 29) **5**

System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Filters; Pressure Control;
Power distribution; Indication and warning systems; Interface with other systems.

C10.9 Ice and Rain Protection (ATA 30) **3**

Ice formation, classification and detection; Anti-icing systems: electrical, hot air and chemical; De-icing systems: electrical, hot air, pneumatic and chemical; Rain repellant; Probe and drain heating; Wiper systems

C10.10 Landing Gear (ATA 32) **3**

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

C10.11 Abnormal Events (ATA 05) **2**

(a) Inspections following lightning strikes and HIRF penetration.
(b) Inspections following abnormal events such as heavy landings and flight through turbulence.

Reference Books:

Airframe and Powerplant Mechanics (AC 65-15A) -Airframe Hand Book FAA
Civil Aircraft Inspection Procedure (CAP 459) Part II Aircraft
A & P technician Air Frame Text Book by Jeppesen
Aircraft Repair Manual (FAA-AC-43.13)-By Larry Reithmaier
Aviation Maintenance Technician Hand book by FAA
Hydraulic Servo Systems by M. GUILLON:
Aircraft Instruments-by E.H.J.Pallett
Aircraft Electrical System-by E.H.J.Pallett

Core Course – B.Sc Honours (Aircraft Maintenance)
Subject: :AIRCRAFT SYSTEMS 1

Credits - Theory-04, Practicals-02
Subject
Code: CP10
Practical Lecture 60
Hours

1 Jacking and leveling of an aircraft. Record caution, warnings and procedure	6
2 Locate and inspect Bleed components installed on aircraft and use maintenance Manual	4
3 Locate and inspect components of air-conditioning system and indications and use maintenance manual.	4
4 Locate and inspect components of aircraft pressurization system and safety devises and use maintenance manual	4
5 Replace passenger seats and Check seat belts for serviceability.	4
6 Identification and inspection of flight control system	4
7 Rigging and operational check flight control systems	8
8 Identification and inspection of landing gear systems. Wheel and Brake removal / installation.	12
9 Identification and inspection of Fuel system	4
10 Quantity Indicating systems functional testing.	4
11 Inspection of aircraft hydraulic system and servicing	6
12 Inspection for lightning strike protection.	2

B. Sc. Honours (Aircraft Maintenance)
Semester - IV
Subject: Piston Engine and Propeller
Credits - Theory-04, Practicals-02
Subject Code: DSE1
Theory Lecture 60 Hours

DSE1.1 Fundamentals **2**
Mechanical, thermal and volumetric efficiencies operating principles — 2 stroke, 4 stroke, Otto and Diesel, Piston displacement and compression ratio; Engine configuration and firing order.

DSE1.2 Engine Performance **2**
Power calculation and measurement; Factors affecting engine power; Mixtures/leaning, pre-ignition.

DSE1.3 Engine Construction **3**
Crank case, crank shaft, cam shafts, sumps; Accessory gearbox; Cylinder and piston assemblies; Connecting rods, inlet and exhaust manifolds; Valve mechanisms;
Propeller reduction gearboxes.

DSE1.4 Engine Fuel Systems **2**
Carburettors Types, construction and principles of operation; Icing and heating

DSE1.5 Fuel injection systems **2**
Types, construction and principles of operation.

DSE1.6 Electronic engine control **4**
Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components

DSE1.7 Starting and Ignition Systems **3**
Starting systems, pre-heat systems; Magneto types, construction and principles of operation; Ignition harnesses, spark plugs; Low and high tension systems

DSE1.8 Induction, Exhaust and Cooling Systems **2**
Construction and operation of: induction systems including alternate air systems;
Exhaust systems, engine cooling systems — air and liquid.

DSE1.9 Supercharging/Turbocharging **3**
Principles and purpose of supercharging and its effects on engine parameters.

Construction and operation of supercharging/ turbocharging systems; System terminology; Control systems; System protection.

DSE1.10 Lubricants and Fuels **2**
Properties and specifications; Fuel additives; Safety precautions

DSE1.11 Lubrication Systems **2**
System operation/lay-out and components.

DSE1.12 Engine Indication Systems **3**
Engine speed; Cylinder head temperature; Coolant temperature; Oil pressure and temperature; Exhaust Gas Temperature; Fuel pressure and flow; Manifold pressure.

DSE1.13 Powerplant Installation **3**
Configuration of firewalls, cowlings, acoustic panels, engine mounts, antivibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains

DSE1.14 Engine Monitoring and Ground Operation **5**

Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Inspection of engine and components: criteria, tolerances, and data specified by engine manufacturer.

DSE1.15 Engine Storage and Preservation **2**

Preservation and de-preservation for the engine and accessories/ systems

DSE1.16 Aircraft Propeller **4**

Fundamentals; Blade element theory; 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; Vibration and resonance.

DSE1.17 Propeller Construction **3**

Construction methods and materials used in wooden, composite and metal propellers;

Blade station, blade face, blade shank, blade back and hub assembly; fixed pitch, controllable pitch, constant speeding propeller; Propeller/spinner installation.

DSE1.18 Propeller Pitch Control **3**

Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Over speed protection.

DSE1.19 Propeller Synchronising **2**

Synchronising and synchrophasing equipment.

DSE1.20 Propeller Ice Protection **2**

Fluid and electrical de-icing equipment.

DSE1.21 Propeller Maintenance **3**

Static and dynamic balancing; Blade tracking; Assessment of blade damage, erosion, corrosion, impact damage, delamination; Propeller treatment/repair schemes;
Propeller engine running.

DSE1.22 Propeller Storage and Preservation **3**

Propeller preservation and de-preservation.

Reference Books:

Airframe and Power plant Mechanics (EA-AC 65- 12A) -Power Plant Hand FAA
Power Plant-By Bent and McKinley
Civil Aircraft Inspection Procedure (CAP 459) Part II Aircraft
Aircraft Propeller and Controls-by Frank Delph
Powerplant Section Text book- (EA-ITP-P)
Aircraft Piston Engines-By Herschel Smith
Aviation Maintenance Technician Series by Dale Crane

Discipline Specific Electives – B. Sc. Honours (Aircraft Maintenance)

Subject: Piston Engine and Propeller

Credits - Theory-04, Practicals-02

Subject Code: DSEP1

Practical Lecture 60 Hours

1 Familiarise with constructions and functions of piston engines	3
2 Identification and inspection of various subassemblies of piston engines	3
3 Identification and inspection of cylinder and piston assemblies.	3
4 Inspection of accessory gear box valve mechanism.	3
5 Identification and inspection of various components of piston engines.	3
6 Identification and inspection of engine fuel system and function of carburetor.	3
7 Identification and inspection of engine fuel injection system and electronic fuel control.	3
8 Function check of magneto.	3
9 Various methods of engine starting and ignition systems and Engine indicating systems	3
10 Identification and inspection of components and function of lubrication system.	3
11 Engine control system and rigging	4
12 Familiarization with engines and airframe interface.	3
13 Testing of engine fire warning and extinguishing operation	3
14 Preparation for engine/ propeller storage and preservation.	3
15 Familiarise with propeller construction 3	
16 Methods of propeller pitch control and its effect on engine power. Feathering and reverse pitch control. Propeller synchrophasing system	4
17 Check Propeller track.	3
18 Engine monitoring and ground operation	4
19 Spark plug cleaning and testing	3

Core Course – B.Sc Honours (Aircraft Maintenance)
Semester - V
Subject: AIRCRAFT SYSTEMS 2
Credits - Theory-04, Practicals-02
Subject Code: C12
Theory Lecture 60 Hours

C12.1 Aircraft Electrical Power System (ATA 24) **8**

Batteries Installation and Operation; DC power generation; AC power generation; Emergency power generation; Voltage regulation; Power distribution; Inverters, transformers, rectifiers;
Circuit protection; External/Ground power;

C12.2 Aircraft Lights System (ATA 33) **4**

External: navigation, anti-collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo;
Emergency Lights.

C12.3 Instrument System (ATA 34) **15**

Direct reading pressure and temperature gauges; Temperature indicating systems; Fuel quantity indicating systems; Gyroscopic principles; Artificial horizons; Attitude director, direction indicator, horizontal situation indicator, turn and slip indicators, turn coordinator; Directional gyros; Ground Proximity Warning Systems; Compass systems: direct reading, remote reading; Flight Data Recording systems; Stall warning systems and angle of attack indicating systems;
Vibration measurement and indication; Glass cockpit.

C12.4 Oxygen System (ATA 35) **8**

System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings;

C12.5 Fire Protection (ATA 26) **6**

(a) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.
(b) Portable fire extinguisher.

C12.6 Water/Waste (ATA 38) **4**

Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspects.

C12.7 Integrated Modular Avionics (ATA42) **10**

Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication,
Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc.; Core System; Network Components

C12.8 Door and Door Warning **5**

Type of Doors. Sensors, Escape Slides, Door warning systems, Inspections techniques

Reference Books:

Aviation Electronics by Keith W Bose
Aircraft Instruments-by E.H.J.Pallett
Aircraft Instruments-by C.A.Williams
Avionics Systems operation & Maintenance by James W Wasson
Principles of Servo mechanism-by A Typers&R.B.Miles
Aircraft Electricity and electronics-by Bent McKinley and also by Eismin/Bent McKinley
Civil Aircraft Inspection Procedure(CAP 459) -Part II Aircraft
The Mechanism of Inertial Position and Heading Indication by Winston Merkey John Hovorka

Core Course – B.Sc Honours (Aircraft Maintenance)

Subject: : AIRCRAFT SYSTEMS 2

Credits - Theory-04, Practicals-02

Subject Code: CP12

Practical Lecture 60 Hours

1 Reading and interpretation of electrical schematic and wiring diagrams and Identification of components of electrical power supply system.	4
2 Replacement of switches and circuit breakers and system check	4
3 Installation and operation check of Batteries in aircraft	4
4 Generator power check / voltage adjustment.	4
5 Internal lighting, replace bulb and filament.	4
6 Operational check of GPWS	4
7 Operational checkup of stall warning system and angle of attack indicating system	4
8 Operational check of temperature indicating system	4
9 Gyroscopic Instrument component replacements and functional tests.	4
10 Inspection and operation check of fuel quantity indication	4
11 Functional check of RR compass	4
12 Removal and Installation of Crew O2 system component	4
13 Identification of FDR system components	4
14 Check operation of fire / smoke detection and warning system.	4
15 Identification of components of door warning system and its operation check	4

Core Course – B.Sc Honours (Aircraft Maintenance)
Semester - V
Subject: AVIONICS
Credits - Theory-04, Practicals-02
Subject Code: C13
Theory Lecture 60 Hours

C13.1 Communication (ATA 23) **8**

Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver and transmitter; Working principles of following systems: Very High Frequency (VHF) communication; High Frequency (HF) communication; Audio; Emergency Locator Transmitters; Cockpit Voice Recorder; ARINC communication and reporting**;**

C13.2 Navigation (ATA 34) **18**

Very High Frequency omnidirectional range (VOR); Automatic Direction Finding (ADF); Instrument Landing System (ILS); Microwave Landing System (MLS); Distance Measuring Equipment (DME); Very Low Frequency and hyperbolic navigation(VLF/Omega); Doppler navigation; Area navigation, RNAV systems; Flight Management Systems; Global Positioning System (GPS), Global Navigation Satellite Systems (GNSS); Inertial Navigation System; Air Traffic Control transponder, secondary surveillance radar; Traffic Alert and Collision Avoidance System(TCAS);
Weather avoidance radar; Radio altimeter; IRS-Inertial reference system; TCASTraffic Collision Avoidance system;

C13.3 Auto-flight (ATA 22) **15**

Fundamentals of automatic flight control including working principles and current terminology;
Flight Director System; Command signal processing; Modes of operation: roll, pitch and yaw channels; Yaw dampers; Auto-throttle systems; Automatic Landing Systems: principles and categories, modes of operation, Approach, glideslope, land, go-around, system monitors and failure conditions. FBW-Fly by Wire

C13.4 On board Maintenance Systems (ATA 45) **5**

Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).
Software management control: Awareness of restrictions, airworthiness

requirements and possible catastrophic effects of unapproved changes to software programmes.

C13.5 Information Systems (ATA46) **10**

The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display; Typical examples include Air Traffic and Information Management Systems and Network Server

Systems; Aircraft General Information System; Flight Deck Information System; Maintenance Information System; Passenger Cabin Information System; Miscellaneous Information System.

C13.6 Avionic General Test Equipment 4

Operation, function and use of avionic general test equipment. Cabin System; Information system.

Reference Books:

Micro Electronics Aircraft System- by E.H.J.Pallett
Avionics Systems operation & Maintenance by James W Wasson
Aircraft Electricity and electronics-by Bent McKinley and also by Eismin/Bent McKinley
Civil Aircraft Inspection Procedure(CAP 459) -Part II Aircraft
Integrated Electronics-Millman and Halkias
Aircraft Radio System-by J. Powell
Electronic Communication System by George Kennedy
Avionics navigation systems Bykayton& Fried
Radio navigation system by Borjeforssell

Core Course – B.Sc Honours (Aircraft Maintenance)
Subject: :AVIONICS
Credits - Theory-04, Practicals-02
Subject Code: CP13
Practical Lecture 60 Hours

1	VHF / HF Communications LRU replacement and Communication Check.	4
2	Use of various test equipment for avionics system maintenance.	2
3	VHF Navigation LRU replacement and system tests.	4
4	Inspection / testing of ELT	2
5	CVR switching and recording	2
6	Antenna replacement and system testing	4
7	Radio Standing Wave ratio Measurement Tests.	4
8	Function Testing of ATC / TCAS system components.	4
9	Operation test of Weather Radar system.	2
10	Intercommunication / Passenger Address Component function testing.	4
11	ILS / VOR Systems function testing using appropriate test equipment e.g. Nav 401/402.	4
12	Radio Altimeter system test utilizing appropriate (555) test set.	4
13	DME / VOR Functional Testing utilizing appropriate test set.	4
14	ADF component functions and tests.	4
15	Functional check of inertial navigation system	
16	Operational testing of Flight Director System's and auto pilot system.	4
17	Locate Autothrottle systems components and bite test.	2
18	Perform BITE on Central Maintenance system.	4

B.Sc Honours (Aircraft Maintenance)
Semester - V
Subject: GROUND HANDLING SAFETY AND SUPPORT SYSTEM
Credits - Theory-04, Practicals-02
Subject Code: C14
Theory Lecture 60 Hours

C14.1 Part-I **5**

General knowledge of ground handling of Aircraft, Aircraft Safety; Mooring, Jacking, Levelling, Hoisting of aircraft, Towing, Mooring of an a/c during adverse conditions. Aircraft cleaning and maintaining.
Ground signalling/marshalling of aircraft in day & night time.

C14.2 Part-II **10**

Brief knowledge of airport and its procedures. Control tower, Dispersal areas, Aprons, Tarmac, Taxy track, Runway and its ends. Approach and clear zone layout.
Brief knowledge of the signals given by the control tower.
Knowledge of Airfield lighting system, Aircraft Rescue & Fire Fighting.

C14.3 Part-III **15**

Maintenance and handling of ground equipment's used in maintenance of aircraft. Compressors, Portable hydraulic test stands, Electrical power supply equipment, charging trolley. Air-conditioning and Heating unit, Ground support air start unit. Pressure oil unit, Fire extinguishers, jacks, Hoisting cranes/gantry, Ladders, Platforms, Trestles, and Chocks.

C14.4 Part-IV **10**

Knowledge of safety and fire precautions to be observed during maintenance including refuelling, defueling & engine start.
Maintenance of hydraulic accumulators, reservoirs and filters:

C14.5 Part-V **10**

Rigging of flight control surfaces and duplicate inspection; Rigging checks-Angular alignment checks and symmetry checks, Knowledge and use of Tensiometers, Protractors etc. Rigging of engine and propeller control

C14.6 Part-VI **10**

Maintenance of landing gear (L/G), Shock strut charging and bleeding, Maintenance of L/G brakes i.e., Dragging, Grabbing, Fading, Brakes and excessive brake pedal travel. Maintenance on wheels, tyres and tubes i.e., dismantling,

inspection, assembling, inflating, inspection and installation
Storage of Rotables.

Reference books

General Handbook AC65-9A
Airframe Handbook AC 65-15A

Core Course – B.Sc Honours (Aircraft Maintenance)
Subject:GROUND HANDLING SAFETY AND SUPPORT SYSTEM

Credits - Theory-04, Practicals-02
Subject
Code: CP14
Practical Lecture 60
Hours

1 Hydraulic system bleeding, replenish fluid reservoir and handling precautions	6
2 Hydraulic accumulator charging	6
3 Use of ground power unit and checks	4
4 Identification and control of various types of fires, practicing fire extinguishing	4
5 Practical on headset communication during arrival and departure of aircraft & Identification of aircraft hazard zones	4
6 Fuel sample check and refueling	6
7 Flight control system lubrication	6
8 Landing gear system lubrication	6
9 Landing gear oleo charging	6
10 Tyre pressure check	4
11 Aircraft parking and mooring	8

B. Sc. Honours (Aircraft Maintenance)
Subject: Transducers and Sensors

Credits - Theory-04, Practicals-02
Subject
Code: DSE4
Theory Lecture 60
Hours

DSE4.1 Introduction **5**

Classification of transducers, Transducer descriptions, parameters, definitions and terminology, Introduction to Microsensors, history and technology of Microsensors, reasons for miniaturization, scaling laws,

DSE4.2 Optical Energy Domain **15**

Physics, Photoeffects in silicon and other materials, Photoconductive sensors, Photovoltaic sensors, Photoemmisive sensors, Microsensors in the optical energy domain, semiconductor physics, Photodiodes and –transistors, Fiberoptic sensors, Chemical sensors

DSE4.3 Mechanical energy Domain **15**

Physics, Surface acoustic waves, variable resistance sensors, strain gauges, piezoelectric sensors, capacitive sensors, micromechanical sensors, sensor mechanisms, strain gauges, accelerometers and gyroscopes, pressure sensors, microphones and tactile sensors

DSE4.4 Thermal energy domain **15**

Seebeck effect, Peltier effect, Thomson effect, Thermoresistance, Thermoresistive sensors, Thermo-mechanical, Thermoresistive micro sensors, Bolometers and Thermopiles

DSE4.5 Magnetic energy Domain **10**

Superconductivity, Hall Effect, Magnetoresistiviy, variable inductance sensors, variable reluctance sensors, Hall Effect sensors, summary

Reference Books:

T.A. Kovacs, Micromachined Transducers Sourcebook, WCB/McGraw-Hill, 1998
J. R. Carstens, Electrical Sensors and Transducers, Regents/Prentice Hall, 1993

B. Sc. Honours (Aircraft Maintenance)
Subject: Transducers and Sensors

Credits - Theory-04, Practicals-02
Subject
Code: DSEP4
Practical Lecture 60
Hours

1	Measurement of pressure, strain and torque using strain gauge.	6
2	Measurement of speed using Electromagnetic transducer.	6
3	Measurement of speed using photoelectric transducers	6
4	Measurement of angular displacement using Potentiometer.	6
5	Measurement of displacement using LVDT.	6
6	Measurement using load cells.	5
7	Measurement using capacitive transducer.	5
8	Measurement using inductive transducer.	5
9	Measurement of Temperature using Temperature Sensors/RTD.	5
10	Characteristics of Hall effect sensor.	5
11	Measuring change in resistance using LDR.	5

B. Sc. Honours (Aircraft Maintenance)
Semester - VI
Subject: Environmental Science
Credits - (02 papers) (Credit: 04 each)
Subject Code: AEEC2
Theory Lecture 60 Hours

AECC 2.1 Introduction to environmental studies **2**

Multidisciplinary nature of environmental studies
Scope and importance; Concept of sustainability and sustainable development

AECC 2.2 Ecosystems **6**

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)

AECC 2.3 Natural Resources : Renewable and Non-renewable Resources **8**

• 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.

AECC 2.4 Biodiversity and Conservation **8**

• 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

AECC 2.5 Environmental Pollution **8**

• 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.
• Pollution case studies

AECC 2.6 Environmental Policies & Practices **7**

• Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
• Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
• Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context

AECC 2.7 Human Communities and the Environment **6**

• Human population growth: Impacts on environment, human health and welfare.
• Resettlement and rehabilitation of project affected persons; case studies.
• Disaster management : floods, earthquake, cyclones and landslides.
• Environmental movements :Chipko, Silent valley, Bishnois of Rajasthan.
• Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
• Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

AECC 2.8 Field work **15**

• Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
• Visit to a local polluted site--Urban/Rural/Industrial/Agricultural.
• Study of common plants, insects, birds and basic principles of identification.
• Study of simple ecosystems--pond, river etc

Reference Books

1 Gadgil, M., &Guha, R.1993. This Fissured Land: An Ecological History of India. Univ. of California Press
2 Gilbert M.Masters, “Introduction to Environmental Engineering and Science”, Pearson education Pvt., Ltd., second edition, ISBN 81-297-0277-0, 2004.
3 Miller T.G. JR., “Environmental Science”, Wadsworth publishing co.
4 Odum, E.P., Odum, H.T. & Andrews, J. 1971.Fundamentals of Ecology. Philadelphia: Saunders.
5 Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.
6 Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi
7 Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
8 Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent
9 Rao, M.N. &Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.

General Electives – B. Sc. Honours (Aircraft Maintenance)

Semester - VI

Subject: Quality Management System

Credits - Theory-05, Tutorial-01

Subject Code: GE6

Theory Lecture 75 Hours

GE 6.1 MODULE I: INTRODUCTION **12**

Descriptors/Topics Meaning of Quality and quality improvement, need of automobile & Aviation Quality, Introduction to Statistical methods for quality control, Process Capability for aerospace applications.

GE 6.2 MODULE II: QUALITY CONTROL **14**

Statistical Quality Control, Ishikawa diagram, control charts, Control charts for attributes & variables, Moving average chart for aviation Quality systems.

GE 6.3 MODULE III : PRODUCTION CONTROL **12**

Acceptance Sampling, OC curve, Sampling Plan, Producer's risk, Consumer's risk, Average Quality Level, AOQL, Design of Single & double sampling plan.

GE 6.4 MODULE IV: QUALITY ASSURANCE **12**

Need of Aerospace Quality Assurance, Quality Audit, total quality management, Concept of Zero defect, ISO-9001 quality systems, IAQG, AS-9100 Aerospace Standards.

GE 6.5 MODULE V : AEROSPACE CERTIFICATION **6**

DGCA, FAA, EASA and IATA Requirements and Standards Aerospace Quality manuals, aircraft airworthiness, documentation, Safety practices & standards. Quality Policy, Objective, Quality Requirements, Quality procedures and evidence retention

GE 6.6 Module VI: Regulatory Compliance **2**

Quality Standards / Regulatory Compliance – Compliance Records.

GE 6.7 Audit and Surveillance **10**

Auditing techniques, recording findings, communication, assessing compliance action and monitoring compliance. Statistical analysis and risk assessment. Risk based surveillance.

Reference Books

EL Grant & RS Leavenworth, "Statistical Quality Control", McGraw Hill Co. M. Mahajan, "Statistical Quality Control", Dhanpat Rai & Co.

KanishkaBedi "Quality Management", Oxford University Press
ISO 9001
AS 9100
DGCA – Civil Aviation Requirements
IATA – IOSA Standards Manual

B. Sc. Honours (Aircraft Maintenance)
Subject: Quality Management System
Credits - Theory-04, Tutorial-01
Subject
Code: GE6
Tutorial Tutorial 15
Hours

1 Develop Typical Quality System for five specific activities of aircraft maintenance industry
2 Carryout audit of five specific activities of aircraft maintenance industry establish regulatory compliance and record recommendation.
3 Carryout audit of five specific activities of aircraft maintenance industry record findings, document evidence, communicate findings, verify action taken and root cause assessment and carryout risk assessment.

Ability Enhancement Elective Course

B. Sc. Honours (Aircraft Maintenance)
Semester -VI

Elective

1 Typical Aircraft Maintenance - Fixed Wing Heavy / Complex Aircraft
2 Typical Aircraft Maintenance - Fixed Wing Light / Composite Aircraft

Or

University Dissertation (University Recommended subject)