

**MRSPTU B.Sc. (HONS.) AIRCRAFT MAINTENANCE ENGINEERING
SYLLABUS 2020 BATCH ONWARDS**

Semester 1st		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int	Ext	Total	
BAME3-101	Aerodynamics	3	1	0	40	60	100	4
BAME3-102	Aerodynamics Lab	0	0	4	60	40	100	2
BAME3-103	Aircraft Maintenance Practices -I	4	1	0	40	60	100	5
BAME3-104	Aircraft Maintenance Practices -I Lab	0	0	4	60	40	100	2
BAME3-105	Electrical Fundamentals - I	3	1	0	40	60	100	4
BAME3-106	Electrical Fundamentals – I Lab	0	0	4	60	40	100	2
BAME3-107	English Communication	4	1	0	40	60	100	5
BAME3-108	Human Factors	3	1	0	40	60	100	4
Total		17	5	12	380	420	800	28

Semester 2 nd		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int	Ext	Total	
BAME3-209	Aircraft Maintenance Practices -II	3	1	0	40	60	100	4
BAME3-210	Aircraft Maintenance Practices -II Lab	0	0	4	60	40	100	2
BAME3-211	Applied Mathematics	5	1	0	40	60	100	6
BAME3-212	Aviation Legislation -I	5	1	0	40	60	100	6
BAME3-213	Electrical Fundamentals - II	3	1	0	40	60	100	4
BAME3-214	Electrical Fundamentals - II Lab	0	0	4	60	40	100	2
BAME3-215	Environmental Science	3	1	0	40	60	100	4
Total		19	5	8	320	380	700	28

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Semester 3 rd		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int	Ext	Total	
BAME3-316	Aircraft Materials	3	1	0	40	60	100	4
BAME3-317	Aircraft Materials Lab	0	0	4	60	40	100	2
BAME3-318	Aircraft Structure	3	1	0	40	60	100	4
BAME3-319	Aircraft Structure Lab	0	0	4	60	40	100	2
BAME3-320	Aviation Legislation -II	5	1	0	40	60	100	6
BAME3-321	Electronic Fundamental and Digital Techniques - I	3	1	0	40	60	100	4
BAME3-322	Electronic Fundamental and Digital Techniques - I Lab	0	0	4	60	40	100	2
Total		14	4	12	340	360	700	24

Semester 4 th		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int	Ext	Total	
BAME3-423	Aircraft Hardware	3	1	0	40	60	100	4
BAME3-424	Aircraft Hardware Lab	0	0	4	60	40	100	2
BAME3-425	Aircraft Piston Engine - I	3	1	0	40	60	100	4
BAME3-426	Aircraft Piston Engine - I Lab	0	0	4	60	40	100	2
BAME3-427	Applied Physics	3	1	0	40	60	100	4
BAME3-428	Applied Physics Lab	0	0	4	60	40	100	2
BAME3-429	Electronic Fundamental and Digital Techniques - II	3	1	0	40	60	100	4
BAME3-430	Electronic Fundamental and Digital Techniques – II Lab	0	0	4	60	40	100	2
Total		12	4	16	400	400	800	24

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Semester 5 th		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int	Ext	Total	
BAME3-531	Aircraft Piston Engine - II	3	1	0	40	60	100	4
BAME3-532	Aircraft Piston Engine - III Lab	0	0	4	60	40	100	2
BAME3-533	Aircraft System - I	3	1	0	40	60	100	4
BAME3-534	Aircraft System - I Lab	0	0	4	60	40	100	2
BAME3-535	Avionics	3	1	0	40	60	100	4
BAME3-536	Avionics Lab	0	0	4	60	40	100	2
BAME3-537	Quality Management System	5	1	0	40	60	100	6
Total		14	4	12	340	360	700	24

Semester 6 th		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int	Ext	Total	
BAME3-638	Aircraft Maintenance - Fixed Wing Light / Composite Aircraft	3	1	0	40	60	100	4
BAME3-639	Aircraft Maintenance - Fixed Wing Light / Composite Aircraft Lab	0	0	4	60	40	100	2
BAME3-640	Aircraft Maintenance - Fixed Wing Heavy / Complex Aircraft	3	1	0	40	60	100	4
BAME3-641	Aircraft Maintenance - Fixed Wing Heavy / Complex Aircraft Lab	0	0	4	60	40	100	2
BAME3-642	Aircraft System - II	3	1	0	40	60	100	4
BAME3-643	Aircraft System - II Lab	0	0	4	60	40	100	2
BAME3-644	Gas Turbine Engine	3	1	0	40	60	100	4
BAME3-645	Gas Turbine Engine Lab	0	0	4	60	40	100	2
Total		12	4	16	400	400	800	24

Odd semester credits = 76 (28+24+24)

Even semester credits = 76 (28+24+24)

Total Credits = 152

Odd semester Marks = 2200 (800+700+700)

Even semester Marks = 2300 (700+800+800)

Total Marks = 4500

**MRSPTU B.Sc. (HONS.) AIRCRAFT MAINTENANCE ENGINEERING
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AERODYNAMICS

Subject Code: BAME3-101

L T P C
3 1 0 4

Duration: 60 Hrs.

RATIONALE

As the AME students will involve in supervising the Maintenance, Repair and Overhauling of aircraft, they must possess adequate knowledge on atmosphere, fundamental principles of aerodynamics, instrument system and theory of flight.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

- Understand the different layers of atmosphere
- Basic principles of aerodynamics
- Aircraft controls and stability
- Functions of control surfaces and tabs
- Lift, drag, thrust and weight
- Aircraft instrument system
- High speed theory
- Principles of rotary wing aircraft
- Basic terms and terminology of aerodynamics

Unit	Contents	Hrs
1	Physics of the Atmosphere International Standard Atmosphere (ISA), application to aerodynamics	2
2	Aerodynamics 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	18
3	Theory of Flight Relationship between lift, weight, thrust and drag; Glide ratio; Steady state flights, performance; Theory of the turn; Influence of load factor: stall, flight envelope and structural limitations; Lift augmentation	16
4	Flight Stability and Dynamics Longitudinal stability (active and passive) Lateral (active and passive) Directional stability (active and passive)	6
5	Theory of Flight Aeroplane Aerodynamics and Flight Controls Operation and effect of:	18

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	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 anti-balance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels	
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INSTRUCTIONAL STRATEGY

- Teachers should lay special emphasis in making the students conversant with the basics principles of aerodynamics and terms and terminologies of theory of flight.
- Use of audio-visual aids/video films should be made to demonstrate the Bernoulli's principle, four forces, operation of controls, stability and high speed theory.
- Exposure to control surfaces and cockpit so that students can learn how control surfaces are operated from cockpit.
- Observing the flying of aircraft: operation of control surfaces and high lift/drag devices during landing and take-off.
- Demonstration of the functions of aircraft parts and control surfaces
- Practical demonstration of flying controls through a **drone** would be a greater advantage.

MEANS OF ASSESSMENT

- Assignments
- Class tests
- Monthly tests
- End-term written tests
- Model/prototype making

Reference Books

1. Aerodynamics - by Clancey
2. Mechanics of Flight -by - A.C.Kermode
3. Aircraft Basic Science – By Michael J Kroes
4. Module 8 Basic Aerodynamics for B1 & B2 certification
5. AC 65-9A Airframe power plant Mechanics

**MRSPTU B.Sc. (HONS.) AIRCRAFT MAINTENANCE ENGINEERING
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AERODYNAMICS LAB

Subject Code: BAME3-102

**L T P C
00 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	Atmospheric layers familiarization on diagrams	2
2	Demonstrations of atmospheric layers Audio/video	2
3	Demonstrations of different types of aerofoil used in aviation industry	2
4	Familiarization of turbulent, laminar airflow, stagnant point.	4
5	Demonstrations of Study of flow over streamlined bodies with different angle of attack by flow (audio /video) visualization technique	4
6	Practical demonstrations of flight control surfaces and their effect on - on aircrafts	4
7	Practical familiarization of different types of aircraft term tabs on aircraft available in hanger.	6
8	Practical demonstrationsof lift augmenting devices - audio/video	4
9	Practical demonstrations for Removal / installation of Pitot Static Instruments	6
10	Practical demonstrations of pitot static instruments leak test on small aircrafts	6
11	Practical demonstrations of various factors affecting lift and drag on an aerofoil	4
12	Practical demonstrations of flight control surface movement from cockpit	6
13	Practical demonstrations on various type of flaps attached on different available aircrafts.	6
14	Familiarization of various parts of aircraft on available aircrafts .	4

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AIRCRAFT MAINTENANCE PRACTICES –I

Subject Code: BAME3-103

**L T P C
4 1 0 5**

Duration: 75 Hrs.

RATIONALE

Aircraft Maintenance Engineers are responsible for the maintenance and repair of aircraft for this purpose they must have proper knowledge of tools used for aircraft maintenance. Proper handling, care and controls of their personal tools.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Aspects of safe working practices- Aircraft and workshop.
- Knowledge on fire and extinguishing agents.
- Care, control and use common hand tools, Common power tools.
- Use of precision measuring tools.
- Classes of fits
- Standard methods for checking shafts, bearings and other parts.
- Knowledge of sheet working.
- Welding, Brazing, Soldering and Bonding methods.

Units	Contents	Hrs
1	Safety Precautions-Aircraft and Workshop 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.	5
2	Workshop Practices Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards.	3
3	Tools 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;	30
4	Fits and Clearances 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.	5
5	Material handling - Sheet Metal Marking out and calculation of bend allowance; Sheet metal working, including bending and forming; Inspection of sheet metal work.	10
6	Welding, Brazing, Soldering and Bonding (a) Soldering methods; inspection of soldered joints. (b) Welding and brazing methods; Inspection of welded and brazed joints;	22

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should show various types of tools used in Aircraft Maintenance to the students. Visits to Aircraft Maintenance workshop should be planned to demonstrate use of various types of tools.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests.

Reference Books:

1. Module 7A Maintenance Practices for B1 & B2 Certification.
2. Airframe and Powerplant Mechanics (AC 65-15A)-Airframe Hand Book FAA
3. Civil Aircraft Inspection Procedure (CAP 459) Part II Aircraft
4. Aircraft Maintenance and Repair By Kroes, Watkin and Delph
5. Aviation Maintenance Technician Hand book by FAA

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AIRCRAFT MAINTENANCE PRACTICES -I LAB

Subject Code: BAME3-104

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	Demonstration of safety precaution while working with- Electricity, gases, oils and chemicals.	2
2	Demonstration of fire extinguisher practice	2
3	Demonstration of tools controlling methods used in aircraft workshop	2
4	Demonstration of simple and precision Measuring and Marking Tools.	2
5	Demonstration of Cutting and Work Holding Tools.	2
6	Filing practice to make square.	4
7	Filing practice to make T fitting.	8
8	Demonstration of Striking Tools	2
9	Demonstration of Drilling, Boring and Thread Cutting Tools	2
10	Thread cutting practice using taps.	4
11	Thread cutting practice using dies.	4
12	Marking out and calculation of bend allowance for right angle bend.	4
13	Marking out and calculation of bend allowance for close and open angle bend.	6
14	Practice of butt welding Joint.	4
15	Practice of 'T' welding Joint.	4
16	Practice of Lap welding Joint.	4
17	Practice of corner welding Joint.	4

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ELECTRICAL FUNDAMENTALS – I

Subject Code: BAME3-105

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

Electricity & Magnetism is devoted to the utilization of the forces of nature and materials for the benefits of mankind. Harnessing the vast sources of energy and transforming them to the most convenient form (electrical) for the overall benefit of the society for sustenance is prime objective. For this purpose, it is necessary to teach the students basics of electrical science, fundamental laws of electricity and different electrical components. This subjects aims at developing knowledge of electricity and its application used in domestic and aviation industries.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Understand about fundamentals of electron theory.
- Distinguish between conductor, semi-conductor & insulator.
- Characteristics of static electricity & properties of electrostatic charges.
- Understand about different electrical terminology.
- Understand various laws of electricity - Coulomb's law; Kirchhoff's law; Ohm's Law.
- Distinguish between resistor, capacitor and inductor.
- Distinguish between alternating current and direct current.
- Characteristics & properties of magnetism and interrelation with electricity.
- Understand properties & application of Transformers and Filters.

Unit	Contents	Hrs
1	Electron Theory Structure and distribution of electrical charges within: atoms, molecules, ions, compounds Molecular structure of conductors, semiconductors and insulators.	03
2	Static Electricity and Conduction Static electricity and distribution of electrostatic charges; Electrostatic laws of attraction and repulsion; Units of charge, Coulomb's Law; Conduction of electricity in solids, liquids, gases and a vacuum.	03
3	Electrical Terminology The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.	02
4	DC Circuits 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.	04
5	Resistance/Resistor (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	05

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	resistors, stability, tolerance and limitations, methods of construction; Variable resistors, thermistors, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge.	
6	<p>Capacitance/Capacitor 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.</p>	04
7	<p>Magnetism 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.</p> <p>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.</p>	05
8	<p>Inductance/Inductor Faraday's Law; Action of inducing a voltage in a conductor moving in a magnetic field.</p> <p>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, self-induction; Saturation point; Principle uses of inductors.</p>	06
9	<p>AC Theory 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.</p>	08
10	<p>Resistive (R), Capacitive (C) and Inductive (L) Circuits 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.</p>	08
11	<p>Transformers Transformer construction principles and operation; Transformer losses and methods for overcoming them; Transformer action under load and no-load conditions;</p> <p>Power transfer, efficiency, polarity markings; Calculation of line and phase</p>	06

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	voltages and currents; Calculation of power in a three phase system; Primary and Secondary current, voltage, turns ratio, power, efficiency; Auto transformers.	
12	Filters Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.	06

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher must show various images or videos related to Topic by using projector. Students should be asked to collect different electrical Components available in the market. Visits to industry should be planned to demonstrate Electrical power generation, distribution & utilization in the industry.

MEANS OF ASSESSMENT

Assignments & oral tests; mid-term & end-term written test; project work.

Reference Books:

1. Electrical Technology- by B.L.Theraja
2. Aircraft Electrical System- by E.H.J.Pallett
3. EASA Module 3 Electrical fundamental for B1 & B2 certification
4. Aircraft Electricity and Electronics- by Thomas K. Eismin

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ELECTRICAL FUNDAMENTALS – I LAB

Subject Code: BAME3-106

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	Simple experiments with static electricity and methods of discharging	4
2	Demonstration of Active and Passive components. Identification of Conductors, semiconductors and Insulators	4
3	Measuring (a) Resistances (b) AC and DC Voltages (c) DC Current & 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 & wheat stone bridges and determine unknown resistance	4
7	Use a Multimeter for measuring Resistance, checking electrical fuses, identify various types of resistance	4
8	Identify various types of capacitors and testing of faulty capacitor.	4
9	Demonstration of Permanent Magnet and Electromagnet	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	Measure the RMS value, Peak value and average of a sinusoidal voltage and current waveforms.	4
13	Demonstration of series and parallel LCR circuit and determine its (a) resonant frequency (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 & band stop	4

**MRSPTU B.Sc. (HONS.) AIRCRAFT MAINTENANCE ENGINEERING
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ENGLISH COMMUNICATION

Subject Code: BAME3-107

**L T P C
3 1 0 4**

Duration: 75 Hrs.

RATIONALE

Although the art of communication is natural to all living beings, people with effective communication skills succeed in their professions and business in today's world of complexities. After studying this course, the students are expected to gain the fundamental knowledge of communication and learn the tools and techniques to develop the interpersonal communication skills so that they will become excellent in dyadic and corporate communication.

LEARNING OUTCOMES

After studying this subject, the students will have the adequate knowledge on:

- The importance of communication
- The process of communication
- The keys or characteristics of effective communication
- The barriers of communication
- The techniques of breaking the communication barriers

After studying this subject, the students will be able to perform the following activities with the enhanced level of confidence:

- Writing
- Listening
- Reading
- Speaking
- Interview
- Non verbal communication

Units	Contents	Hrs
1	Introduction Theory of Communication, Types and modes of Communication	5
2	Language of Communication Verbal and Non-verbal (Spoken and Written), Personal, Social and Business Barriers and Strategies, Intra-personal, Inter personal and Group communication	16
3	Speaking Skills Monologue, Dialogue, Group Discussion Effective Communication/ Miscommunication Interview, Public Speech	22
4	Reading and Understanding Close Reading, Comprehension, Summary, Paraphrasing, Analysis and Interpretation Translation (from Indian language to English and vice-versa) Literary/Knowledge Texts	16
5	Writing Skills Documenting, Report Writing, Making notes, Letter writing	16

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INSTRUCTIONAL STRATEGY

1. Teachers should lay special emphasis in making the students conversant with concepts, process and practices related to effective communication skills.
2. It is recommended to use audio-visual aids/video films to impart the knowledge on the English language and communication skills.

MEANS OF ASSESSMENT

- Assignments
- Quiz program
- Monthly tests
- End-term written tests
- Debate
- Dialogue
- Group discussion
- Public speaking
- Practical proficiency tests

Reference Books:

1. Fluency in English - Part II, Oxford University Press, 2006
2. Strengthen Your Writing, V.R. Narayanaswami, 3rd Edition, Orient Longman, 2005.
3. Basic Communication Skills for Technology, Andrea J. Rutherford, 1st Edition,
4. Pearson Business English, Pearson, 2008
5. "Elements of Business Communication" by International Book House PVT. LTD- P.R. Chadha, Sangeeta Magan.
6. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas, Nell Ann Pickett, Ann A. Laster, Katherine E. Staples,
7. Technical English (Writing, Reading and Speaking), 8th Edition, Pearson Education, USA, Addison Wesley Longman Inc., 2001

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HUMAN FACTORS

Subject Code: BAME3-108

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

The term “human factors” in the context of aviation maintenance engineering is relatively new. It refers to the study of human capabilities and limitations in the workplace. Human factors researchers study the interaction of maintenance personnel, the equipment they use, the written and verbal procedures and rules they follow, and the environmental conditions of any system. The aim of human factors is to optimise the relationship between maintenance personnel and systems with a view to improving safety, efficiency and well-being”. For this purpose, AME students in this course are required to teach the concepts of human factor to develop knowledge for keeping the person and object safe with maximum output during the maintenance work.

LEARNING OUTCOMES

After undergoing this course, the students will be able to know:

- Human performance and limitations, social psychology, physical environment and factors affecting performance of a person.
- Task, communication and human error during the work.
- Hazards in the workplace, human error in the maintenance environment.
- Human factors in the aircraft maintenance and inspection.
- Human errors in the aircraft maintenance and inspection.
- Error prevention and considerations strategies.

Units	Contents	Hrs
1	General: The need to take human factors into account; Incidents attributable to human factors/ human error; 'Murphy's' law.	5
2	Human Performance and Limitations: Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access.	5
3	Social Psychology: Responsibility: individual and group; Motivation and de-motivation; Peer pressure; 'Culture' issues; Team working; Management, supervision and leadership.	5
4	Factors Affecting Performance:	5

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	Fitness/health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and under-load; Sleep and fatigue, shift work; Alcohol, medication, drug abuse.	
5	Physical Environment: Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment.	5
6	Tasks: Physical work; Repetitive tasks; Visual inspection; Complex systems.	5
7	Communication: Within and between teams; Work logging and recording; Keeping up to date, currency; Dissemination of information.	5
8	Human Error: Error models and theories; Types of error in maintenance tasks; Implications of errors (i.e. accidents); Avoiding and managing errors.	5
9	Hazards in the Workplace: Recognising and avoiding hazards; Dealing with emergencies.	5

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should give demonstration of various models concerned to human factors to the students. Different transparencies and animated projections should be shown to the students for better understanding of the lesson.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making.

Reference Books:

1. CAP 715 - An Introduction to Aircraft Maintenance Engineering Human Factors for JAR 66, Civil Aviation Authority, UK.
2. CAP 718 - Human Factors in Aircraft Maintenance and Inspection, Civil Aviation Authority, UK.
3. FAA-H-8083-30 - Aircraft Maintenance Technician Handbook - General, US Department of Transportation, Federal Aviation Administration ICAO Doc 9806
4. EASA Module 9 Human Factors for B1 certification

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TUTORIAL		
T	Contents	Hrs
1	Application of Human Factors in development of Aircraft Maintenance Programme and Inspection Schedule.	2
2	Application of Human Factors in Aircraft Maintenance Planning and Execution.	2
3	Application of Human Factors in Aircraft Maintenance.	1
4	Detail study of Murphy's' law.	1
5	To study Shel Model.	2
6	Study of Dirty Dozen.	1
7	Stress Management in Aircraft Maintenance environment.	2
8	To study human behaviour in performing aircraft inspection in adverse weather conditions.	2
9	Study of social impact on aircraft maintenance engineer.	2

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AIRCRAFT MAINTENANCE PRACTICES –II

Subject Code: BAME3-209

L T P C
3 1 0 4

Duration: 60 Hrs.

RATIONALE

Aircraft Maintenance Engineers are responsible for the maintenance and repair of aircraft for this purpose they must have proper knowledge of aircraft maintenance procedures. This Subject has been prepared to provide knowledge on Corrosion & its prevention, abnormal events which can happen any to the aircrafts or associated personal, how to read engineering drawings, how the aircrafts can be maintained hand handled in a most efficient way. It also includes information necessary for the students to perform maintenance or make minor repair to units in the aircraft normally requiring such action on the flight line or in the maintenance hangar.

LEARNING OUTCOMES

After undergoing this subject, the students will be able to:

- Prevent formation of corrosion hence deterioration of aircraft from this dangerous enemy.
- Can carry out the weighing schedule of an aircraft.
- Can follow the Engineering Drawings in aircraft literature provided with aircraft in a proficient manner.
- Deal the abnormal events as per manufacturer recommendations.
- Understand ATA100 specifications.

Units	Contents	Hrs
1	Corrosion 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.	20
2	Engineering Drawings, Diagrams and Standards 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.	4
3	Aircraft WeightandBalance a) Centre of Gravity/Balance limits calculation: use of relevant documents; b) Preparation of aircraft for weighing; Aircraft weighing	3
4	Aircraft HandlingandStorage 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;	15

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	Electrical, hydraulic and pneumatic ground supplies. Effects of environmental conditions on aircraft handling and operation.	
5	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	08
6	Abnormal Events a) Inspections following lightning strikes and HIRF penetration. b) Inspections following abnormal events such as heavy landings and flight through turbulence	05
7	Maintenance Procedures 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	05

INSTRUCTIONAL STRATEGY

While teaching these subject/topics teachers needs to refer the Aircraft Maintenance Manual and other publications provided with testing kit or testing equipment. To make the subject more interesting artificial snags can be developed in aircraft systems and troubleshooting procedures should be followed for rectification as per the Maintenance Manual. Very old corroded aircraft can also be used to be familiarized with types of corrosion. Visit to a aviation approved store will be an extra advantage to the students.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests.

Reference Books:

1. Airframe and Power plant Mechanics (AC 65-15A)-Airframe Hand Book FAA
2. Civil Aircraft Inspection Procedure (CAP 459) Part II Aircraft.
3. Aircraft Maintenance and Repair By Kroes, Watkin and Delph
4. Acceptable Methods, Techniques and practices (FAA)-EA-AC 43.13-1 A&2A
5. EASA Module 6 Material and Hardware for B1 & B2 Certification
6. EASA Module 7A Maintenance Practices for B1 & B2 Certification

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AIRCRAFT MAINTENANCE PRACTICES -II LAB

Subject Code: BAME3-210

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	Conduct a Dye penetrant inspection to find flaws.	06
2	Conduct a Magnetic Particle inspection to find flaws in ferrous materials.	06
3	Refuel the Aeroplane Piston aircraft by following the proper procedures.	08
4	Inspect abnormal events such as heavy landings; note the procedure step by step.	06
5	Draw the different types of lines on a paper, used in engineering Drawing	10
6	Carry out a visit to aviation store for familiarisation with the procedures.	08
7	Carry out visual inspection of four stroke piston engine.	04
8	Join two dissimilar metal strips to prevent it from Dissimilar metal corrosion.	06
9	Tow the light aeroplane from hangar to the tarmac and make it ready for ground run. Note down the procedure you have followed with precautions.	04
10	Inspect the most corrosion prone areas of an aircraft.	02

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APPLIED MATHEMATICS

Subject Code: BAME3-211

**L T P C
5 1 0 6**

Duration: 90 Hrs.

RATIONALE

Contents of this course provide fundamental base for understanding engineering problems and their solution algorithms. Contents of this course will enable students to use basic tools like logarithm, binomial theorem, partial fractions, matrices, t-ratios and co-ordinates for solving complex engineering problems with exact solutions in a way which involve less computational task. By understanding the logarithm, they will be able to make long calculations in short time and it is also a pre-requisite for understanding Calculus.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Apply complex number in engineering problems.
- Apply permutation and combination to count without actual counting.
- Apply permutation and combination to understand binomial theorem.
- Calculate the approximate value of roots of certain expressions in engineering problems by application of binomial theorem.
- Resolve rational functions to partial fractions for the use in Integral Calculus.
- Use matrices to provide solution to engineering problems.
- Solve different problems using trigonometry.

Units	Contents	Hrs
1	PART 1 Linear Algebra: 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, Diagonalization of a Matrix Determinants: Elementary properties of determinants up to 3rd order, consistency of equations, Cramer's rule.	14
2	PART 2 Trigonometry Functions: Concept of angles, measurement of angles in degrees, grades and radians and their conversions. Applications of angles such as angle subtended by an arc, diameter of moon etc. T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T-Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2). Applications of Trigonometric terms in engineering problems such as to find an angle of elevation, height, distance etc.	18
3	PART 3 Multivariable Differential calculus Definition of function; Concept of limits. Differentiation of x^n , $\sin x$, $\cos x$, $\tan x$, e^x , $\log_a x$ (Please take one example of	24

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	differentiation by definition). Differentiation of sum, product and quotient of functions. Differentiation of function of a function. Differentiation of trigonometric inverse functions. Logarithmic differentiation. Exponential differentiation, Successive differentiation (excluding nth order). Functions of 2 Variables, Limits and continuity, Partial differentiation	
4	PART 4 Multivariable Integral calculus Multiple Integrals-Double integrals, Change of order, Applications to areas, volumes, Triple Integral.	12
5	PART 5 Vector Calculus Gradient, Divergence, Curl, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).	22

INSTRUCTIONAL STRATEGY

- Basic elements of algebra, trigonometry and co-ordinate geometry can be taught in the light of their applications in the field of engineering and technology.
- By laying more emphasis on applied part, teacher can also help in providing a good continuing education base to the students.
- Students need to be taught the skills needed to use software tools built by experts through multiple problem solving based on the topics related to Algebra, Trigonometry and Coordinate Geometry that the industry requires.
- Examples to be used should be related to engineering.
- Students should be able to relate to the actual use of these examples and the way mathematical calculations will help them in doing their job.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid- term and end-term written tests, model/prototype making
Actual tutorial work, exercises and viva-voce

Reference Books

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

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AVIATION LEGISLATION –I

Subject Code: BAME3-212

**L T P C
5 1 0 6**

Duration: 90 Hrs.

Rationale:

The Civil Aviation Safety Authority is responsible for establishing and administrating the regulatory framework in relation to aircraft safety. This subject will enable the students to learn about civil aviation rules and requirements. A healthy, well-managed Civil Aviation sector, supported by good aviation policy-making and regulation, is vital to the economy of every state. Civil Aviation Authorities (CAAs) which is DGCA in India, are responsible for the oversight and regulation of civil aviation with a focus on aviation safety, security, airspace policy, economic regulation, efficiency, sustainability, consumer protection and respect for the environment.

Learning Outcomes:

After undergoing this subject, the students will be able to:

- To get the knowledge of DGCA, ICAO, FAR, EASA procedures through CAR.
- Acquire knowledge of documentation and procedures of certificate of airworthiness and registration.
- Procedures of maintenance programme and inspections.
- Understanding of the legislation and regulations that must be adhered to when manufacturing and maintaining aircraft.

Units	Contents	Hrs
1	Regulatory Framework: Role of International Civil Aviation Organization; The Aircraft Act and Rules made there under Role of the DGCA; Relationship between CAR-21, CAR-M, CAR-145, CAR-66, CAR 147 The Aircraft Rules (Applicable to Aircraft Maintenance and Release) Aeronautical Information Circulars (Applicable to Aircraft Maintenance and Release)CAR Sections 1 and 2	15
2	CAR-66 Certifying Staff – Maintenance Detailed understanding of CAR-66.	20
3	CAR-147 Approved Maintenance Training Organization Detailed understanding of CAR-147 (Basic)	15
4	Aircraft Certification (a) General Certification rules: such as FAA & EACS 23/25/27/29; Type Certification; Supplemental Type Certification; CAR-21 Design/Production Organisation Approvals. Aircraft Modifications and repairs approval and certification Permit to fly requirements (b) Documents Certificate of Airworthiness; Certificate of Registration;	15

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	Noise Certificate; Weight Schedule; Radio Station Licence and Approval.	
5	Aircraft Operations: 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);	10
6	Applicable National and International Requirements: (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 requirements.	15

INSTRUCTIONAL STRATEGY:

While imparting instructions, teacher should show various types of certificates and necessary documentation to the students. Students should be asked to fill all the forms and maintain log books.

Reference Books

1. The Aircraft Act, 1934
2. The Aircraft Rules, 1937, VOL 1
3. The Aircraft Rules, 1937, VOL 3
4. Aeronautical Information Circular
5. CAR - Section - 1, 2, & 8 SMS,
6. CAR - 21, M, 145, 66 & 147
7. Special Federal Aviation Regulations (SFARs) - 14 CFR, SFAR 88 & JAA TGL 47
Airworthiness Procedure Manual

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ELECTRICAL FUNDAMENTALS – II

Subject Code: BAME3-213

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

Electricity & Magnetism is devoted to the utilization of the forces of nature and materials for the benefits of mankind. Harnessing the vast sources of energy and transforming them to the most convenient form (electrical) for the overall benefit of the society for sustenance is prime objective. For this purpose, it is necessary to teach the students basics of electrical science, fundamental laws of electricity and different electrical components. This subject aims at developing knowledge of electricity and its application used in domestic and aviation industries.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Understand about sources of electrical energy.
- Understand about construction and working of battery.
- Understand about construction and working of DC & AC generators.
- Distinguish between bonding, grounding and shielding.
- Understand about electrical cable and connectors.
- Distinguish between wire stripping, crimping & splicing.
- Understand about electromagnetic interference (EMI).
- Understand about electrostatic sensitive devices.

Units	Contents	Hrs
1	Generation of Electricity Elementary knowledge on generation of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.	04
2	DC Sources of Electricity 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.	04
3	Power Power, work and energy (kinetic and potential); Dissipation of power by a resistor; power formula; Calculations involving power, work and energy	08
4	DC Motor/Generator Theory Basic motor and generator theory; Construction and purpose of components in DC generator; Operation of DC generator, factors affecting output & direction of current flow in DC generators; Operation of DC motor and factors affecting output power, torque, speed and direction of rotation of DC motors; series wound, shunt wound and compound motors; Starter Generator construction.	09
5	AC Generators 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	09

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	connections, advantages & uses; Permanent Magnet Generators.	
6	AC Motors 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.	08
7	Electro sensitive Devices Special handling of components sensitive to electrostatic discharges; awareness of risks and possible damage, component and personnel anti-static protection devices.	04
8	Electromagnetic Environment influence of the following phenomena on maintenance practices for electronic system:- Electromagnetic Compatibility EMC; Electromagnetic Interference EMI; High Intensity Radiated Field HIRF; Lightning/lightning protection	06
9	Aircraft Electrical Cables and Connectors <ul style="list-style-type: none"> 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 & 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 c) Avionic General Test Equipment Operation, function and use of avionic general test equipment. Cabin System; Information system. 	08

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher must show various images or videos related to Topic by using projector. Students should be asked to collect different electrical Components available in the market. Visits to industry should be planned to demonstrate Electrical power generation, distribution & utilization in the industry.

MEANS OF ASSESSMENT

Assignments & oral tests; mid-term & end-term written test; project work.

Reference Books:-

1. Electrical Technology- by B.L.Theraja
2. Aircraft Electrical System- by E.H.J.Pallett
3. Aircraft Electricity and electronics- by Thomas K Eismen

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ELECTRICAL FUNDAMENTALS – II LAB

Subject Code: BAME3-214

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	Generation of electricity by light, heat, chemical action, magnetism & motion.	4
2	Demonstration of power sources using primary and secondary cells.	4
3	Familiarization with Lead acid battery and nickel cadmium battery	4
4	Demonstration of various Battery charging methods..	4
5	Familiarization with DC Generator and its types using different method of coil Arrangements (series and shunt) to understand their Usage	6
6	Familiarization with DC Motor and its types using different method of coil Arrangements (series and shunt) to understand their Usage.	6
7	Familiarization with AC generator using single/ poly phase arrangements to understand their usage.	4
8	Familiarization with Various types of AC motors .	4
9	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.	6
11	Identify cables and cables values by reference to the maintenance manuals. Identify a range of electrical component symbols.	6
12	Inspection of electrical cable looms / bundles and cable trunking.	4
13	Familiarization with different electrical cables and connectors.	4

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ENVIRONMENTAL SCIENCE

Subject Code: BAME3-215

L T P C
3 1 0 4

Duration: 60 Hrs.

RATIONALE

Environmental science is important to save our world from destruction. Because of man's abusive actions, the environment is not safe anymore. There are more calamities experienced such as flashfloods, hurricanes and draughts and climate change. If we do not study the environment, then there is a great danger that everything that we know as home with all that surround us, will lead to extinction, yes including the extinction of our specie.

We need to study the environment and the sciences applied into it to find solutions to different environmental issues so that children of tomorrow will still enjoy the healthy and productive environment we still have now. If man will only make use of the different discoveries through environmental science, then this world will definitely be a better place to be called home not only for us but for the next generation.

LEARNING OUTCOMES

The Environmental Studies major prepares students for careers as leaders in understanding and addressing complex environmental issues from a problem-oriented, interdisciplinary perspective. Students:

- Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
- Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.

Units	Contents	Hrs
1	PART 1 Multidisciplinary nature of environmental studies Scope and importance; Concept of sustainability and sustainable development	2

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2	PART 2 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)	6
3	PART 3 Natural Resources : Renewable and Non-renewable Resources Land resources and land use change; Land degradation, soil erosion and desertification Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water: Use and over--exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter--state). Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.	8
4	PART 4 Biodiversity and Conservation Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots. India as a mega-biodiversity nation; Endangered and endemic species of India Threats to biodiversity: Habitat loss, poaching of wildlife, man--wildlife conflicts, biological invasions; Conservation of biodiversity: In--situ and Ex-situ conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value	8
5	PART5 Environmental Pollution Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution. Nuclear hazards and human health risks Solid waste management: Control measures of urban and industrial waste. Pollution case studies	8
6	PART6 Environmental Policies & Practices Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD). Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context	7
7	PART 7 Human Communities and the Environment	6

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	<p>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).</p>	
8	PART 8 Field work 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	15

INSTRUCTIONAL STRATEGY

The learning outcomes provide the planning framework for teachers.

- In their planning, teachers in Lower Primary schools use the learning outcomes from the syllabuses, and the elaborations in this Teacher Guide, to identify specific knowledge, skills and attitudes that can be developed at each grade.
- Continuous assessment of student learning against the outcomes will ensure a supportive classroom environment that will meet the students' individual learning needs.
- Here is a discovery-learning motto to keep in mind when planning activities for students who are learning in two languages

MEANS OF ASSESSMENT

- Assessment is the ongoing process of identifying, gathering and interpreting information about students' achievement of learning outcomes. All assessment must link to the learning outcomes.
- Recording and reporting that enable them to determine which learning outcomes students have achieved, and to report these achievements to parents in ways that make sense to them.
- Students need to receive meaningful feedback about their achievement of learning outcomes. This can best be done using continuous assessment.
- The student's knowledge and skills are continually developing in a healthy classroom environment. It is important for teachers to be aware of, and record what the students know, can do, and understand.

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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. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi
6. "Perspectives in Environmental Studies" by New Age International Publishers-Anubha Kaushik & CP Kaushik

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SYLLABUS 2020 BATCH ONWARDS**

AIRCRAFT MATERIALS

Subject Code: BAME3-316

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

Lot of development has taken place in the field of materials. New materials are being developed and it has become possible to change the properties of materials to suit the requirements. AME students in this course are required to make use of different materials for various applications. For this purpose, it is necessary to teach those metal properties, usage various ferrous and non ferrous, Composite and Non- Metallic materials. This subject aims at developing knowledge about the characteristics and usage of various types of aircraft materials used in the Aircraft industries.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Distinguish between metals and non metals and ferrous and non ferrous materials.
- Classify various types of metals and non metals.
- Characteristics, properties and identification of common alloy steels used in aircraft.
- Characteristics, properties and identification of common non-ferrous materials used in aircraft;
- Heat treatment and application of non-ferrous materials;
- Characteristics, properties and identification of common composite and non-metallic materials, other than wood, used in aircraft.
- Characteristics, properties and types of fabrics used in aeroplane; Inspections methods for fabric.

Unit	Contents	Hrs
1	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.	16
2	Aircraft Material — Non-Ferrous (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.	12
3	Aircraft Materials - Composite and Non- Metallic (a) Characteristics, properties and identification of common composite and non-metallic 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. (c) Bonding practices; Environmental conditions, Inspection methods Bonding methods and inspection of bonded joints.	14
4	Wooden structures	10

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	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.	
5	Fabric covering & Non Metals Characteristics, properties and types of fabrics used in aeroplane; Inspections methods for fabric; Types of defects in fabric; Repair of fabric covering.	8

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should show various types of engineering materials to the students. Students should be asked to collect samples of various materials available in the market. Visits to industry should be planned to demonstrate use of various types of materials or Heat Treatment Processes in the industry.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making

Reference Books:

1. EASA Module 6 Material and Hardware for B1 & B2 Certification.
2. Aircraft handbook FAA (AC 65-15 A)
3. Civil Aircraft Inspection Procedures (CAIP 459-Part I, Basic)
4. Airframe & Powerplant Mechanics (General Handbook EA-AC 65-9A) FAA
5. Aircraft Materials & Processes by Titterton
6. CAIP 562

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AIRCRAFT MATERIALS LAB

Subject Code: BAME3-317

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	Identification of common alloy steels used in aircraft.	4
2	Identification of common non-ferrous materials used in aircraft.	4
3	Identification of common composite and non-metallic materials used in aircraft.	4
4	Identification of Sealant and bonding agents.	4
5	Demonstration of simple repair of composite and non-metallic materials and structures (Bonding practices)	6
6	Identification of common types of wood and glue used in aircraft.	4
7	Identification and detection of defects in wood material and wooden structures	6
8	Identification of the common fabrics and adhesives used in aircraft structure.	6
	Demonstration of types of defects in fabric used in aircraft.	6
9	Demonstration of how to repair fabric covering in aircraft structure.	10
10	Inspection methods used on fabric covering repair work.	6

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AIRCRAFT STRUCTURE

Subject Code: BAME3-318

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

As the AME students will involve in maintenance, repair and overhauling of aircraft in future, they must be well versed in identifying the parts of aircraft and understanding their functions. Hence, learning the basic term of aviation, the concepts of aircraft structure and control surfaces are mandatory.

LEARNING OUTCOMES

After undergoing the subject, students will be able to have the adequate knowledge on the following:

- General terms and terminologies of aviation
- Major and minor parts of aircraft and their functioning
- Types of aircraft structure
- Classification of aircraft structure
- Fasteners and rivets being used in aircraft
- Loads acting on aircraft during flight
- Rigging and symmetry checks
- Mass balancing and aerodynamic balancing
- Attachment of wings
- Aircraft surface protection

Units	Contents	Hrs
1	Airframe Structures — General Concepts (a) Airworthiness requirements for structural strength; Structural classification, primary, secondary and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Lightning strike protection provision. Aircraft bonding (b) Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning, anti-corrosive protection, wing, empennage and engine attachments; Structure assembly techniques: riveting, bolting, bonding; Methods of surface protection, such as chromating, anodising, painting; Surface cleaning; Airframe symmetry: methods of alignment and symmetry checks.	25
2	Airframe Structures — Aeroplanes Fuselage (ATA 52/53/56) Construction and pressurisation sealing;	12

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	Wing, tail-plane pylon and undercarriage attachments; Seat installation and cargo loading system; Doors and emergency exits: construction, mechanisms operation and safety devices; Window and windscreen construction and mechanisms, attachment.	
3	Flight Control Surfaces (ATA 55/57) Construction and attachment; Balancing — mass and aerodynamic.	6
4	Stabilisers (ATA 55) Construction; Control surface attachment.	6
5	Wings (ATA 57) Construction; Fuel Storage, Landing gear, pylon, control surface and high lift/drag attachments.	6
6	Nacelles/Pylons (ATA 54) Construction; Firewalls; Engine mounts.	5

INSTRUCTIONAL STRATEGY

1. Teachers should lay special emphasis in making the students conversant with the parts of aircraft and their functions, aviation terms and terminologies, types of aircraft constructions and materials used.
2. Use of audio-visual aids/video films should be made to show specialized operations.
3. Exposure to aircrafts parts
4. Observing the flying of aircraft: operation of control surfaces and high lift/drag devices during landing and take off
5. Demonstration of the functions of aircraft parts and control surfaces

MEANS OF ASSESSMENT

- Assignments
- Weekly class tests
- Monthly test
- End-term written tests
- Model/prototype making

Reference Books

1. Aircraft handbook FAA (AC 65-15 A)
2. Aircraft Construction Repair and Inspection-By Joe Christy
3. Aviation Maintenance Technician Hand book by FAA
4. Aircraft Maintenance and Repair- Delp /Bent/McKinley,
5. AC 43.13
6. EASA Module-11 by AIRCRAFT TECH BOOK CO.
7. A & P Technician Air Frame Text Book by Jeppesen

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AIRCRAFT STRUCTURE LAB

Subject Code: BAME3-319

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	Familiarization of aircraft reference lines, station and zone numbers	4
2	Demonstration of major structural members of fixed wing aircraft. Loads on major structural members.	6
3	Familiarization of detail structural members of aircraft and loads acting on these structural members.	6
4	Demonstration of Aircraft structure construction	4
5	Familiarization Aircraft structural assembly, joints and lightning protection	4
6	Demonstration of components of flight control surfaces and methods of mass balancing	6
7	Familiarization Control surface, landing gear and engine attachment	4
8	Demonstration of firewalls and engine mounts of aircraft.	4
9	Demonstration of Common structural defects, simple inspection technique and recording	8
10	Demonstration of Construction (Modelling) of various types structural joints	8
11	Demonstrate the Check on aircraft symmetry	6

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AVIATION LEGISLATION –II

Subject Code: BAME3-320

**L T P C
5 1 0 6**

Duration: 90 Hrs.

RATIONALE:

The Civil Aviation Safety Authority is responsible for establishing and administrating the regulatory framework in relation to aircraft safety. This subject will enable the students to learn about civil aviation rules and requirements. A healthy, well-managed Civil Aviation sector, supported by good aviation policy-making and regulation, is vital to the economy of every state. Civil Aviation Authorities (CAAs) which is DGCA in India are responsible for the oversight and regulation of civil aviation with a focus on aviation safety, security, airspace policy, economic regulation, efficiency, sustainability, consumer protection and respect for the environment.

LEARNING OUTCOMES:

After undergoing this subject, the students will be able to:

- Get of approval of maintenance organization in cat. f& g of CAR M.
- Get of approval of maintenance organization in CAR-145.
- Acquire knowledge of documentation and procedures of certificate of airworthiness and registration.
- Procedures of maintenance programme and inspections.
- Understanding of the legislation and regulations that must be adhered to when manufacturing and maintaining aircraft.

Units	Contents	Hrs
1	CAR-M: Detail understanding of CAR M provisions related to Continuing Airworthiness, Detailed understanding of CAR-M.	20
2	CAR-145 — Approved Maintenance Organizations: Detailed understanding of CAR-145 and CAR M Subpart F.	15
3	Safety Management System State Safety Programme Basic Safety Concepts Hazards & Safety Risks SMS Operation SMS Safety performance, Safety Assurance	15
4	CAP – 3300	13
5	Fuel Tank Safety 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)	10
6	CAR-21: Detail understanding of CAR-21 provisions related to Continuing Airworthiness.	17

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INSTRUCTIONAL STRATEGY:

While imparting instructions, teacher should show various types of certificates and necessary documentation to the students. Students should be asked to fill all the forms and maintain log books.

Reference Books:

1. The Aircraft Act, 1934
2. The Aircraft Rules, 1937, VOL 1
3. The Aircraft Rules, 1937, VOL 3
4. Aeronautical Information Circular
5. CAR - Section - 1, 2, & 8 SMS,
6. CAR - 21, M, 145, 66 & 147
7. Special Federal Aviation Regulations (SFARs) - 14 CFR, SFAR 88 & JAA TGL 47
Airworthiness Procedure Manual.

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ELECTRONIC FUNDAMENTAL AND DIGITAL TECHNIQUES – I

Subject Code: BAME3-321

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

This subject comes under the Core Technology group and will enable the students to comprehend the theory, concepts, characteristics and working principles of basic electronic devices and their applications in electronic circuits. The knowledge of various devices acquired by the students will help them to design, test, troubleshoot and repair electronic circuits

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Classify various types of Diodes and transistors
- Characteristics, and properties of Operational Amplifier
- Acquire knowledge about printed circuit board.
- Know about principle of operation of resolvers, differential, control and torque.
- Classification of numbering system
- To get knowledge about microprocessor

Units	Contents	Hrs
1	<p>Semiconductors Diode 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.</p> <p>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, Schottky diode, photo conductive diode, varactor diode, varistor, rectifier diodes, Zener diode.</p>	8
2	<p>Transistors 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, flip- flop circuits.</p>	8
3	<p>Integrated Circuits a) 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:</p>	8

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	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 b) Operation and use of encoders and decoders. , functions of encoders type. Uses of medium, large and very large scale integration.	
4	PrintedCircuitBoards Description and use of printed circuit boards.	4
5	Servomechanisms 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 synchroleads,hunting.	10
6	Numbering Systems Numbering systems: binary, octal and hexadecimal; Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa.	3
7	DataConversion Analogue Data, Digital Data; Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.	3
8	DataBuses Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications.	3
9	Logic Circuits Identification of common logic gate symbols, tables and equivalent circuits; Applications used for aircraft systems, schematicdiagrams.Interpretation of logicdiagrams.	3
10	Microprocessors 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.	6
11	Fiber Optics 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	4

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should show various types of engineering materials to the students. Students should be asked to collect various electronics components available in the market. .

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making

Reference Books:

1. Basic Electronics-Bernard Grob
2. Digital Fundamentals by Malvino and Leech
3. Principles of Electronics by V K Mehta
4. EASA module 3 Electrical Fundamental for B1 & B2 Certification

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ELECTRONIC FUNDAMENTAL AND DIGITAL TECHNIQUES– I LAB

Subject Code: BAME3-322

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
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) Functional testing of diodes	6
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).	6
5	Uses of basic electronic components (diodes, transistors),digital Multimeter, Function Generator and Oscilloscope	6
6	Construct a model to study fixed Bias and Voltage divider bias configuration for CE transistor.	6
7	Familiarization with Single Stage CE amplifier of given gain	4
8	Study of correlation between different numbering systems	4
9	Study the various methods of digital to analogue conversion	4
10	Familiarization with typical data buses used in aircraft system.	4
11	Familiarization with and use of printed circuit board.	4
12	Demonstrate fiber optic data transmission over electrical wire propagation;	4
13	Study of Universal Gates and making all other logic gates using universal gates.	4

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AIRCRAFT HARDWARE

Subject Code: BAME3-423

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

Lot of development has taken place in the field of Aircraft hardware. New hardware is being developed. AME students in this course are required to make use of different Aircraft hardware for various applications. For this purpose, it is necessary to teach them basics properties and usage of various Aircraft hardware. Various types of Fasteners used in aircraft. This subject aims at developing knowledge about the characteristics and usage of various types of aircraft hardware used in the Aircraft industries.

LEARNING OUTCOMES

After undergoing this course, the students will be able to know:

- Characteristics, properties and identification of common types of hardware used in aircraft.
- Distinguish between different fasteners used in aircraft.
- Classify various types of fasteners used in aircraft.
- Thread forms, dimensions and tolerances for standard threads used in aircraft; measuring screw threads

Unit	Contents	Hrs
1	Fasteners - Screw threads Screw nomenclature; Thread forms, dimensions and tolerances for standard threads used in aircraft; measuring screw threads;	4
2	Fasteners - Bolts, studs and screws 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.	6
3	Fasteners - Locking devices Tab and spring washers, locking plates, split pins, palnuts, wire locking, quick release fasteners, keys, circlips, and cotter pins.	4
4	Fasteners - Aircraft rivets & Riveting a) Types of solid and blind rivets: specifications and identification, heat treatment. b) Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints.	16
5	Pipes and Unions (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.	5
6	Pipes and Hoses Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes.	5
7	Springs	5

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	a) Types of springs, materials, characteristics and applications. b) Inspection and testing of springs.	
8	Bearings a) Purpose of bearings, loads, material, construction; Types of bearings and their application. b) Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes.	5
9	Transmissions a) 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. b) Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems.	5
10	Control Cables a) Types of cables; End fittings, turnbuckles and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems. b) Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems.	5

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should show various types of aircraft hardware to the students. Students should be asked to collect samples of various aircraft hardware available in the market. Visits to industry should be planned to demonstrate use of various types of aircraft hardware in the aircraft industry.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making

Reference Books:

1. EASA Module 6 Material and Hardware for B1 & B2 Certification.
2. EASA Module 7A Maintenance Practices for B1 & B2 Certification.
3. Aircraft handbook FAA (AC 65-15 A)
4. Civil Aircraft Inspection Procedures (CAIP 459-Part I, Basic)
5. Airframe & Powerplant Mechanics (General Handbook EA-AC 65-9A) FAA

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AIRCRAFT HARDWARE LAB

Subject Code: BAME3-424

L T P C

Duration: 60 Hrs.

0 0 4 2

Practical	Contents	Hrs
1	Identification of different thread forms.	2
2	Measuring of screw threads.	2
3	Identification of aircraft bolts and nuts	2
4	Identification of aircraft screws and dowels.	2
5	Insertion and removal of aircraft studs.	6
6	Identification and use of aircraft locking devices.	2
7	Single row riveting practice.	6
8	Double row (zig-zag) riveting practice.	6
9	Patch repair riveting practice	8
10	Identification of rigid and flexible pipes and standard unions for aircraft.	2
11	Bending and flaring practice of aircraft pipes.	4
12	Inspection and testing of aircraft pipes and hoses.	4
13	Inspection and cleaning of aircraft bearings.	2
14	Inspection of gears, belts and pulleys, chains and sprockets;	4
15	Inspection of screw jacks, lever devices, push-pull rod systems.	4
16	Inspection and testing of control cables	4

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SYLLABUS 2020 BATCH ONWARDS**

AIRCRAFT PISTON ENGINE-I

Subject Code: BAME3-425

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

Lot of development has taken place in the field of piston engines as well as in propeller used in aircraft. New engine and propeller designs and technology are being developed continuously since its inception. AME students in this course are required to have knowledge of various types of piston engines, propellers and their applications in aircraft. For this purpose, it is necessary to teach them basics of the construction, systems of piston engines and propellers fitted in aircraft. This subject aims at developing knowledge about the basic design and functioning of different piston engines and propellers as well as its systems used in the Aircraft industries.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Understand fundamentals, principle of operation, basic design and construction of piston engines.
- Know characteristics, properties and identification of piston engines used in aircraft.
- Piston engine supercharging and turbocharging.
- Classify different types of propellers used on aircraft.
- Different terms used in construction of the propeller.
- Propeller pitch control, synchronising, propeller maintenance, preservation of propeller.

Units	Contents	Hrs
1	Fundamentals: Mechanical, thermal and volumetric efficiencies operating principles — 2 stroke, 4 stroke, Otto and Diesel, Piston displacement and compression ratio; Engine configuration and firing order.	8
2	Engine Performance: Power calculation and measurement; Factors affecting engine power; Mixtures/leaning, pre-ignition.	6
3	Engine Construction: Crank case, crank shaft, cam shafts, sumps; Accessory gearbox; Cylinder and piston assemblies; Connecting rods, inlet and exhaust manifolds; Valve mechanisms; Propeller reduction gearboxes.	10
4	Supercharging/ Turbo charging: Principles and purpose of supercharging and its effects on engine parameters. Construction and operation of supercharging/ turbo-charging systems; System terminology; Control systems; System protection.	4
5	Aircraft Propeller: 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.	6
6	Propeller Construction: Construction methods and materials used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; fixed	8

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	pitch, controllable pitch, constant speed propeller; Propeller/spinner installation.	
7	Propeller Pitch Control: Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Over speed protection.	6
8	Propeller Synchronising: Synchronising and synchrophasing equipment.	2
9	Propeller Ice Protection: Fluid and electrical de-icing equipment.	2
10	Propeller Maintenance: Static and dynamic balancing; Blade tracking; Assessment of blade damage, erosion, corrosion, impact damage, delamination; Propeller treatment/repair schemes; Propeller engine running.	6
11	Propeller Storage and Preservation: Propeller preservation and de-preservation.	2

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should give demonstration of various types of piston engines as well as propellers, its systems and components, to the students. Different mock ups, transparencies and animated videos should be shown to the students for better understanding of the lesson.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making.

Reference Books:

1. Airframe and Power plant Mechanics (EA-AC 65- 12A) -Power Plant Hand FAA
2. Civil Aircraft Inspection Procedure (CAP 459) Part II Aircraft
3. Aircraft Propeller and Controls-by Frank Delph
4. Aircraft Piston Engines-By Herschel Smith
5. Aviation Maintenance Technician Series by Dale Crane
6. Aircraft Power Plants by Kroes& Wild
7. Aircraft A & P Technician Power Plant by Jeppesen
8. EASA Module-17 A Propeller by AIRCRAFT TECH BOOK CO.
9. 12A

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AIRCRAFT PISTON ENGINE-I LAB

Subject Code: BAME3-426

L T P C
0 0 4 2

Duration: 60 Hrs.

Practical	Contents	Hrs
1	Familiarise with the functioning of 2 stroke and 4 stroke piston engines.	4
2	Familiarise with constructions and functions of piston engines.	4
3	Identification of various components of piston engines like Crank case, crank shaft, cam shafts,	4
4	Identification of cylinder and piston assemblies.	4
5	Identification of connecting rods, inlet and exhaust manifolds.	4
6	Familiarise with the functioning of accessory gear box valve mechanism.	4
7	Familiarise with the functioning of supercharger/ turbocharger.	4
8	Familiarise with the functioning of propeller reduction gear.	4
9	Familiarise with different types of propeller.	4
10	Check the propeller blade angle.	4
11	Check Propeller track.	4
12	Inspection of propeller blade for damage, erosion, corrosion, impact damage, delamination etc.	4
13	Familiarise with propeller electrical de-icing system.	4
14	Preparation for propeller storage and preservation.	4
15	Locking of propeller mounting nuts.	4

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APPLIED PHYSICS

Subject Code: BAME3-427

L T P C
3 1 0 4

Duration: 60 Hrs.

RATIONALE

Applied physics includes the study of a large number of diverse topics all related to things that go on in the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which objects will behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content. Note: Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles. In all contents, SI units should be followed. Working in different sets of units can be taught through relevant software. Some topics are related with aviation also so aviation terms and examples should be preferred.

LEARNING OUTCOMES

After undergoing this subject, the students will be able to:

Compute units and dimensions of different physical quantities.

- Represent physical quantities as scalar and vectors. Solve difficult problems (walking of man, motion of lawn roller.)
- Analyze and design banking of roads as well as necessity of rolling of aircraft and apply conservation of momentum principle to explain recoil of gun etc.
- Identify forms of energy, conversion from one form to another. Compare and contrast the physical properties associated with linear motion and rotational motion and give examples of conservation of angular momentum.
- Describe the surface tension phenomenon and its units, cause of surface tension and effects of temperature on surface tension.
- Describe the viscosity of liquids. Define stress and strain. State Hooke's law and conditions under which it is valid.
- Measure temperature in various processes on different scales (Celsius, Kelvin Fahrenheit etc.)
- Distinguish between conduction, convection and radiation.
- Use equipments like vernier calliper, screw gauge, spherometer.

Unit	Contents	Hrs
1	PART-1 Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. Force, resolution and composition of forces: resultant, parallelogram law of forces, equilibrium of forces. Newton's Laws of motion: concept of momentum, Newton's laws of motion and their engineering applications, derivation of force equation from Newton's second law of motion; conservation of momentum, impulse. Simple numerical problems	6
2	PART-2 Mechanics of solids Friction: Definitions: Types of friction, Laws of static friction, Limiting friction, Angle of friction, angle of repose; motion on horizontal and inclined	14

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	planes. Methods of reducing friction, Concept of stress and strain at a point; Concepts of elasticity, plasticity, strain hardening, failure (fracture/yielding), one dimensional stress-strain curve; Generalized Hooke's law. Force analysis — axial force, shear force, bending moment and twisting moment. Bending stress; Shear stress; Concept of strain energy; Yield criteria.	
3	<p>PART-3</p> <p>Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets.</p> <p>Rotational Motion: Concept of translatory and rotating motion with examples. Concept of torque, angular momentum and their relationship. Angular velocity and Conservation of angular momentum.</p> <p>Moment of inertia and its physical significance, radius of gyration, Theorems of parallel and perpendicular axes (statements)</p>	10
4	<p>PART-4 Properties of Matter</p> <p>Pressure: definition, its units, atmospheric pressure, gauge pressure, absolute pressure, U-tube manometers and barometer gauges and their applications</p> <p>Surface tension: concept, its units, angle of contact, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension</p> <p>Fluid motion, stream line and turbulent flow, Equation of Continuity, Bernauli's Theorem and their applications.</p> <p>Viscosity and coefficient of viscosity: Buoyant force, buoyancy, Stoke's Law and derivation of terminal velocity, effect of temperature on viscosity and its application in hydraulic systems.</p>	10
5	<p>PART-5</p> <p>Oscillations: Simple harmonica motion. Differential equation of SHM and its solutions.</p> <p>Kinetic and Potential Energy, Total Energy and their time averages. Damped Oscillations.</p>	10
6	<p>PART-6 Thermometry</p> <p>Difference between heat and temperature on the basis of K.E. of molecules Principles of measurement of temperature and different scales of temperature and their relationship.</p> <p>Resistance thermometers and Pyrometers with their field applications such as Thermocouple, Bi-metallic thermometer.</p> <p>Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them</p> <p>Modes of transfer of heat (Conduction, convection and radiation with examples)</p> <p>Co-efficient of thermal conductivity, determination of thermal conductivity of good conductor (Searle's method) and bad conductor (Lee's disc method)</p>	10

INSTRUCTIONAL STRATEGY

1. Teacher may use various teaching aids like models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject.
2. Students need to be exposed to use of different sets of units and conversion from one unit type to another. Software may be used to solve problems involving conversion of units.

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3. The teacher should explain about field applications before teaching the basics of mechanics, work, power and energy, rotational motion, properties of matter etc. to develop proper understanding of the physical phenomenon.
4. Use of demonstration can make the subject interesting and develop scientific temper in the students.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making Actual laboratory and practical work, exercises and viva-voce

Reference Books

1. University Physics. FW Sears, MW Zemansky and HD Young13/e, 1986. Addison Wesley
2. Mechanics Berkeley Physics course, v.1: Charles Kittel, et. Al. 2007, Tata McGraw-Hill
3. Applied Physics I & II by RA Banwait & R Dogra, Eagle Parkashan, Jalandhar
4. Applied Physics by Jasmer Kaur and Bhupinder Singh, Lords Publications, Jalandhar City

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APPLIED PHYSICS LAB

Subject Code: BAME3-428

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	To determine diameter of a wire using screw gauge.	4
2	To determine the mass of two different objects using a beam balance.	4
3	To study variation of time period of a simple pendulum of a given length by taking bobs of same size but different masses and interpret their result.	6
4	To study relationship between force of limiting friction and normal reaction.	4
5	To determine Young's modulus of elasticity of the material of a given wire.	4
6	To verify zeroth law of thermodynamics.	4
7	To find the Moment of Inertia of a flywheel about its axis of rotation	4
8	To find the surface tension of a liquid by capillary rise method.	6
9	To determine the atmospheric pressure at a place using Barometer.	4
10	Calculation of the Momentum, Kinetic energy, and Velocity after collision.	4
11	To find the force constant of a helical spring by plotting a graph between load and extension.	6
12	To determine the internal resistance of a given primary cell using barometer.	6
13	To note the change in level of liquid in a container on heating and interpret the observations.	4

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SYLLABUS 2020 BATCH ONWARDS**

ELECTRONIC FUNDAMENTAL AND DIGITAL TECHNIQUES – II

Subject Code: BAME3-429

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

This subject comes under the Core Technology group and will enable the students to comprehend the theory, concepts, characteristics and working principles of basic electronic devices and their applications in electronic circuits. The knowledge of various devices acquired by the students will help them to design, test, troubleshoot and repair electronic circuits

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- 1) understand Computer related terminology and typical memory devices
- 2) Acquire knowledge of Operation, application and identification in logic diagrams of multiplexers.
- 3) Understand Principles of operation of common types of displays Functions that may be typically integrated in the Integrated Modular Avionic (IMA)

Units	Contents	Hrs
1	Basic Computer Structure 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).	5
2	a) Software management control: Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes. b) On board Maintenance Systems (ATA 45) Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).	7
3	a) Electronic Instrument Systems Typical systems arrangements and cockpit layout of electronic instrument systems b) Electronic Displays 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; 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;	18
4	Typical Electronic/Digital Aircraft Systems 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 EICAS-Engine Indication and Crew Alerting System	10

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	<p>FBW-Fly by Wire FMS-Flight Management System IRS-Inertial reference system</p>	
5	<p>Integrated Modular Avionics(ATA42) Introduction of various 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.</p>	12
6	<p>Cabin Systems(ATA44) 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.</p>	8

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should show various types of engineering materials to the students. Students should be asked to collect various electronics components available in the market.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making

Reference Books:

1. EASA module 5 Digital Techniques Electronic Instruments Systems
2. Basic Electronics-BernardGroB
3. Digital Fundamentals by Malvino and Leech
4. Aircraft Electrical and Electronics systems- by Mike tooley and David Wyatt

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SYLLABUS 2020 BATCH ONWARDS**

ELECTRONIC FUNDAMENTAL AND DIGITAL TECHNIQUES – II LAB

Subject Code: BAME3-430

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	Familiarization with computer architecture and its components	6
2	Identification of components of Display systems	6
3	Operation check of Display system.	6
4	Familiarization with CRT and various components associated with EFIS	6
5	Identification of components in engine display systems	6
6	Familiarization with light emitting diodes and Liquid crystal display	6
7	Familiarization with typical Electronic / Digital Aircraft systems.	6
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.	6
9	Demonstration of various types of cockpit layout.	6
10	Demonstration of ESD.	6

**MRSPTU B.Sc. (HONS.) AIRCRAFT MAINTENANCE ENGINEERING
SYLLABUS 2020 BATCH ONWARDS**

AIRCRAFT PISTON ENGINE –II

Subject Code: BAME3-531

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

Lot of development has taken place in the field of piston engines as well as in propeller used in aircraft. New engine and propeller designs and technology are being developed continuously since its inception. AME students in this course are required to have knowledge of various types of piston engines and their applications in aircraft. For this purpose, it is necessary to teach them basics of the systems of piston engines fitted in aircraft. This subject aims at developing knowledge about the systems found in different piston engines used in the Aircraft industries.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Understand characteristics and properties of fuel and lubricating oil used in piston engines.
- Understand about fuel system components of the engine.
- Understand about the functioning of oil system components of the engine.
- Understand about ignition system components of the engine.
- Know about starting system of the engine.
- Know about induction system, exhaust system, cooling system of the engine.
- Understand about different engine instrumentation system.
- Piston engine monitoring, ground operation engine preservation and storage techniques.

Units	Contents	Hrs
1	Engine Fuel Systems (Carburetor): Carburetors Types, construction and principles of operation; Icing and heating.	8
2	Engine Fuel Systems (Injection): Types, construction and principles of operation.	2
3	Engine Fuel Systems (Electronic engine control):: Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components.	4
4	Lubricants and Fuels: Properties and specifications; Fuel additives; Safety precautions.	4
5	Lubrication Systems: System operation/lay-out and components.	8
6	Starting and Ignition Systems: Starting systems, pre-heat systems; Magneto types, construction and principles of operation; Ignition harnesses, spark plugs; Low and high tension systems.	10
7	Induction, Exhaust and Cooling Systems: Construction and operation of: induction systems including alternate air systems; Exhaust systems, engine cooling systems — air and liquid.	4
8	Engine Indication Systems: Engine speed; Cylinder head temperature; Coolant temperature; Oil	6

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	pressure and temperature; Exhaust Gas Temperature; Fuel pressure and flow; Manifold pressure.	
9	Powerplant Installation: Configuration of firewalls, cowlings, acoustic panels, engine mounts, antivibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.	4
10	Engine Monitoring and Ground Operation: 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.	8
11	Engine Storage and Preservation: Preservation and de-preservation for the engine and accessories/ systems.	2

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should give demonstration of various types of piston engines as well as propellers, its systems and components, to the students. Different mock ups, transparencies and animated videos should be shown to the students for better understanding of the lesson.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making.

Reference Books:

1. Airframe and Power plant Mechanics (EA-AC 65- 12A) -Power Plant Hand FAA
2. Civil Aircraft Inspection Procedure (CAP 459) Part II Aircraft
3. Aircraft Piston Engines-By Herschel Smith
4. Aviation Maintenance Technician Series by Dale Crane
5. Aircraft Power Plants by Kroes& Wild
6. Aircraft A & P Technician Power Plant by Jeppesen
7. 12A

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AIRCRAFT PISTON ENGINE -II LAB

Subject Code: BAME3-532

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	Familiarisation with different types of carburettors.	4
2	Identification and inspection of engine fuel system and function of carburettor systems.	4
3	Familiarisation with engine driven fuel pump and booster pump.	4
4	Identification and inspection of components and function of lubrication system.	4
5	Familiarisation with different parts of magneto, impulse coupling.	4
6	Inspection of ignition harness and ignition switch.	4
7	Function check of magneto.	4
8	Spark plug cleaning, gap checking and testing.	4
9	Familiarisation with engine starting systems.	4
10	Familiarise with piston engine instruments like tachometer, CHT gauge, oil pressure gauge, manifold pressure gauge etc.	4
11	Familiarise with engine nacelle and check the complete overview of the engine and its attachments, connections and controls.	4
12	Preparation for engine and accessories/ systems for preservation and storage.	4
13	Perform top overhaul of the engine.	8
14	Perform engine ground run-up and interpret engine power output and parameters.	4

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SYLLABUS 2020 BATCH ONWARDS**

AIRCRAFT SYSTEM-I

Subject Code: BAME3-533

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

This subject provides the knowledge about handling procedures of aircraft on ground which includes weighing, balancing, taxiing, re-fuelling/defueling procedures and will enable the students to comprehend the theory, concepts and working of pneumatic, Air conditioning and cabin pressurization system. This will help them to troubleshoot the faults in the systems

LEARNING OUTCOMES

Key areas of study include:

- Aircraft handling and effects of environmental conditions on it and its storage.
- Emergency equipment requirements, cabin lay-out and cargo handling and retention equipment
- Airframe systems; including hydraulic, pneumatic, and environmental control systems etc.

Units	Contents	Hrs
1	Flight Controls(ATA27) Primary controls: aileron, elevator, rudder, spoiler; Trim Tabs; Active load Limiter; High lift devices; Lift dump, speed brakes; System operation: manual, hydraulic, pneumatic, gust locks systems; Balancing and rigging; Stall protection/warning system.	9
2	Hydraulic Power(ATA 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Filters; Pressure Control; Power generation pneumatic, Emergency power generation. Power distribution; Indication and warning systems; Interface with other systems.	9
3	Landing Gear(ATA 32) 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	6
4	Fuel Systems(ATA28) System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross- feed and transfer; Indications and warnings; Refuelling and defueling; Longitudinal balance fuel systems.	9
5	Equipment and Furnishings (ATA 25) (a) Emergency equipment requirements; Seats, harnesses and belts. (b) Cabin lay-out; Equipment lay-out; Cabin Furnishing Installation (level 2); Cabin entertainment equipment; Galley installation;	6

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	Cargo handling and retention equipment; other systems.	
6	Pneumatic/Vacuum(ATA36) System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems	9
7	Air Conditioning and Cabin Pressurization(ATA21) Pressurization and air conditioning systems; Cabin pressure controllers, protection and warning devices Heating Systems	6
8	Ice and Rain Protection(ATA30) Ice formation, classification and detection; Anti-icing systems: electrical, hot air and chemical; De-icing systems: electrical, hot air, pneumatic and chemical; Rain repellent System; Probe and drain heating; Wipersystems	6

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should practically demonstrate the aircraft weighing and various procedures related to aircraft system on aircraft by referring aircraft manual. Students should be asked to maintain their log cards/ books..

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making

Reference Books:

1. Airframe and Powerplant Mechanics (AC 65-15A) -Airframe Hand Book FAA
2. Civil Aircraft Inspection Procedure (CAP 459) Part II Aircraft
3. A & P technician Air Frame Text Book by Jeppesen
4. Aircraft Repair Manual (FAA-AC-43.13)-By Larry Reithmaier
5. Aviation Maintenance Technician Hand book by FAA Hydraulic Servo Systems by M. GUILLON:
6. Aircraft Instruments-by E.H.J.Pallett
7. Aircraft Electrical System-by E.H.J.Pallett
8. EASA Module-11 by AIRCRAFT TECH BOOK CO.
9. Airframe and Powerplant Mechanics (AC 65-15A) -Airframe Hand Book FAA

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SYLLABUS 2020 BATCH ONWARDS**

AIRCRAFT SYSTEM-I LAB

Subject Code: BAME3-534

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	Demonstrations of Flight control surfaces on aircraft with its operation.	4
2	Demonstrations for brake bleeding methods on light airplane and identify the type of hydraulic fluids by its color.	10
3	Demount a tire from an aircraft wheel, inspect the tire for wear & the wheel & tire for damage and reinstall the tire on the wheel.	10
4	Familiarization and inspection of Fuel system of light aeroplane.	6
5	Practical demonstrations to Replace passenger seats and Check seat belts for serviceability with available aircrafts.	4
6	Familiarization of pneumatic system of the aircraft.	4
7	Demonstrations to Locate and inspect aircraft pressurization system components and safety devices and use maintenance manual of available aircraft.	6
8	Demonstration on an aircraft locate and identify the compressor ,condenser, the evaporator and the service valves of the vapor cycle airconditioning system	6
9	Demonstrate the correct way to inspect and clean rubber de-icer boots	6
10	Locate and identify the components in a pneumatic de-icer system.	4

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AVIONICS

Subject Code: BAME3-535

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

Maxwell first suggested the existence of electromagnetic waves in 1864. In 1894, Marconi demonstrated the commercial potential of the phenomenon that Maxwell predicted and Hertz actually used in his apparatus. Marconi's system of wireless telegraphy proved to be invaluable for maritime communications. The use of radio equipment & avionics in general has increased markedly for all types of aircraft during the past century. Today the term avionics, which is a combination of the words aviation electronics, encompasses a variety of electronic system. This subjects aims at developing knowledge of avionics system installed in aircraft can include communications (COMM), navigation (NAV) & autopilot.

LEARNING OUTCOMES

After undergoing this syllabus, the students will be able to:

- Understand about function of aircraft radio communication system.
- Understand about function of aircraft radio navigation system.
- Understand about automatic flight control system.
- Understand about on board maintenance system.
- Understand about on board information sharing system.
- Understand about Avionic General Test Equipment.

Units	Contents	Hrs
1	Instruments/Avionic Systems Instrument Systems (ATA 31) Pitot static: altimeter, air speed indicator, vertical speed indicator; Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn coordinator; Compasses: direct reading, remote reading; Angle of attack indication, stall warning systems. Glass cockpit;Other aircraft system indication.	20
2	Communication (ATA 23) 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;	12
3	Navigation (ATA 34) 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; Global Positioning System (GPS), Global Navigation Satellite Systems (GNSS); INS (Inertial Navigation System); Air Traffic Control transponder, secondary surveillance radar; Traffic Alert and Collision Avoidance System(TCAS). Weather Avoidance Radar; Radio altimeter;	16
4	Auto-flight (ATA 22)	12

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	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 & categories, modes of operation : Approach, glide slope, land, go-around; system monitors and failure conditions.	
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INSTRUCTIONAL STRATEGY

While imparting instructions

- Instructor must show various images, videos & animation related to the topic with the help of projector (OHP).
- With the help of Aircraft Flight Simulator demonstrate different aircraft radio system to the students.
- Arrange visit to different Airline & MROs to demonstrate functioning of different aircraft system and its components installed into actual aircraft engage into operation.

MEANS OF ASSESSMENT

Assignments & oral tests; mid-term & end-term written test; project work.

Reference Books:-

1. Micro Electronics Aircraft System- by E.H.J. Pallett
2. Aircraft Electricity and electronics- by Thomas K Eismen
3. Civil Aircraft Inspection Procedure(CAP 459) - Part II (Aircraft)
4. Integrated Electronics - Millman and Halkias
5. Aircraft Radio System - by J. Powell
6. Electronic Communication System - by George Kennedy
7. EASA Module-11 by AIRCRAFT TECH BOOK CO.
8. Aircraft Instruments-by E.H.J.Pallett

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AVIONICS LAB

Subject Code: BAME3-536

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	VHF / HF Communications LRU replacement.	6
2	Use of various test equipment for avionics system maintenance.	6
3	VHF Navigation LRU system tests.	4
4	Inspection of ELT.	6
5	Pitot static leak test as per manufacturer's instructions.	6
6	Antenna replacement and system testing.	6
7	Radio Standing Wave ratio Measurement Tests.	4
8	Compass Swinging and preparing the deviation card.	8
9	VOR Systems function testing.	6
10	DME Functional Testing.	4
11	ADF component functions and tests.	4

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QUALITY MANAGEMENT SYSTEM

Subject Code: BAME3-537

**L T P C
5 1 0 6**

Duration: 90 Hrs.

RATIONALE

The aim of quality management system is to improve understanding of what customers really want in the way of services the organisation produces and to ensure that it consistently delivers exactly what is expected. For this purpose, in this course students are taught the quality management system to develop knowledge to maintain consistently the standard of maintenance work carried out with economy.

Safety Management System (SMS) is a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedure.

Fuel Tank Safety (FTS) program training is to familiarize the students with;

- Theoretical background to fuel system safety issues
- The concept of Ignition source prevention
- The concept of flammability reduction
- Changes to Instructions for Continuing Airworthiness and their availability to and use by maintenance personnel
- The purpose and hazards of Flammability Reduction Systems

LEARNING OUTCOMES

After undergoing this course, the students will be able to;

- Apply his/her knowledge to carry out audit and ensure best Quality management system.
- Be able to plan, organise and conduct an internal audit of quality control in aviation industry.
- Use his knowledge to implement Concept of Zero defect.
- SMS training provide students' knowledge of safety management concepts and ICAO Standards and Recommended Practices (SARPs) on safety management in Annexes 6, 11 and 14, and related guidance material; and develop participants' knowledge to certify and oversee the implementation of key components of an SMS, in compliance with relevant ICAO SARPs.
- By undergoing FTS training candidates will familiarize with the elements of fuel system safety issues including its language, history and practical considerations.
- Equip candidates in their everyday tasks to account for the challenges posed by the Fuel Tank System Safety issues.

Units	Contents	Hrs
1	INTRODUCTION: Need of Aviation Quality. Concept of terms – Quality, Quality Policy, Quality improvement, Reliability, Benchmarking, Quality council, Quality circle, Six Sigma, Acceptance sampling. Introduction to Statistical methods for quality control, Process capability for aerospace applications.	12
2	QUALITY CONTROL AND QUALITY ASSURANCE: Introduction of Seven Quality Control tools. Ishikawa diagram, control charts, 80-20 rule.	12

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	Variation in manufacturing or services- its causes, measurement and control, Statistical Process Control, Concept of Zero defects. ISO-9001 quality systems, AS-9100 Aerospace Standards requirements.	
3	AUDIT AND SURVEILLANCE: Quality audit procedures, auditing techniques, recording findings and evidence retention, communication, assessing compliance action and monitoring compliance. Statistical analysis and risk assessment.	6
4	INTRODUCTION TO SAFETY MANAGEMENT SYSTEMS (SMS); Objective and contents. Introductory concepts. SMS features. System description.	12
5	Gap analysis. SMS and QMS. SSP/SMS and the accident investigation process. Integration of management systems. Clarifying terms. The difference between safety slogans and safety principles.	18
6	FUEL TANK SAFETY (FTS) TRAINING; Major accidents and accident investigations and their conclusions involving fuel system safety, including TWA flight 800. Theoretical background to fuel system safety issues. The concept of Ignition source prevention. The concept of flammability reduction.	14
7	Background to and objectives of SFAR 88 and INT/POL/25/12 Concepts introduced by SFAR 88 & INT/POL/25/12 and TGL 47 – CDCCLs, Airworthiness Limitations, Modifications Changes to Instructions for Continuing Airworthiness and their availability to and use by maintenance personnel The purpose and hazards of Flammability Reduction Systems.	16

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should demonstrate various figures and diagrams concerned to quality management system, SMS and FTS to the students. Visits can be planned to the aviation organizations to familiarize the students with the live aircraft environment. Presentations and animated videos concerned with these topics can also prove to be very useful to understand the topics.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests.

Reference Books:

1. EL Grant & RS Leavenworth, "Statistical Quality Control", McGraw Hill Co. M.
2. Mahajan, "Statistical Quality Control", Dhanpat Rai & Co.
3. Kanishka Bedi "Quality Management", Oxford University Press
4. ISO 9001
5. Federal Aviation Administration Advisory Circulars, related with the topics.
6. Safety Management Systems HANDBOOK by ACI World Safety and Technical Standing Committee
7. SAFETY MANAGEMENT SYSTEMS MANUAL by FAA
8. Fuel Tank Safety Training Notes

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AIRCRAFT MAINTENANCE - FIXED WING LIGHT / COMPOSITE AIRCRAFT

Subject Code: BAME3-638

L T P C
3 1 0 4

Duration: 60 Hrs.

RATIONALE

This Subject has been prepared for specific Fixed Wing Light / Composite Aircrafts. It contains information necessary to enable the students to service, troubleshoot, functionally test, and repair systems and equipment in the particular aircraft. It also includes information necessary for the students to perform maintenance or make minor repair to units in the aircraft normally requiring such action on the flight line or in the maintenance hangar. It covers the aircraft configuration as delivered to the customer.

LEARNING OUTCOMES

After undergoing this subject, the students will be able to:

- * Read the Maintenance Manual, Illustrated Parts Catalogue, Wiring Diagrams and other literature available with the aircraft.
- * Understand the various systems fitted to the specific aircraft.
- * Troubleshoot the Landing Gear system.
- * Carryout towing, Levelling, Weighing and Pre-flight operations.

Units	Contents(Hansa)	Hrs
1	General Description of Light Aircraft as per AMM	4
2	Towing and Taxiing, Placards and Markings, Precautions for Towing.	8
3	Fuselage, Wing And Empennage, Aileron Control System, Wing Flap Control System, Elevator Control System, Elevator Trim Tab Control System, Rudder Control System, Landing Gear and purging of Brakes.	12
4	Engine, Propeller, Fuel System.	10
5	Instruments & Instrument Systems.	2
6	Electrical System, Lighting And Lightning Protection	2
7	Wiring Diagrams.	2
8	Avionics.	2
9	Landing Gear, Lights, Instruments and Panels, Lights.	8
10	Ground Handling, Servicing, Cleaning, Lubrication and Inspection.	10

INSTRUCTIONAL STRATEGY

While teaching this subject teachers need to refer the Aircraft Maintenance Manual and other publications of the fixed wing Light/Composite aircraft available with the Institute. To make the subject more interesting artificial snags can be developed in systems and troubleshooting procedures should be followed for rectification as per Aircraft maintenance Manual.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests, troubleshooting.

Reference Books –Aircraft maintenance-fixed wing Light/composite aircraft.

1. Specific “Aircraft Maintenance Manual” for Light/composite aircraft available with the Institute.
2. Specific “Aircraft Flight Manual” for Light/composite aircraft available with the Institute.
3. Any other literature provided with the heavy/complex aircraft.

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AIRCRAFT MAINTENANCE - FIXED WING LIGHT / COMPOSITE AIRCRAFT LAB

Subject Code: BAME3-639

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	Dimensions and Areas, Lifting and Shoring, Levelling and Weighing procedures.	08
2	Ground Handling, Servicing, Cleaning, Lubrication and Inspection.	08
3	Fuselage, Wing And Empennage, Aileron Control System, Wing Flap Control System, Elevator Control System, Elevator Trim Tab Control System, Rudder Control System, Landing Gear And Brakes.	10
4	Engine, Propeller, Fuel System, supercharging system, lubrication system, carburettor system, ignition system.	18
5	Instruments & Instrument Systems.	02
6	Electrical System, Lighting And Lightning Protection	04
7	Pre-flight Inspection.	02
8	Post flight Inspection.	02
9	Inspection Following an Incident, 25 Hours inspection.	06

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AIRCRAFT MAINTENANCE-FIXED WING HEAVY/COMPLEX AIRCRAFT

Subject Code: BAME3-640

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

This Subject has been prepared for a specific fixed wing Heavy/Complex Aircrafts available with the affiliated institute. It contains information necessary to enable the students to service, troubleshoot, functionally test, and repair systems and equipment in the particular aircraft. It also includes information necessary for the students to perform maintenance or make minor repair to units in the aircraft normally requiring such action on the flight line or in the maintenance hangar. It covers the aircraft configuration as described in the AMM.

LEARNING OUTCOMES

After undergoing this subject, the students will be able to:

- * Read the Maintenance Manual, Illustrated Parts Catalogue, Wiring Diagrams and other literature available with the aircraft.
- * Understand the various systems fitted to the specific aircraft.
- * Troubleshoot the Landing Gear and other systems.
- * Carryout towing, Leveling, Procedure of weighing and Pre-flight operations.

Units	Contents(For Lear jet-29) Manual Learjet 25B/C/D/F	Hrs
1	Brief introduction of the Maintenance Manual, The list of abbreviations used in manual, Definition of terms used in Manual, Visual inspection criteria.	5
2	Dimensions and Areas, Lifting and Shoring, Levelling and Weighing procedures.	6
3	Towing and Taxiing, Placards and Markings, Precautions for Towing.	4
4	Air Conditioning and Pressurization.	5
5	Electrical Power, Equipment and Furnishings.	5
6	Fire Protection, Flight Controls.	4
7	Fuel, Hydraulic Power, Ice and Rain Protection.	8
8	Landing Gear, Lights, Oxygen system, Vacuum system, Instruments and Panels, Lights.	5
9	Doors, Fuselage, Stabilizer, Windows, Wings,	6
10	Engine Fuel and Control, Ignition, Engine Controls, Engine Oil and lubrication system.	12

INSTRUCTIONAL STRATEGY

While teaching this subject teachers need to refer the Aircraft Maintenance Manual and other publications of the fixed wing Heavy/Complex aircraft available with the Institute. To make the subject more interesting artificial snags can be developed in aircraft systems and troubleshooting procedures should be followed for rectification as per the Maintenance Manual.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests, troubleshooting.

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Reference Books – Aircraft maintenance-fixed wing heavy/complex aircraft.

1. Specific “Aircraft Maintenance Manual” for heavy/complex aircraft available with the Institute.
2. Specific “Aircraft Flight Manual” for heavy/complex aircraft available with the Institute.
3. Any other literature provided with the heavy/complex aircraft

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AIRCRAFT MAINTENANCE - FIXED WING HEAVY / COMPOSITE AIRCRAFT LAB

Subject Code: BAME3-641

L T P C
0 0 4 2

Duration: 60 Hrs.

Practical	Contents	Hrs
1.	Measure the Dimensions and Areas of the aircraft and verify with the aircraft literature available with the aircraft.	6
2.	Jack the complete aircraft and level it longitudinally as well as laterally.	6
3.	Tow the aircraft to the tarmac and prepare for ground run.	6
4.	Check all primary flight controls for correct functioning and Operation.	4
5.	Removal and installation of aircraft battery.	4
6.	Check and replenish lubricating oil if required.	6
7.	Removal of landing gear wheel, inspection & greasing of its bearings, re-installation.	10
8.	Familiarisation with type of Engine installed, its mounting procedure, general specifications of the engine, type of oil used.	12
9.	General description of the FCU.	6

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AIRCRAFT SYSTEM-II

Subject Code: BAME3-642

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

This subject provides the knowledge about Batteries Installation and Operation of aircraft lights system and will enable the students to comprehend the theory, concepts and working of various instruments and taking readings, system lay-out of oxygen system and Integrated Modular Avionics This will help them to troubleshoot the faults in the systems

LEARNING OUTCOMES

After successful completion of course students should be able to

1. To know about basic principle of flight instruments that how they are useful to pilots for operation of flight.
2. To understand about what types of operating systems are used to conduct successful operation.
3. To understand about how aircrafts are maintained
4. To understand about how controls operate an aircraft.

Units	Contents	Hrs
1	Aircraft Electrical Power System (ATA24) 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;	10
2	Aircraft Lights System(ATA 33) External: navigation, anti-collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency Lights.	4
3	Oxygen System(ATA35) System lay-out: cockpit, cabin; Sources, storage, charging and Distribution; Supply regulation; Indications and warnings;	6
4	Fire Protection(ATA26) A)Fire and smoke detection and warning systems; Fire extinguishing systems; System tests. B)Portable fire extinguisher.	8
5	Water/Waste(ATA38) Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspects.	8
6	Information Systems (ATA 46) 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 functions 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	14

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	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.	
7	Door and Door Warning Type of Doors. Sensors, Escape Slides, Door warning systems, Inspections techniques	4
8	Air Conditioning and Cabin Pressurization(ATA21) 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.	6

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should practically demonstrate the aircraft weighing and various procedures related to aircraft system on aircraft by referring aircraft manual. Students should be asked to maintain their log cards/ books..

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making

Reference Books:

1. Aircraft Electricity and electronics-by Bent McKinley and also by Eismin/Bent McKinley
2. Civil Aircraft Inspection Procedure(CAP 459) -Part II Aircraft
3. EASA Module-11 by AIRCRAFT TECH BOOK CO.
4. Airframe and Powerplant Mechanics (AC 65-15A) -Airframe Hand Book FAA

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AIRCRAFT SYSTEMS-II LAB

Subject Code: BAME3-643

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	Demonstration of Reading and interpretation of electrical schematic and wiring diagrams and Identification of components of electrical power supply system.	4
2	Demonstrate the Replacement of switches and circuit breakers and system check	4
3	Demonstrate Installation and operation check of Batteries in aircraft	4
4	Familiarization of voltage adjustment.	4
5	Demonstration of Internal lighting, replace bulb and filament.	4
6	Demonstration of Operational checkup of stall warning system and angle of attack indicating system	4
7	Demonstration Operational check of temperature indicating system	4
8	Familiarization of the Gyroscopic Instrument component of an aircraft.	6
9	Demonstrate the proper range marking on glass of an aircraft instrument.	4
10	Familiarization of RR/DR compass	4
11	Familiarization of oxygen system of an aircraft.	4
12	Demonstrate the correct way to use a CO2 fire extinguisher to extinguish a fire in fuel that has spilled on the ground and to extinguish an induction system fire in piston engine aircraft	4
13	Demonstrate the water waste system/ toilet system layout/ servicing and inspection.	4
14	Demonstration of Identification of components of door warning system and its operation check	6

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GAS TURBINE ENGINE

Subject Code: BAME3-644

**L T P C
3 1 0 4**

Duration: 60 Hrs.

RATIONALE

Lot of development has taken place in the field of gas turbine engine. New engine designs and technology are being developed continuously since its inception. AME students in this course are required to have knowledge of various types of turbine engines and its applications. For this purpose, it is necessary to teach them basics of the construction, systems of gas turbine engines fitted in aircraft. This subject aims at developing knowledge about the basic design and functioning of different turbine engine systems used in the Aircraft industries.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Understand principle of operation, basic design and construction of gas turbine engines.
- Classify different types of turbine engines.
- Know characteristics, properties and identification of engines used in aircraft.
- Understand about fuel, oil and ignition system components of the engine.
- Know about starting system, power augmentation system, fire protection system of the engine.
- Gas turbine engine monitoring, ground operation engine preservation and storage techniques.

Unit	Contents	Hrs
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
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
3	Inlet: Compressor inlet ducts; Effects of various inlet configurations; Ice protection.	2
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
5	Combustion Section: Constructional features and principles of operation.	2
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	3

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	creep.	
7	Exhaust: Constructional features and principles of operation; Convergent, divergent and variable area nozzles; Engine noise reduction; Thrust reversers.	2
8	Bearings and Seals: Constructional features and principles of operation and handling.	2
9	Lubricants and Fuels: Properties and specifications; Fuel additives; Safety precautions.	1
10	Lubrication Systems: System operation/lay-out and components.	2
11	Fuel Systems: Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components.	3
12	Air Systems: Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services.	3
13	Starting and Ignition Systems: Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements.	3
14	Engine Indication Systems: 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.	4
15	Power Augmentation Systems: Operation and applications; Water injection, water methanol; Afterburner systems.	2
16	Turbo-prop Engines: Gas coupled/free turbine and gear coupled turbines; Reduction gears; Integrated engine and propeller controls; Over-speed safety devices.	3
17	Turbo-shaft engines: Arrangements drive systems, reduction gearing, couplings, control systems.	3
18	Auxiliary Power Units (APUs): Purpose, operation, protective systems.	3
19	Powerplant Installation: 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.	3
20	Fire Protection Systems: Operation of detection and extinguishing systems.	2
21	Engine Monitoring and Ground Operation: 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.	4
22	Engine Storage and Preservation: Preservation and de-preservation for the engine and accessories/ systems.	3

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INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should give demonstration of various types of gas turbine engines, its systems and components, to the students. Different mock ups, transparencies and animated videos should be shown to the students for better understanding of the lesson.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making

Reference Books:

1. Aircraft Gas Turbine Technology by IRWINE TREAGER
2. The Jet Engine' by ROLLS ROYCE
3. Aviation Maintenance Technician Series by Dale Crane
4. Jet Aircraft power Systems' by JACK V. CASAMASSA and RALPH D.BENT
5. Civil Aircraft Inspection Procedure (CAP459) Part- II Aircraft
6. Aircraft Power Plants by M.J.KROES, T.W.Wild, R.D.Bent and J.L.McKINLEY;
7. EASA Module-15 Gas Turbine Engine by AIRCRAFT TECH BOOK CO.
8. Aviation Maint Technician Hand Book-Power Plant -12A by FAA
9. Aircraft A & P Technician Power Plant by Jeppesen

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GAS TURBINE ENGINE LAB

Subject Code: BAME3-645

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Practical	Contents	Hrs
1	Identify engine types, subassemblies and components of turbine engines .	4
2	Identify various parts of thrust management and bypass system of turbine engine.	4
3	Identification and inspection of compressors stages.	4
4	Engine compressor bleed air familiarisation.	2
5	Identification various components of combustion systems and methods of cooling's.	4
6	Identification of exhaust system and methods of noise reduction.	2
7	Familiarisation with oil system components mock-up.	2
8	Familiarisation with fuel system components mock-up.	6
9	Familiarization with methods of engine starting and ignition systems.	4
10	Operation check of Engine indicating systems.	4
11	Familiarization of GPU starting and shutdown procedure.	4
12	Familiarization with power plant removal & installation.	8
13	Visual Inspection of engines.	4
14	Familiarization with engines and airframe interface.	4
15	Study engine storage and preservation.	4