

SEMESTER I

Course Code		Credits :3
USARM 101	BASIC AERODYNAMICS	
<p>Unit I -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, profile (parasite) drag, induced drag, centre of pressure, 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.</p>		20 Lectures
<p>Unit II -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.</p>		20 Lectures
<p>Unit III -Flight Stability and Dynamics: International Standard Atmosphere (ISA), application to aerodynamics. Longitudinal, lateral and directional stability (active and passive).</p>		20 Lectures
<p>Reference Book :- Mechanics of flight by A C Kermode</p>		

Course Code		Credits :3
USARM 102	ELECTRICAL FUNDAMENTALS	
<p>Unit I: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. 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. Generation of Electricity Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion. 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. DC Circuits Ohms Law, Kirchoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage and current; Significance of the internal resistance of a supply.</p>		30 Lectures

Unit II: Resistive (R), Capacitive (C) and Inductive (L) Circuits :

Inductance/Inductor

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

Resistance/Resistor

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.

Positive and negative temperature coefficient conductance; Fixed resistors, stability, tolerance and limitations, methods of construction; Variable resistors, thermistors, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge;

Power

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

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.

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.

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.

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

30 Lectures

Unit III : Motors and Generators:

DC Motor/Generator Theory

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

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.

Transformers

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

Filters

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

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 connections advantages and uses; Permanent Magnet Generators.

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.

30 Lectures

Reference Book :

1. Aircraft Electricity and Electronic by Eismen (Chapter 3,6,10,11,12,13)
2. Examples in electrical Calculation by Admiralty
3. Electrical technology by B L Theraja (Volume 2)

Course Code		Credits :3
USARM 103	ELECTRONIC FUNDAMENTALS	
<p>Unit I –Semiconductors: Diode symbols; Diode characteristics and properties; Diodes in series and parallel; Main characteristics and use of silicon controlled rectifiers (thyristors), light emitting diode, photo conductive diode, varistor, rectifier diodes; Functional testing of diodes. Materials, electron configuration, electrical properties; P and N type materials: effects of impurities on conduction, majority and minority characters; PN junction in a semiconductor, development of a potential across a PN junction in unbiased, forward biased and reverse biased conditions; Diode parameters: peak inverse voltage, maximum forward current, temperature, frequency, leakage current, power dissipation; Operation and function of diodes in the following circuits: clippers, clampers, full and half wave rectifiers, bridge rectifiers, voltage doublers and triplers; Detailed operation and characteristics of the following devices: silicon controlled rectifier (thyristor), light emitting diode, Shottky diode, photo conductive diode, varactor diode, varistor, rectifier diodes, Zener diode.</p>		30 Lectures
<p>Unit II –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 stabilisation; Multistage circuit principles: cascades, push-pull, oscillators, multivibrators, flip-flop circuits. Integrated Circuits: Description and operation of logic circuits and linear circuits; Introduction to operation and function of an operational amplifier used as: integrator, differentiator, voltage follower, comparator; Operation and amplifier stages connecting methods: resistive capacitive, inductive (transformer), inductive resistive (IR), direct; Advantages and disadvantages of positive and negative feedback. Description and use of printed circuit boards.</p>		30 Lectures
<p>Unit III – Servomechanisms : Understanding of the following terms: Open and closed loop systems, feed-Principles of operation and use of the following synchro system components/features: resolvers, differential, control and torque, transformers, inductance and capacitance transmitters. Understanding of the following terms: Open and closed loop, follow up, servomechanism, analogue, transducer, null, damping, feedback, dead band; Construction operation and use of the following synchro system components: resolvers, differential, control and torque, E and I transformers, inductance transmitters, capacitance transmitters, synchronous transmitters;Servomechanism defects, reversal of synchro leads, hunting.</p>		30 Lectures
<p>Reference Book : 1. Digital Principles and Applications by DONALD P. LEACH, ALBERTPAUL ALVINO,GOUTAM SAHA 2. Aircraft Instruments system by E H J Pallet</p>		

Course Code		Credits :3
USARM 104	MAINTENANCE PRACTICES	
Unit I -Workshop Practices : 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; Operation, function and use of avionic general test equipment. Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards. Operation, function and use of avionics general test equipments.		20 Lectures
Unit II-Hardware : Continuity, insulation and bonding techniques and testing; Use of crimp tools: hand and hydraulic operated; Testing of crimp joints; Connector pin removal and insertion; Co-axial cables: testing and installation precautions; Identification of wire types, their inspection criteria and damage tolerance. Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding. EWIS installations, inspection, repair, maintenance.		20 Lectures
Unit III–Pipes and safety precautions : Types of solid and blind rivets: specifications and identification, heat treatment. Rivnut, special non blind rivets. Riveted joints, rivet spacing and pitch; Inspection of riveted joints. Bending and belling / flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses Installation and clamping of pipes, Inspection and testing of springs, Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. Also, instruction in 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.		20 Lectures
Reference Book :- 1. FAA-H-8083-30(9A) & 15 A 2. Shop Theory (Anderson) 3. A/C powerplant – Kroes and Wild		

Course Code		Credits :4
USARM 105	Communication	
Unit I–Reading, Comprehension skills and vocabulary development : Abstracting and summarizing skills, Concepts of functional and reading vocabulary, Importance of vocabulary and its enhancement, Developing effective conversational skills, Oral and written expression of ideas.		20 Lectures
Unit II–Professional skill Professional skill development, writing: – letter writing, report writing, speaking & listening: – discussion, debates. Seven C’s of effective communication		20 Lectures

Unit III – Human rights:

Human rights constituents with special reference to Fundamental Rights in India

20 Lectures**Reference Book :-**

Human Rights and communication skills by Basantrani

PRACTICAL

Course Code	PRACTICALS	Credits : 1
USARM1P1	ENGINEERING DRAWING	50 marks
Use of Drawing Instruments, Lines & lettering. Construction of parabola, ellipse, hyperbola. First and Third angle projections Technology, orthographic, Isometric oblique perspective.		60 hours

Course Code	PRACTICALS	Credits :1
USARM 1P2	MAINTENANCE PRACTICES	50 marks
<ol style="list-style-type: none"> 1. Identifying different parts of aircraft. And their operation on aircraft. 2. Measure the length using micrometer 3. Measure the length using vernier caliper 4. Single patch riveting 5. Double patch riveting 6. Lap Joint by Riveting. 7. Butt joint by Riveting. 8. Make a rectangular doubler 9. Make a circular doubler 10. To study use of torque wrenches 11. To study use of spanners. 12. To study use of pliers 		60 hours

Course Code	PRACTICALS	Credits :1
USARM 1P3	ELECTRICAL FUNDAMENTALS	50 marks
<ol style="list-style-type: none"> 1. Use of multimeter 2. Measurement of AC voltage 3. Measurement of DC voltage 4. Measurement of resistance 5. Measurement of resistance with color band 6. Measurement of resistance in series 7. Measurement of resistance in parallel 8. Verify ohms law 9. Verify kirchoff's voltage law 10. Verify kirchoff's current law 11. Working of Relays and solenoids 12. Connection of battery cells in series and parallel 13. Familiarization with transformers 14. Measurement of output voltage of DC generator 15. Working of DC motor' 16. Measurement of output voltage of alternator 		60 hours

Course Code	PRACTICALS	Credits :1
USARM 1P4	ELECTRONIC FUNDAMENTALS	50 marks
1) Identification of components of R, L, C and measure values 2) Study of the features and controls of CRO & Multi meter 3) Study of Operating Controls of Voltmeter, Ammeter, Power meter, Ohm meter, DMM for its use 4) Study the characteristics of Electron Tube 5) Identification of Semiconductor devices – Diodes, Transistors and perform their characteristics 6) Study of SCR and its characteristics and waveform 7) Study of Zener diode and its characteristics and waveform 8) Study the working of Half wave, Full wave, Bridge Rectifier and observe the waveform 9) To check UJT transistor and perform its characteristics 10) To observe the performance of choke input and capacitance input filter after the rectification circuit		60 hours

SEMESTER II

Course Code		Credits :3
USARM 201	PHYSICS	
Unit I–Basic Physics : Mass, Centre of Gravity, Work, Energy, Power, Pressure, stress, Torque, Elasticity of Material, Speed, Velocity, Newton’s laws of motion, Principle of the Gyroscope. Friction, Viscosity, Fluid Resistance, Specific Gravity, Pressure & Buoyancy in liquids, kinetic Theory of gases, Speed of sound		20 Lectures
Unit II –Thermodynamics and Laws : Heat & Energy, Conversion, Thermodynamics, Charle’s and Boyle’s laws, Heat Transfer, Specific Heat, Absolute and relative humidity, Vapour locks, calorific values of fuels		20 Lectures
Unit III –Fluid dynamics : Dynamics of fluid, Pascal’s law & its application in Hydraulic press, Hydraulic and Pneumatic system. Bernoulli’s law, Venturi tube theory, Streamline, Laminar and turbulent flow.		20 Lectures
Reference Book :- FAA 9A		

Course Code		Credits :3
USARM 202	AVIATION LEGISLATION	
Unit I: Regulatory framework. Role of ICAO; the aircraft act and rule made there under; role of DGCA; relationship between CAR-21, CAR-M, CAR-145, CAR-66, the aircraft rules (applicable to aircraft maintenance and release); aeronautical information circulars (applicable to aircraft maintenance and release); CAR section 1 and 2.		30 Lectures
Unit II:CAR- 66, CAR 145 and Aircraft operations CAR 66 Certifying staff maintenance Detailed understanding of CAR-66. CAR 145 – Approved maintenance organizations Detailed understanding of CAR 145 and CAR M subpart F. Aircraft Operations Commercial air transport/ Commercial operations Air operators certificate; Operator’s responsibilities, in particular regarding continuing airworthiness and maintenance; Documents to be carried on board; aircraft playcarding (Markings)		30 Lectures
Unit III : Aircraft Certification (a) General certification rule: such a FAA and EACS 23/25/27/29; Type certification; Supplemental type certification; CAR – 21 Design/ Production organization approvals. Aircraft modifications and repairs approval and certification permit to fly requirements. (b) Documents: Certificate of airworthiness; Certificate of registration; noise certificate; weight schedule; radio station license and approval		30 Lectures

Reference Book :

1. CAR by DGCA
2. CAR 66 by DGCA
3. CAR 145 by DGCA
4. CAR 21 by DGCA
5. CAR M by DGCA

Course Code		Credits :3
USARM 203	DIGITAL TECHNIQUES I	
Unit I –Numbering Systems : Numbering systems: binary, octal and hexadecimal; Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa.		20 Lectures
Unit II – Data buses and Data conversions: Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications. Analogue Data, Digital Data; Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types		20 Lectures
Unit III - Logic Circuits and Microprocessors: Identification of common logic gate symbols, tables and equivalent circuits; Applications used for aircraft systems, schematic diagrams. 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		30 Lectures
Reference Book : 1. Digital Principles and Applications by DONALD P. LEACH, ALBERTPAUL ALVINO, GOUTAM SAHA		

Course Code		Credits :4
USARM 204	MATERIALS AND HARDWARE I	
Unit I - Aircraft Materials - Ferrous and Non Ferrous : Characteristics, properties and identification of common alloy steels and non ferrous alloys used in aircrafts; Heat treatment and application of alloy steels and non ferrous alloys. Testing of alloys steels and non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance. Wooden structures: Construction methods of wooden airframe structures. Characteristics properties and types of wood and glue used in aeroplanes, 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 covering.		30 Lectures
Unit II -Composite materials : Characteristics, properties and identification of common composite and non-metallic materials, other than wood, used in aircraft; Sealant and bonding agents.		30 Lectures

<p>The detection of defects/deterioration in composite and non-metallic material. Repair of composite and non-metallic material. Types of corrosion and their identification</p>	
<p>Unit III –Fasteners : Screw nomenclature; Thread forms, dimensions and tolerances for standard threads used in aircraft; Bolt types: specification, identification and marking of aircraft bolts, international standards; nuts, studs , Washers. Nuts: self locking, anchor, standard types; Machine screws: aircraft specifications; Studs: types and uses, insertion and removal; Self tapping screws, dowels. Locking devices: Tab and spring washers, locking plates, split pins, palnuts, wire locking, quickrelease fasteners, keys, circlips, cotter pins.</p>	20 Lectures
<p>Reference Book :- 1. FAA-H-8083-30(9A) & 15 A 2. Shop Theory (Anderson)</p>	

Course Code		Credits :3
USARM 205	MAINTENANCE PRACTICES AND GROUND HANDLING	
<p>Unit I –MAINTENANCE PRACTICES : Testing, cleaning and inspection of bearings; Lubrication requirement of bearings. Defect of bearings & their causes. Swaging of end fittings, inspection & testing of control cables Bowden cables, aircraft flexible control systems. Inspection of gears, backlash, Inspection of belts & pulleys, chains & sprockets Inspection of screw jacks, lever devices, push-pull rod systems. 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.</p>		20 Lectures
<p>Unit II – Aircraft Weight and Balance and storage: Centre of Gravity/Balance limits calculation: use of relevant documents; preparation of aircraft for weighing Aircraft weighing Aircraft taxiing/towing and associated safety precautions; Aircraft jacking, chocking, securing and associated safety precautions; Aircraft storage methods; Refueling/defueling procedures; De-icing/anti-icing procedures. Different methods of aircraft leveling</p>		20 Lectures
<p>Unit III – Disassembly, Inspection, Repair and Assembly Techniques: Types of defects and visual inspection techniques. Corrosion removal, assessment and re-protection. General repair methods, Structural Repair Manual Ageing, fatigue and corrosion control programmes; Non destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and boroscope methods. Disassembly and re-assembly techniques. Abnormal Events: Inspections following lightning strikes and HIRF penetration. Inspections following abnormal events such as heavy landings and flight through turbulence.</p>		20 Lectures
<p>Reference Book :- 1. FAA 9A 2. CAIP volume</p>		

PRACTICALS

Course Code	PRACTICALS	Credits :1
USARM 2P1	PHYSICS	50 marks
<ol style="list-style-type: none"> 1. To measure the length, ,breadth and height of rectangular block using vernier caliper 2. To measure the outer and inner diameter of the pipe using vernier caliper 3. To measure the inner and outer radius using radius gage 4. To measure the gap between electrodes of spark plug using thickness gauge 5. To measure the pressure using Manometer 6. To measure specific gravity of given fluid using hydrometer. 7. To measure the inner diameter of the pipe using telescopic gauge 8. To show magnetic lines of forces never intersect each other using bar magnet 9. Show the nature of airflow using venturi tube (Bernoulis theorem) 10. Show Newton's laws of motion 11. Identification of poles, equator, meridian, latitude and longitude with globe 		80 hours

Course Code	PRACTICALS	Credits :1
USARM 2P2	DIGITAL TECHNIQUES	50 marks
<ol style="list-style-type: none"> 1. To Study the working of AND gate 2. To Study the working of OR gate 3. To Study the working of NAND gate 4. To Study the working of NOR gate 5. To Study the working of NOT gate 6. Observe the working of flip flop 7. Clock 8. seven segment decoder circuit 9. Multiplexer IC 10. Demultiplexer IC 11. A-D/D-A converter IC 		80 hours

Course Code	PRACTICALS	Credits :2
USARM 2P3	GROUND HANDLING	100 marks
<p>AIRCRAFT GROUND HANDLING & WEIGHT AND BALANCE:-</p> <ol style="list-style-type: none"> 1) Cabin door- Upper, lower, opening, closing and locking 1) Carry out weight and balance of aircraft 2) carry out taxing and towing of aircraft 3) Carry out jacking up and lowering of aircraft 4) use Proper procedure for parking of aircraft 5) Carry out refueling of aircraft 6) Carry out defueling of aircraft 7) use ground hydraulic supply 8) carry out Procedure for lashing and mooring of aircraft 10) familiarization with marshalling of aircraft 		80 hours

INFRASTRUCTURE:

a) The basic Infrastructure required to start the Course in the Organization, at the start of the Course.

Infrastructure: As per University norms.

Basic Workshop: Having Lathe Machine, Drilling machines, Grinders, Surface table, bench vices etc.

Land area: Sufficient land for building a Hanger for parking the Institution owned aircrafts and Tarmac for giving run up and taxi check of those aircrafts.

The Cost of the above infrastructure and Basic Workshop is Rs. 25,00,000/- (approx. as on date) excluding the cost of land.

b) After starting the Course, the Equipments required in the Organization at the start of Second semester

Laboratory / Workshop:

- i) Electrical Workshop
- ii) Instrument Workshop
- iii) Radio Navigation Workshop
- iv) Computer Workshop
- v) RT (Radio Telephony) – Communication
- *vi) Welding Shop. (1 Lakhs)
- *viii) Machine Shop (5 Lakhs)

Note: All the shops to be well equipped to carry out practical of the students. The

Cost of the above infrastructure is Rs. 80,55,000/- (approx. as on date) + 6 lakhs

c) After starting the Course, the Infrastructure required in the Organization at the start of Third semester i.e. Second year will be as follows:-

i) Hanger and Tarmac: For parking aircrafts, their run-up and taxiing for functional checks of the various systems.

ii) Aircrafts: 1) Light aircraft (weight below 5700 kg) & Piston engine
2) Heavy aircraft (weight above 5700 kg) & Jet engine

iii) Workshops: 1) Engine Workshop
2) Airframe Workshop

The Cost of the above is Rs. 2,93,00,000/- (approx. as on date)

Total cost for all three years a) + b) + c) = Rs. 3,98,55,000/- + 6 Lakhs

Faculty Qualifications and requirements:

Chief Instructor : a) One each, having BAMEL (Basic Aircraft Maintenance Engineering Licence) and at least five years of Aviation Experience of which at least two years in the field of Instruction **OR**

b) Engineering Graduate with at least two years of Practical experience in Aviation Industry of which at least one year in the field of Instruction.

Instructors :

Year	New Appointments	Total Appointments
1 st year	03	03
2 nd year	03	06
3 rd year	03	09

Non Teaching

Office staff : 02 Jr. Clerk
Peon : 03

* Additional workshops

External Theory examination 60

Marks

i) Duration – These examinations shall be of 2 Hours duration for each paper.

ii) Theory Question Paper Pattern:-

- There shall be four questions each of 15 marks. On each unit there will be one question and the fourth one will be based on entire syllabus.

- All questions shall be compulsory with internal choice within the questions.

(Each question will be of 20 to 23 marks with options.)

- Question may be subdivided into sub-questions a, b, c... and the allocation of marks depend on the weightage of the topic.

SEMESTER III

Course Code		Credits :4
USARM301	AVIATION LEGISLATION AND HUMAN FACTORS	
<p>Unit I–CAR- M, applicable National and international requirements</p> <p>CAR-M Detailed understanding of CAR 21 provisions related to continuing airworthiness Detailed understanding of CAR – M</p> <p>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.;</p> <p>(b) Continuing airworthiness; Test flights; ETOPS, maintenance and dispatch requirements; RVSM, maintenance and dispatch requirements RNP, MNPS Operations All Weather Operations,</p>		30 Lectures
<p>Unit II -Safety Management System and Fuel Tank Safety</p> <p>Safety Management System State Safety Programme Basic Safety Concepts Hazards & Safety Risks SMS Operation SMS Safety performance Safety Assurance 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)</p> <p>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)</p>		30 Lectures
<p>Unit III– Human Factors</p> <p>General The need to take human factors into account; Incidents attributable to human factors/human error; ‘Murphy’s’ law.</p> <p>Human Performance and Limitations Vision; Hearing; Information processing; Attention and perception; Attention and perception; Memory; Claustrophobia and physical access.</p>		30 Lectures

<p>Social Psychology Responsibility: individual and group; Motivation and de-motivation; Peer pressure; ‘Culture’ issues; Team working; Management, supervision and leadership</p> <p>Factors Affecting Performance Fitness/health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and under load; Sleep and fatigue, shift work; Alcohol, medication, drug abuse.</p> <p>Physical Environment Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment.</p> <p>Tasks Physical work; Repetitive tasks; Visual inspection; Complex systems.</p> <p>Communication Within and between teams; Work logging and recording; Keeping up to date, currency; Dissemination of information.</p> <p>Human Error Error models and theories; Types of error in maintenance tasks; Implications of errors (i.e. accidents) Avoiding and managing errors.</p> <p>Hazards in the Workplace Recognising and avoiding hazards; Dealing with emergencies.</p>	
<p>Reference Book :</p> <ol style="list-style-type: none"> 1. CAR by DGCA 2. CAR 66 by DGCA 3. CAR 145 by DGCA 4. CAR 21 by DGCA 5. CAR M by DGCA 6. ICAO Doc. 9683 	

Course Code		Credits :3
USARM302	INSTRUMENTS	
<p>Unit I:Basics: 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</p>		20 Lectures
<p>Unit II – System: General arrangement of typical electronic/digital aircraft systems and associated BITE (Built In Test Equipment) testing such as:</p>		20 Lectures

ACARS-ARINC Communication and Addressing and Reporting System ECAM-Electronic Centralised Aircraft Monitoring EFIS-Electronic Flight Instrument System EICAS-Engine Indication and Crew Alerting System FBW-Fly by Wire, FMS-Flight Management System	
Unit III :System: GPS-Global Positioning System IRS-Inertial reference system TCAS-Traffic Collision Avoidance system Integrated modular Avionics Cabin System Information system	20 Lectures
Reference Book : Aircraft Instruments system by E H J Pallet	

Course Code		Credits :3
USARM 303	DIGITAL TECHNIQUES II	
Unit I –Fibre Optics and Electronic Displays : Advantages and disadvantages of fibre optic data transmission overelectrical wire propagation; Fibre optic data bus; Fibre optic related terms;Terminations; Couplers, control terminals, remote terminals;Application of fibre optics in aircraft systemsPrinciples of operation of common types of displays used in modernaircraft, including Cathode Ray Tubes, Light Emitting Diodes and LiquidCrystal Display.		30 Lectures
Unit II- Software Management Control: Awareness of restrictions, airworthiness requirements and possiblecatastrophic effects of unapproved changes to software programmes.		20 Lectures
Unit III – Electrostatic Sensitive Devices: Special handling of components sensitive to electrostatic discharges;Awareness of risks and possible damage, component and personnelantistatic protection devices, Influence of the following phenomena on maintenance practices forelectronic system: EMC-Electromagnetic Compatibility EMI-Electromagnetic InterferenceHIRF-High Intensity Radiated Field Lightning/lightning protection		30 Lectures
Reference Book : 1. Digital Principles and Applications by DONALD P. LEACH, ALBERTPAUL ALVINO,GOUTAM SAHA		

Course Code		Credits :3
USARM304	HARDWARE	
Unit I -Springs and Bearings : Types of springs, materials, characteristics and applications. Purpose of bearings, loads, material, construction; Types of bearings and their application. Gear types		30 Lectures

and their application; Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns; Belts and pulleys, chains and sprockets.	
Unit II-Control Cables : Types of cables; End fittings, turnbuckles and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems. Electrical 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	20 Lectures
Unit III-Quick release fasteners: Dzus fastener, camloc fastener, airlock fasteners. Pins : Cotter pin, split pin etc	20 Lectures
Reference Book :- 1. FAA-H-8083-30(9A) & 15 A 2. Shop Theory (Anderson)	

Course Code		Credits :3
USARM 305	ENVIRONMENTAL STUDIES	
Unit I-Environmental concepts : Environment: definition and composition, atmosphere, biosphere, ecological system and ecology, food chain, exploitation of natural resources in sustainable manner, Global warming, Acid rain.		20 Lectures
Unit II-Disaster and Waste management: What is disaster, concept of disaster, cause of disaster, major natural disaster, cyclones, Tsunami, disaster management, forms of waste, classification of waste, sources of waste their effects and waste management		20 Lectures
Unit III – Sustainable Development: Natural resources, ever increasing power requirement, renewable resources, Sustainability, conservation, Environmental clearance for establishing and operating Industries in India. Wildlife protection act,		20 Lectures
Reference Book :- Environmental Management – Smita Salunke		

PRACTICALS

Course Code	PRACTICALS	Credits :1
USARM 3P1	INSTRUMENTS	50 marks
INSTRUMENT:- 1) Identification of various elements of Instrument Mechanism 2) Disassembly, cleaning, inspection and assembly of ASI 3) Disassembly, cleaning, inspection and assembly of Altimeter 4) Showing properties of gyro 5) Disassembly, cleaning, inspection and assembly of Directional Gyro 6) Disassembly, cleaning, inspection and assembly of RPM Indicator 7) Familiarization of Learjet cockpit instruments 8) Familiarization of Instrument related components and their locations 9) Checking of Insulation Resistance with Meggar 10) Use of Soldering Iron in Electrical Instrument		80 hours

Course Code	PRACTICALS	Credits :1
USARM 3P2	DIGITAL TECHNIQUES	50 marks
1) Study of microprocessor 8085. 2) Study of ARINC 429/629 BUS. 3) Study of Fiber optic cable. 4) Pamphlet Design in MS-WORD 2007 5) Article Design in MS-WORD 2007 6) Comparative Worksheet Design in MS-EXCEL 2007 7) Comparative Different Slides in MS-POWERPOINT 2007 with Different Transitions 8) Usage of Record Sets, Passing & Returning of Record Set from a procedure, Usage of Command Object – Parameter Collection 9) Trapping ADO Errors, Class & its methods, Encapsulation – using properties in VB 10) Class creation and Usage, Usage of ActiveX components – both ActiveX DLL and ActiveX EXE, Package and Deployment Wizard 11) Interactive Discussion on VB 6.0 12) Interactive Discussion on AUTOCAD 2010		80 hours

Course Code	PRACTICALS	Credits :2
USARM 3P3	Welding	100 marks
AIRCRAFT MATERIAL-WELDING :- 1) Familiarization of Gas Welding & Precautions 2) Leftward & Rightward Welding 3) Butt Welding 4) Lap Joint 5) T Joint 6) Familiarization to Electric Arc Welding and Precautions 7) Grinding 8) Arc Welding Practice 9) Butt Joint 10) Slotted Welding		80 hours

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| <ul style="list-style-type: none">11) Fillet Welding12) Gas Welding13) Arc Welding14) Position Welding (Gas & Arc) – Flat, Vertical, Horizontal, Overhead15) Pipe Welding (Gas & Arc)16) Brazing17) Silver Soldering | |
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SEMESTER IV

Course Code		Credits :3
USARM 401	CABIN ATMOSPHERE CONTROL	
Unit I–Fire Protection : Fire extinction Principles, fire extinguisher mediums & their proper use, Fire warning devices, Thermal switches, Thermocouple system, continuous loop fire warning systems, spot detection, smoke detection, fire zones, Routine maintenance, inspection.		20 Lectures
Unit II –Pressurisation Atmosphere; Description of a cabin pressure system; Structural Requirements for pressure cabins; Cabin pressure and rate of change controls; Safety; Discharge and Relief Valves; Recirculation systems; Humidification. Precautions to be observed on ground tests; Understanding the pressure altitudes; cabin altitude; Differential pressure; Operations of pressure controllers; Outflow valve; Safety Valve; Cabin rate of climb indicator; Manual pressure control valve; Negative pressure relief valve; Fault finding.		20 Lectures
Unit III –Air Conditioning Air conditioning systems; Air cycle and vapour cycle machines Distribution systems; Flow, temperature and humidity control system.		20 Lectures
Reference Book :- 1. A & P Technician Airframe Textbook –Jeppesen 2. Aviation Maintenance Technician handbook – FAA -9A, 15A, 12A		

Course Code		Credits :3
USARM 402	THEORY OF FLIGHT AND INSTRUMENTS	
Unit I:Aeroplane Aerodynamics and Flight Controls : Operation and effect of: — roll control: ailerons and spoilers; — pitch control: elevators, stabilators, variable incidence stabilisers and canards; — yaw control, rudder limiters; Control using elevons, ruddervators; High lift devices, slots, slats, flaps, flaperons; Drag inducing devices, spoilers, lift dumpers, speed brakes; Effects of wing fences, saw tooth leading edges; Boundary layer control using, vortex generators, stall wedges or leading edge de- vices; Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;		30 Lectures
Unit II:High Speed Flight : Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number, compressibility buffet, shock wave, aerodynamic heating, area rule; Factors affecting airflow in engine intakes of high speed aircraft; Effects of sweepback on critical Mach number, mach tuck.		20 Lectures

<p>Unit II:Autopilot: Fundamentals of automatic flight control including working principles and current terminology; Command signal processing; Modes of operation: roll, pitch and yaw channels; Yaw dampers; Stability Augmentation System in helicopters; Automatic trim control; Autopilot navigation aids interface; Autothrottle systems. Automatic Landing Systems: principles and categories, modes of operation, approach, glideslope, land, goaround, system monitors and failure conditions</p>	20 Lectures
<p>Reference Book :</p> <ol style="list-style-type: none"> 1. Mechanic of flight – (A C Karmode) 2. Automatic Flight control by Pallett 	

Course Code		Credits :3
USARM 403	GAS TURBINE ENGINE - I	
<p>Unit I –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, turboshaft, turboprop. 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.</p>		30 Lectures
<p>Unit II –Parts of Gas Turbine Engine: Inlet Compressor inlet ducts, Effects of various inlet configurations; Ice protection 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. Combustion Section Constructional features and principles of operation. Turbine Section Operation and characteristics of different turbine blade types; Blade to disk attachment; Nozzle guide vanes; Causes and effects of turbine blade stress and creep. Exhaust Constructional features and principles of operation; Convergent, divergent and variable area nozzles; Engine noise reduction; Thrust reversers</p>		20 Lectures

<p>Unit III –Systems: Bearings and Seals Constructional features and principles of operation. Lubricants & fuels Properties and specifications; Fuel additives; Safety precautions Lubrication Systems System operation/lay-out and components. Fuel Systems Operation of engine control and fuel metering systems including electronic engine control (FADEC);Systems lay-out and components.</p>	30 Lectures
<p>Reference Book :</p> <ol style="list-style-type: none"> 1. Aircraft gas turbine engine by Treager 2. Gas turbine engine by Otis 	

Course Code		Credits :3
USARM 404	PISTON ENGINE - I	
<p>Unit I - 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. Power calculation and measurement; Factors affecting engine power; Mixtures/leaning, pre-ignition Crank case, crank shaft, cam shafts, sumps; Accessory gearbox; Cylinder and piston assemblies; Connecting rods, inlet and exhaust manifolds; Valve mechanisms; Propeller reduction gearboxes. Types of engine, Requirements, terms and definition.</p>		30 Lectures
<p>Unit II -Engine Fuel Systems : Carburetors Types, construction and principles of operation; Icing and heating Fuel injection systems Types, construction and principles of operation. Operation of engine control and fuel metering systems.</p>		20 Lectures
<p>Unit III –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. Construction and operation of: induction systems including alternate air systems; Exhaust systems, engine cooling systems — air and liquid. Principles and purpose of supercharging and its effects on engine parameters; Construction and operation of supercharging/turbocharging systems; System terminology; Control systems; System protection.</p>		30 Lectures
<p>Reference Book :- 12A, AC powerplant Kroes and Wild</p>		

Course Code		Credits :3
USARM 405	PROPELLER	
Unit I –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. Construction methods and materials used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly;		30 Lectures
Unit II – Propeller pitch: Fixed pitch, controllable pitch, constant speed propeller; Propeller/spinner installation Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch;Overspeed protection. Synchronising and synchrophasing equipment.		20 Lectures
Unit III – Propeller maintenance: Fluid and electrical de-icing equipment. Static and dynamic balancing; Blade tracking; Assessment of blade damage, erosion, corrosion, impact damage, delamination; Propeller treatment/repair schemes; Propeller engine running. Propeller preservation and depreservation		20 Lectures
Reference Book :- Aviation maintenance Technician handbook power plant – FAA 12A		

PRACTICALS

Course Code	PRACTICALS	Credits :1
USARM 4P1	Aircraft Systems	40 marks
<ol style="list-style-type: none"> 1. Different types of fire extinguishers how to use them, recharging, weighing and certification 2. Locate and identify the following : i) Safety valve ii) Discharge valve iii) Relief Valve 3. Removal of heat exchanger. 4. Installation of heat exchanger. 5. Maintenance of components of air-conditioning system. 6. Simulation of removal of fire extinguisher bottle from aircraft 7. Carry out snag analysis and rectification of Cabin pressure low 8. Carry out snag analysis and rectification of Cabin temperature high 		40 hours

Course Code	PRACTICALS	Credits :1
USARM 4P2	INSTRUMENTS	40 marks
<p>INSTRUMENT AUTOPILOT:-</p> <ol style="list-style-type: none"> 1) Disassembly, cleaning, inspection and assembly of VSI 2) Disassembly, cleaning, inspection and assembly of Gyro Horizon Indicator 3) Disassembly, cleaning, inspection and assembly of Turn & Bank Indicator 4) Disassembly, cleaning, inspection and assembly of Hydraulic Pressure Gauge 5) Calibration of Air Speed Indicator 6) Showing the nature of airflow with the help of venture tube 7) Operation of primary control surfaces by the movement of pilot's control 8) Tracing of pitot and static system pipelines and preparing a detailed schematic diagram 9) Simulated removal and installation of ASI / Mach Indicator combined on co-pilot's instrument panel 10) Simulated removal and installation of Altimeter on co-pilot's instrument panel 11) Simulated removal and installation of Vertical Speed Indicator on co-pilot's instrument panel 12) Simulated removal and installation of Cabin VSI on co-pilot's instrument panel 13) Inspection of cabling & wiring and system handling in a/c 14) Familiarization of aircraft autopilot basic functioning 15) Positional familiarization of AFCS inputs 16) Familiarization with location and operation of AFCS computers 17) Visual familiarization and working of outer loop control interface 18) Positional familiarization of servo alternators 19) Familiarization of AFCS control panel 20) Operation of altitude HOLD mode (Simulated) 21) Operation of HDG HOLD mode (Simulated) 22) Operation of NAV HOLD mode (Simulated) 23) Operation of pitch control knob (Simulated) 24) Operation of pitch control knob (Simulated) 		50 hours

Course Code	PRACTICALS	Credits :1
USARM 4P3	GAS TURBINE ENGINE	40 marks
<ol style="list-style-type: none"> 1. Identifying the following parts on aircraft Jet Engine – Air Intake, Compressor Combustion Chamber, Turbine, Exhaust 2. Types of Combustion Chamber – Can, Can Annular, Annular 3. Types of Compressor – Axial, Centrifugal Compressor 4. Types of Turbine Blades 5. Fuel flow Transmitter – Location , type of signal generated and end location, gauge in cockpit 6. L H and RH manifold identification, location and end connection 7. Fuel nozzle- total numbers, type, distinguish between simplex and duplex nozzles 8. Fuel cooled oil cooler (FCOC)- Location, mounting, safety and configuration 9. Locate and trace all the supply, scavenge and breather lines of oil system on the engine 		50 hours

Course Code	PRACTICALS	Credits :1
USARM 4P4	PISTON ENGINE	40 marks
<ol style="list-style-type: none"> 1. Familiarization of Piston engine components: Crankcase, Crankshaft, Camshaft, Bearings, Connecting Rod, Piston, Piston Rings. 2. Spark Plug – Checking, Cleaning & Fouling of Plug 3. Operation of 4 Stroke Engine 4. Operation of 2 Stroke Engine 5. Identifying the different types of carburetors 6. Propeller Locking, Carburetor Locking 7. Working of magneto 		50 hours

Course Code	PRACTICALS	Credits :1
USARM 4P5	PROPELLER	40 marks
<p>PROPELLER AND ITS CONTROL:-</p> <ol style="list-style-type: none"> 1) Familiarization with propeller blade elements 3) Propeller construction 4) Propeller blade station numbering 5) familiarization with fixed pitch, controllable and constant speed propeller 6) Feathering and reverse pitch propeller 7) Propeller synchronization 8) Icing protection of propeller 9) Propeller hub and blade inspection 10) Storage and preservation of propeller 11) Blade tracking 12) Over speed protection of propeller 13) Propeller pitch changing mechanism 		50 hours

INFRASTRUCTURE:

a) The basic Infrastructure required to start the Course in the Organization, at the start of the Course.

Infrastructure: As per University norms.

Basic Workshop: Having Lathe Machine, Drilling machines, Grinders, Surface table, bench vices etc.

Land area: Sufficient land for building a Hanger for parking the Institution owned aircrafts and Tarmac for giving run up and taxi check of those aircrafts.

The Cost of the above infrastructure and Basic Workshop is Rs. 25,00,000/- (approx. as on date) excluding the cost of land.

b) After starting the Course, the Equipments required in the Organization at the start of Second semester

Laboratory / Workshop:

- i) Electrical Workshop
- ii) Instrument Workshop
- iii) Radio Navigation Workshop
- iv) Computer Workshop
- v) RT (Radio Telephony) – Communication
- *vi) Welding Shop. (1 Lakhs)
- *viii) Machine Shop (5 Lakhs)

Note: All the shops to be well equipped to carry out practical of the students. The

Cost of the above infrastructure is Rs. 80,55,000/- (approx. as on date) + 6 lakhs

c) After starting the Course, the Infrastructure required in the Organization at the start of Third semester i.e. Second year will be as follows:-

i) Hanger and Tarmac: For parking aircrafts, their run-up and taxiing for functional checks of the various systems.

ii) Aircrafts: 1) Light aircraft (weight below 5700 kg) & Piston engine
2) Heavy aircraft (weight above 5700 kg) & Jet engine

iii) Workshops: 1) Engine Workshop
2) Airframe Workshop

The Cost of the above is Rs. 2,93,00,000/- (approx. as on date)

Total cost for all three years a) + b) + c) = Rs. 3,98,55,000/- + 6 Lakhs

Faculty Qualifications and requirements:

Chief Instructor : a) One each, having BAMEL (Basic Aircraft Maintenance Engineering Licence) and at least five years of Aviation Experience of which at least two years in the field of Instruction **OR**

b) Engineering Graduate with at least two years of Practical experience in Aviation Industry of which at least one year in the field of Instruction.

Instructors :

Year	New Appointments	Total Appointments
1 st year	03	03
2 nd year	03	06
3 rd year	03	09

Non Teaching

Office staff : 02 Jr. Clerk
Peon : 03

* Additional workshops

External Theory examination 60

Marks

i) Duration – These examinations shall be of 2 Hours duration for each paper.

ii) Theory Question Paper Pattern:-

- There shall be four questions each of 15 marks. On each unit there will be one question and the fourth one will be based on entire syllabus.

- All questions shall be compulsory with internal choice within the questions.

(Each question will be of 20 to 23 marks with options.)

- Question may be subdivided into sub-questions a, b, c... and the allocation of marks depend on the weightage of the topic.

SEMESTER V

Course Code		Credits :3
USARM 501	AIRFRAME SYSTEM	
<p>Unit I -Hydraulic Power and Pneumatic/Vacuum Systems: System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Pressure Control; Power distribution; Indication and warning systems; Interface with other systems. Filters.</p> <p>Pneumatic/Vacuum Systems: System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.</p>		30 Lectures
<p>Unit II–Ice and rain protection Pneumatic deicing systems, de-icer boots constructions, deicing system components, pneumatic deicing system maintenance, thermal anti icing system, ground deicing of aircraft, wind shield ice control system, rain elimination system</p>		20 Lectures
<p>Unit III–Oxygen System : Oxygen system: Purpose of the system; Safety portable & fixed Oxygen systems; low pressure and high pressure oxygen system & components; Installation and replacement of Oxygen lines. General familiarization with provision of emergency equipment on modern aircraft such as Emergency exits; Megaphone; Signaling Flares; FDR & CVR; Fire Extinguishers.</p> <p>Lights: External: navigation, anti-collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.</p>		20 Lectures
<p>Reference Book :- A & P Technician Airframe textbook (Jeppesen)</p>		

Course Code		Credits :3
USARM 502	LANDING GEAR	
<p>Unit I –General – Landing gear arrangement, shock strut, electrical and hydraulic landing gear extension and retraction, emergency extension system, nose wheel centering mechanism, nose wheel steering, shimmy dampers.</p>		20 Lectures
<p>Unit II – Brakes – Independent brake system, power operated brake system, power boosted brake system, power brake control valve, nose wheel brakes, single disc brakes, multi disc brakes, segmented rotor brakes, expander tube brake system, inspection and maintenance of brakes, bleeding of brake.</p>		20 Lectures

<p>Unit III – Wheels and tyres Split wheel, removable and fixed flange wheels, different parts of tyres, aircraft tyre maintenance, rethreading and recapping, tube inspections, mounting and demounting of wheels and tyres, Antiskid system, landing gear retraction check, rigging and adjustment.</p>	20 Lectures
<p>Reference Book :- A & P Technician Airframe textbook (Jeppesen)</p>	

Course Code		Credits :3
USARM 503	GAS TURBINE ENGINE– II	
<p>Unit I – Power Augmentation Systems Operation and applications; Water injection, water methanol; Afterburner systems. Turboprop Engines Gas coupled/free turbine and gear coupled turbines; Reduction gears; Integrated engine and propeller controls; Overspeed safety devices. Turbo shaft engines Arrangements drive systems, reduction gearing, couplings, control systems. Auxiliary Power Units (APUs) Purpose, operation, protective systems. Power plant 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</p>		30 Lectures
<p>Unit II –Engine Indication Systems : Exhaust Gas Temperature/Interstage 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; Vibration measurement and indication; Torque; Power.</p>		20 Lectures
<p>Unit III – Starting and Ignition Systems : Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements. 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.</p>		30 Lectures
<p>Reference Book :</p> <ol style="list-style-type: none"> 1. Aircraft gas turbine engine by Treager 2. Gas turbine engine by Otis 		

Course Code		Credits :3
USARM 504	PISTON ENGINE- II	
Unit I -Lubrication Systems and Fuel system: System operation/lay-out and components, Properties and specifications of different types of lubricants. System operation/lay-out and components, Properties and specifications of different types of fuel.		20 Lectures
Unit II-Powerplant: 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. Engine Indication Systems Engine speed; Cylinder head temperature; Coolant temperature; Oil pressure and temperature; Exhaust Gas Temperature; Fuel pressure and flow; Manifold pressure.		20 Lectures
Unit III-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. Preservation and depreservation for the engine and accessories/ systems		20 Lectures
Reference Book :- 12A, 15A, AC powerplant Kroes and Wild		

Course Code		Credits :3
USARM 505	FLIGHT CONTROLS AND SNAG RECTIFICATION	
Unit I:Flight Controls (ATA 27) Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control; High lift devices; Lift dump, speed brakes; System operation: manual, hydraulic, pneumatic, electrical, fly-by-wire; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks systems; Balancing and rigging; Stall protection/warning system		30 Lectures
Unit II:Fuel Systems (ATA 28) System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling; Longitudinal balance fuel systems.		30 Lectures

Unit III :Aircraft Structure Systems (Mechanical)Snag analysis and Rectification:

The snags in the aircraft systems pertaining to syllabus covered in Semester 1 to Semester 5 for Aircraft structure systems: namely Hydraulics, Pneumatics, Ice &rain protection, Landing gear, Oxygen, Fire protection, Air conditioning & cabin pressurization. The snag analysis and rectification.

Aircraft Structure Systems (Avionics)Snag analysis and Rectification:

The snags in the aircraft systems pertaining to syllabus covered in semester 1 to 5 for aircraft structure systems namely Electrical, Instrument, Radio and Digital. The snag analysis and rectification.

30 Lectures

Reference Book :

Aviation Maintenance Technician handbook – FAA -9A, 15A, 12A

Course Code	PRACTICALS	Credits :1
USARM 5P1	AIRFRAME SYSTEM	40 marks
<ol style="list-style-type: none"> 1. Servicing of hydraulic reservoir 2. Operation of Hydraulic shut off valve 3. Charging of hydraulic accumulator 4. Discharging of hydraulic accumulator 5. Check for hydraulic leak 6. Servicing of pneumatic system installed on aircraft 7. Check for antiicing methods used on aircraft 8. Study how Antiicing of windshield is done 9. Check for various component and servicing of those components used for antiicing purpose on the aircraft. 10. Servicing of oxygen cylinder 11. Servicing of oxygen mask 12. Carryout snag analysis and rectification of Hydraulic quantity low 13. Carryout snag analysis and rectification for Low oxygen pressure 		50 hours

Course Code	PRACTICALS	Credits :1
USARM 5P2	LANDING GEAR	40 marks
<ol style="list-style-type: none"> 1. Locate and identify various parts of aircraft landing gear 2. Carryout greasing of various parts of aircraft landing gear 3. Swap landing gear wheel on aircraft 4. Servicing of oleo pneumatic shock strut 5. Identify the information given on tire 6. Inspection of brake system 7. check the operation of antiskid system installed on aircraft 8. replace the tires on the aircraft wheel. 9. Carryout analysis and rectification of Landing Gear warning light ON 		40 hours

Course Code	PRACTICALS	Credits :1
USARM 5P3	GAS TURBINE ENGINE	40 marks
<ol style="list-style-type: none"> 1. carry out preflight inspection. 2. Carry out simulated start of aircraft engine (in presence of supervisor) 3. Locate and trace the various components of aircraft fuel system installed on aircraft. 4. Take necessary safety precautions after hot start and hung start 5. Replenish engine oil 6. Main fuel pump- Purpose, location and mounting method including safety 7. Fuel control unit-Identification, location, with reference to axial & circumferential and mounting 		50 hours

8. Over speed governor- function, mounting, locking method and signals	
<p>Carryout snag analysis of following :</p> <p>i) No start, No light up, No EGT rise.</p> <p>ii) Slow start.</p> <p>iii) Hung start.</p> <p>iv) Hung up at low speed – less than 30%.</p> <p>v) Hung up at 50% N2 – High EGT. (Hot start).</p> <p>vi) Stall.</p> <p>vii) Flame out or power loss.</p> <p>viii) Stall – Surge.</p> <p>ix) Parameter fluctuation.</p> <p>x) High Oil Consumption (HOC).</p> <p>xi) Oil from Drain Mast – no other leak.</p> <p>xii) Oil wetting in fan cowl & Accessory Gear Box (AGB).</p>	

Course Code	PRACTICALS	Credits :1
USARM 5P4	PISTON ENGINE	40 marks
<p>Details about Overhaul and Maintenance of the engine – including dismantling, inspection, repair and assembly with table of limits of all important engine parts such as Crankcase. Accessories case assembly, Oil sump, Crank shaft assemblies, Connecting rods, Piston assemblies, Cylinder assemblies, Valve mechanism, Gear train, Lubrication system, Induction system, Cooling and exhaust system.</p>		40 hours

Course Code	PRACTICALS	Credits :1
USARM 5P5	Snag analysis and Rectification	40 marks
<p>Snag rectification of snag related to following topics</p> <p>1. Practicals on defect rectification of aircraft power supply system such as GPU not Getting connected to aircraft. Low battery voltage, ground relay chattering etc.</p> <p>6. Practicals on servicing of GPU, charging, cleaning, checking of electrolyte level and specific gravity.</p> <p>7. Checking the serviceability, inspection, removal and fitting of landing lights and taxiing lights etc.</p>		60 hours
<p>1. Study of radio altimeter and its test procedure</p> <p>2. Familiarization of ATC system components and its test procedure</p> <p>3. Study of ESDS requirements and precaution during ground handling</p> <p>4. Operational test of VHF com system on Local frequency contact precaution and procedure</p> <p>5. Operational test of VOR Nav. System</p> <p>6. Operational/Self test operation of ILS components</p>		
<p>1. Pitot –static system of aircraft.</p>		

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| <ol style="list-style-type: none">2. Stall warning system on aircraft.3. EGT System snags.4. N1 & N2 rpm related system snags.5. Fuel flow system related snags.6. EPR related system snags.7. Auto pilot system related snags.8. DR9. Compass, RR compasses related snags.10. Gyro related snags on aircraft. | |
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SEMESTER 6

Course Code		Credits :6
USARM 6P1	AIRFRAME	200 marks
1	Servicing of main gear shock strut (Preferred Method)	350 hours
2	Procedure sheet of servicing of main gear shock strut (Alternate Method)	
3	Procedure sheet of servicing of nose gear shock strut (Preferred Method)	
4	Procedure sheet of servicing of nose gear shock strut (Alternate Method)	
5	Procedure sheet for (MLG Wheel Removal)	
6	Procedure sheet for (MLG Wheel Installation)	
7	Procedure sheet of Nose Wheel Removal	
8	Procedure sheet of Nose Wheel Installation	
9	Procedure Sheet of Landing Gear Lubrication (MLG and NLG)	
10	Procedure sheet of Anti-skid system check	
11	Procedure sheet of Aileron brush seal lubrication	
12	Procedure sheet of Lubrication of Rudder Pedal Bushings	
13	Lubrication of flap track rollers	
14	Lubrication of flap and spoiler actuator piston rod felt wiper	
15	Servicing hydraulic accumulator	
16	Servicing of hydraulic reservoir	
17	Charging emergency air bottle	
18	Visual inspection of emergency air bottle	
19	Servicing of oxygen system	
20	Control cable pressure seal replacement	
21	Flared tubing – maintenance practices	
22	Remove wing leading edge	
23	Install wing leading edge	
24	Control cable system inspection	
25	Aileron balance tab rigging	
26	Flap Removal	
27	Flap Installation	
28	Rudder Removal	
29	Rudder Installation	
30	Elevator Removal	
31	Elevator Installation	
32	Remove and Installation of cabin emergency windows	
33	Internal leak check of hydraulic system	
34	Engine driven hydraulic pump removal	
35	Engine driven hydraulic pump- Installation	

36	Engine driven hydraulic pump- Leakage check	
37	Operational check of Eng. driven hyd. Pumps	
38	Hydraulic supply shutoff valve operational check	
39	Functional test of landing gear emergency blow down extension system	
40	Returning the landing gear to normal operation after emergency extension	
41	Disassemble Nose wheel for tire change	
42	Assembly of nose wheel after tyre change	
43	Main landing gear wheel disassembly for tyre change	
44	MLG. Wheel assemble after tyre change	
45	Multiple disc brake – wear check	
46	Multiple disc brake – removal	
47	Multiple Disc brake installation	
48	Bleeding Brake System	

Course Code		Credits :6
USARM 6P2	ENGINE	200 Marks
1	Removal of Fuel Pump Filter	350 hours
2	Cleaning of Fuel Pump Filter	
3	Installation of Fuel Pump Filter	
4	Removal of O.S.G. Servo Fuel Filter	
5	Cleaning of O.S.G.Servo Fuel Filter .	
6	Installation of O.S.G.Servo Fuel Filter	
7	Removal of Fuel Control Unit Filter	
8	Cleaning of Fuel Control Unit Filter	
9	Installation of Fuel Control Unit Filter	
10	Removal of Fuel Flow-meter	
11	Installation of Fuel Flow-Meter	
12	Removal of Oil Filter	
13	Disassembly of Oil Filter	
14	Cleaning of Oil Filter	
15	Assembly of Oil Filter	
16	Inspection/Checks of Oil Filter	
17	Removal of fuel manifold	
18	Installation of fuel manifold	
19	Inspection of fuel manifold	
20	Removal of Fuel Pressurizing and Drain Valve	
21	Installation of Fuel P & D Valve	
22	Inspection/check of Fuel P & D Valve	
23	Removal of Fuel Nozzles	
24	Installation of Fuel Nozzles	

25	Inspection of Fuel Nozzles	
26	Removal of Over Speed Governor	
27	Installation of Over Speed Governor	
28	Inspection of Over Speed Governor	
29	Removal of Fuel pump AND Fuel control Unit	
30	Installation of Fuel pump &Fuel control Unit	
31	Inspection of Fuel pump &Fuel control Unit	
32	Maintenance of Engine Oil Filter	
33	Maintenance of Engine Oil Filter	
34	Throttle Lever Cable Rigging	
35	Starter Generator Removal and Installation	

Course Code		Credits :8
USARM 6PP	AEROPROJECT	300 marks
Project on either one of these		
1	Innovative Project on Airframe system of the aircraft	
2	Innovative Project on Engine system of the aircraft	

INFRASTRUCTURE:

a) The basic Infrastructure required to start the Course in the Organization, at the start of the Course.

Infrastructure: As per University norms.

Basic Workshop: Having Lathe Machine, Drilling machines, Grinders, Surface table, bench vices etc.

Land area: Sufficient land for building a Hanger for parking the Institution owned aircrafts and Tarmac for giving run up and taxi check of those aircrafts.

The Cost of the above infrastructure and Basic Workshop is Rs. 25,00,000/- (approx. as on date) excluding the cost of land.

b) After starting the Course, the Equipments required in the Organization at the start of Second semester

Laboratory / Workshop:

- i) Electrical Workshop
- ii) Instrument Workshop
- iii) Radio Navigation Workshop
- iv) Computer Workshop
- v) RT (Radio Telephony) – Communication
- *vi) Welding Shop. (1 Lakhs)
- *viii) Machine Shop (5 Lakhs)

Note: All the shops to be well equipped to carry out practical of the students. The

Cost of the above infrastructure is Rs. 80,55,000/- (approx. as on date) + 6 lakhs

c) After starting the Course, the Infrastructure required in the Organization at the start of Third semester i.e. Second year will be as follows:-

i) Hanger and Tarmac: For parking aircrafts, their run-up and taxiing for functional checks of the various systems.

ii) Aircrafts: 1) Light aircraft (weight below 5700 kg) & Piston engine

2) Heavy aircraft (weight above 5700 kg) & Jet engine

iii) Workshops: 1) Engine Workshop

2) Airframe Workshop

The Cost of the above is Rs. 2,93,00,000/- (approx. as on date)

Total cost for all three years a) + b) + c) = Rs. 3,98,55,000/- + 6 Lakhs

Faculty Qualifications and requirements:

Chief Instructor : a) One each, having BAMEL (Basic Aircraft Maintenance Engineering Licence) and at least five years of Aviation Experience of which at least two years in the field of Instruction **OR**

b) Engineering Graduate with at least two years of Practical experience in Aviation Industry of which at least one year in the field of Instruction.

Instructors :

Year	New Appointments	Total Appointments
1 st year	03	03
2 nd year	03	06
3 rd year	03	09

Non Teaching

Office staff : 02 Jr. Clerk
Peon : 03

* Additional workshops

External Theory examination 60

Marks

i) Duration – These examinations shall be of 2 Hours duration for each paper.

ii) Theory Question Paper Pattern:-

- There shall be four questions each of 15 marks. On each unit there will be one question and the fourth one will be based on entire syllabus.

- All questions shall be compulsory with internal choice within the questions.

(Each question will be of 20 to 23 marks with options.)

- Question may be subdivided into sub-questions a, b, c... and the allocation of marks depend on the weightage of the topic.