SEMESTER V

Course Code		Credits :4
USARA 501	**AIRFRAME SYSTEMS**	
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. **Pneumatic/Vacuum Systems:** System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.		**30 Lectures**
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		**30 Lectures**
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. **Lights :**External: navigation, anti-collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.		**30 Lectures**
Reference Book :- A & P Technician Airframe textbook (Jeppesen)		

Course Code		Credits :4
USARA 502	**LANDING GEAR**	
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.		**30 Lectures**
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.		**30 Lectures**

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.	**30 Lectures**
Reference Book :- A & P Technician Airframe textbook (Jeppesen)	

Course Code		Credits :3
USARA 503	**Snag rectification**	
Unit I –AIRCRAFT ELECTRICITY The snags in the aircraft systems pertaining to syllabus covered in Semester 1 to Semester 4 for Aircraft Electrical systems. The snag analysis, reason finding and rectification required.		**30 Lectures**
Unit II –AIRCRAFT INSTRUMENT The snags in the aircraft systems pertaining to syllabus covered in Semester 1 to Semester 4 for Aircraft Instrument systems. The snag analysis, reason finding and rectification required.		**30 Lectures**
Unit III –RADIO NAVIGATION The snags in the aircraft systems pertaining to syllabus covered in Semester 1 to Semester 4 for Aircraft Radio communication systems and aircraft Digital Technology. The snag analysis,reason finding and rectification required.		**30 Lectures**
Reference Books: 1. Aircraft instruments by E.H.J. Pallet, 2. Aircraft electricity by Eismin 3. Aircraft communication and navigation system by MIKE TOOLEY		

Course Code		Credits :4
USARA 504	**CABIN ATMOSPHERE CONTROL**	
Unit I – Fire Protection : Fire extinguishing 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.		**30 Lectures**
Unit II – Pressurization 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.		**30 Lectures**
Unit III –Air Conditioning Air conditioning systems; Air cycle and vapour cycle machines		**30 Lectures**

Distribution systems; Flow, temperature and humidity control system.	

Reference Book :-

1. A & P Technician Airframe Textbook –Jeppesen
2. Aviation Maintenance Techician handbook – FAA -9A, 15A, 12A

PRACTICALS

Course Code	**PRACTICALS**	Credits :1
USARA 5P1	**AIRFRAME SYSTEM**	60 marks
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 anti-icing methods used on aircraft 8. Study how Anti-icing of windshield is done 9. Check for various components and servicing of those components used for anti-icing 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
USARA 5P2	**LANDING GEAR**	60 marks
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
USARA 5P3	**SNAG RECTIFICATION ELECTRICITY**	60 marks
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. 2. Practicals on defect rectification on aircraft power supply distribution system such as voltage regulators malfunctioning, adjustment of voltage on aircraft etc. 3. Practicals on defect rectification on navigation, anti-collision and landing lights etc. 4. Practicals on inverter circuits, primary, secondary and standby inverter		**50 hours**

5. Practicals on removal, inspection and fitting of anti-collision lights. 6. Practicals on servicing of GPU, charging, cleaning, checking of electrolyte level and specific gravity. 7. Checking the serviceability, inspection, removal and fitting of landing lights and taxiing lights etc.	

Course Code	**PRACTICALS**	Credits :1
USARA 5P4	**RADIO NAVIGATION**	60 marks
1) Familiarization of test equipment signal generator, frequency counter 2) Study of radio altimeter and its test procedure 3) Familiarization of ATC system components and its test procedure 4) Study of ADF system components and its test procedure 5) Identification of ILS components and study its test procedure 6) Study of GPWS components and testing 7) Study of W/R system components and its procedure 8) Study of ESDS requirements and precaution during ground handling 9) Operational test of VHF com system on Local frequency contact precaution and procedure 10) Operational test of VOR Nav. system 11) Operational/Self test operation of ILS components		**50 hours**

Course Code	**PRACTICALS**	Credits :1
USARA 5P5	**INSTRUMENT SYSTEM (SNAG RECTIFICATION)**	60 marks
Pitot –static system related snag. Capacitance type Fuel quantity system related snag. Stall warning system related snag. EGT System snags. N1 & N2 rpm related system snags. Fuel flow system related snags. EPR related system snags. Auto pilot system related snags. Engine oil system related snags. DR Compass, RR compasses related snags. Gyro related snags on aircraft.		**50 hours**

SEMESTER 6

Course Code		Credits :4
USARA 6P1	**ELECTRICAL SYSTEM**	150 marks
1	Starter-generator brush wear check	**250 hours**
2	Starter generator removal	
3	Starter generator installation	
4	Dc power distribution functional check	
5	Removal and installation of static discharger wick	
6	Inspection & functional test of static discharger wick	
7	Auxiliary battery removal and installation	
8	Removal and installation of voltage regulator	
9	Inspection of no:-4 gauge electrical cables	
10	Inverter removal and installation	
11	Removal and installation of power relays	
12	Removal and installation and functional check of landing light	
13	Removal and installation of navigation light and strobe light	
14	Removal and installation of anti-collision light	
15	Removal surface electrical resistivity check	
16	Routine maintenance of GPU (battery trolley)	
17	Wire identification**.**	

Course Code		Credits :4
USARA 6P2	**INSTRUMENT SYSTEM**	150 marks
1	Operational check of wing low fuel warning light system	**250 hours**
2	Fuel quantity indicator calibration	
3	Removal & installation of thermo-couple harness	
4	Resistance and insulation check of thermo-couple harness and it's leads	
5	Adjusting and testing of egt indicating system	
6	Removal and installation of static port	
7	Functional test of oil pressure transmitter	
8	Oil pressure transmitter test & adjustment	
9	Oil pressure switch & transmitter removal & installation	
10	Pitot system leakage check	
11	Altitude pressure switch functional test	
12	Calibration of flux valve – direct sync	
13	Fuel flow transmitter removal and installation	
14	Fuel flow indicator adjustment	
15	Compensation of magnetic compass	

16	Static system leakage check	
17	Stall warning system functional test	
18	Opening & closing of main door	
19	Battery connection and voltage check	

Course Code		Credits :4
USARA 6P3	**RADIO NAVIGATION**	100 marks
1	Power supply system requirements for Radio Communication and Navigation system	**200 hours**
2	Electrical Circuit Breakers	
3	Auxiliary Power Supply System as emergency power supply	
4	Visual inspection of the F.M. Transreceiver type RT-18D and its mounting rack	
5	Insulation property check of the R.F. co-axial cable	
6	Inspection of the rack mounted ATC Transponder	
7	Maintenance checks and inspection of the Nose Radome	
8	Inspection of the VOR/LOC/GS Navigation Receiver type VIR-30	
9	Details of the Radio Communication equipments as installed on the Lear Jet aircraft	
10	Details of the Navigation equipments as installed on the Lear Jet aircraft	
11	Details of the Navigation antennas as installed on the Lear Jet aircraft	
12	Details of the Radio Communication antennas as installed on the Lear Jet aircraft	
13	Basic devices used as interface devices between pilots and communication equipments	
14	Polarization of Navigation antennas	
15	Methods to reduce damage due to electrostatic charges while working on electric components	

Course Code		Credits :8
USARA 6PP	**AEROPROJECT**	300 marks
Project on either one of these		
1	Innovative Project on electrical system of the aircraft	
2	Innovative Project on Instrument system of the aircraft	
3	Innovative Project on Radio Navigation 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 taxy 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 taxying 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
1st year	03	03
2nd year	03	06
3rd 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.