GUJARAT TECHNOLOGICAL UNIVERSITY

AERONAUTICAL ENGINEERING (01)

AIRCRAFT SYSTEMS, INSTRUMENTS AND MAINTENANCE

SUBJECT CODE: 2140103

B.E. 4th SEMESTER

Type of Course: Engineering Science

Prerequisite: Zeal to learn the subject

Rationale: Understanding of basics of aircraft Systems, Instruments and Maintenance is must for an aeronautical engineer.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
4	2	0	6	70	20	10	30	0	20	150

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	**Aircraft basic instruments** Pitot Static System and flight Instruments- Air Speed Indicator, Vertical Speed Indicator, Altimeter. Gyro Instruments- Attitude Indicator, Directional Gyro Indicator, Turn Coordinator, Turn and Slip Indicator. Engine Instruments- Tachometer, Engine Pressure Ratio Indicator, Cylinder head Temperature gauge, Manifold Pressure gauge, Exhaust Temperature Gauge, Fuel Flow Indicator. Control Indicators- Flap Position Indicator, Trim position Indicator.	**24**	**50**
2	**Aircraft Operation and Controls** Introduction of Single/Mono Control System and Dual Control System. Control Column and Joy Stick Operations as Single and Dual Controls. Flap Controls, Airbrake Controls, Spoiler Controls, Trim tab Control system, Thrust Reversal, Variable Pitch Propeller Control. Rudder paddle Operation as Single and Dual Control with Steering and Differential Brakes	**10**	**21**
3	**Aircraft Cable Control System Components** Joy Stick, Control Column, Bushes and Bearings, Housings, Dowels, Cables, Pulleys, Cable Connectors, Turnbuckles, Push-Pull Rods, Push-Pull Cables, Rod Ends, Eye Ends, Knuckle Joints, Lock Nuts, Levers, Bell Crank, Control Horns, Servo Arms, Introduction and Application wise classifications of Actuators.	**6**	**10**
4	**Aircraft Engines** Reciprocating Engine: Engine Components and Mechanisms, Operation of 2 stroke and 4 stroke engines. Classification and Types and applications. Turbine Engines: Principle of operation, Design and Classification and components of Gas turbine engines, Thrust Augmentation methods,	**6**	**9**

	Thrust reversal and vectoring.		
5	**Aircraft Systems and components** Hydraulic Control System, Air Conditioning System, Cabin Pressurization System(Cockpit and Passenger Compartment), Fuel System, Lubrication systems	**6**	**10**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
20%	40%	40%	-	-

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Aircraft Maintenance and Repair (Sixth Edition)- TATA McGraw-Hill EDITION by- Croes, Watkins, Delp.
2. Flight without Formula by. A. C. Kermode.
3. Introduction to Flight. By John D. Anderson Jr. (Mc. Graw Hill)
4. Ground Studies for Pilots (G.S.P.) for (system and Instrumentation)

Course 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.

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.