



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad – 500043

Aeronautical Engineering

List of Laboratory Experiments

AERODYNAMICS AND PROPULSION LABORATORY								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AAEC12	Core	L	T	P	C	CIA	SEE	Total
		0	0	3	1.5	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36			Total Classes: 36			
Branch: AE	Semester: IV	Academic Year: 2021-22			Regulation: UG20			
<p>Course overview: The course is intended to provide the basic understanding of flow around different aerofoil sections to calculate lift, drag, and moments by using low speed wind tunnel. Propulsion lab deals to understand the performance and efficiency of different compressors, nozzles, propeller and turbines.</p>								
<p>Course objectives: The students will try to learn:</p> <ol style="list-style-type: none"> The understand the behaviour of flow properties over different models using subsonic wind tunnel. The demonstrate experimentally the pressure distribution over circular, symmetric and cambered aerofoils and evaluate lift and drag. The illustrate flow visualization studies at low speeds over different aerodynamic bodies. The demonstrate the performance of blower, turbines, nozzles and propellers. The understand the thermodynamic behaviour of gas turbine engines and to calculate different performance parameters. 								
<p>Course outcomes: After successful completion of the course, students will be able to:</p> <p>CO 1 Demonstrate the wind tunnel calibration for different speeds and velocity and verify by using Pitot Tube of Wind tunnel</p> <p>CO 2 Analyse the pressure distribution of cylinder, symmetrical, and cambered aerofoils at different angles of attack and flow speed by using subsonic wind tunnel</p> <p>CO 3 Estimate the aerodynamic forces and moments of the different models for getting aerodynamic characteristics and wake performance</p> <p>CO 4 Classify different fuels based on calorific value using bomb calorimeter for selecting optimal fuel in solid rocket motors</p> <p>CO 5 Categorize the different types blowers, nozzles and propellers for identifying exit systems in various propulsion systems</p> <p>CO 6 Analyze the mechanical efficiency of gas turbine stages for designing futuristic gas turbine engines based on requirements</p>								
WEEK NO	EXPERIMENT NAME							Course Outcomes
WEEK – I	CALIBRATION AND PRESSURE DISTRIBUTION – CYLINDER							CO1
	Calibration of subsonic wind tunnel, Pressure distribution over cylinder.							
WEEK – II	PRESSURE DISTRIBUTION AND FLOW VISUALIZATION – SYMMETRICAL AND CAMBERED AEROFOIL							CO2
	Pressure distribution and flow visualization over symmetric, cambered aerofoil							
WEEK – III	FORCE MEASUREMENT							CO3
	Force measurement using wind tunnel balance.							
WEEK – IV	WAKE ANALYSIS							CO3
	Force measurement using wind tunnel balance.							
WEEK – V	FLOW OVER A FLAT PLATE							CO3
	Flow over a flat plate							
WEEK – VI	CALORIFIC VALUE OF DIFFERENT SOLID FUELS							CO4

	Calculation of calorific value of different fuels and materials using digital bomb calorimeter and optimizing astute fuels.	
WEEK – VII	BLOWER TEST RIG	CO5
	Efficiency of blower test rig for 3 different vane settings.	
WEEK –VIII	NOZZLE PERFORMANCE	CO5
	Calculation of various nozzle performance with airflow	
WEEK - IX	PROPELLER TEST RIG	CO5
	Calculation of propeller efficiency and thrust availability using propeller test rig at various blade pitch angles.	
WEEK - X	GAS TURBINE PARAMETERS CALCULATION	CO6
	Calculation of work, power and Thrust requirement in gas turbine- combustion power input, work heat relationship.	
WEEK - XI	GAS TURBINE EFFICIENCY AND PERFORMANCE DIAGRAMS	CO6
	Elucidate T-S, H-S diagrams for the gas turbine and compare efficiencies of non-ideal engine components.	
WEEK - XII	GAS TURBINE EFFICIECNY CALCULATIONS	CO6
	Calculation of thermal, propulsive and overall efficiency of turbo jet cycle.	