

Course Number and Name	
BGE007 – GAS DYNAMICS AND SPACE PROPULSION	
Credits and Contact Hours	
3&45	
Course Coordinator's Name	
Mr.Thirumavalavan	
Text Books and References	
<p>TEXTBOOKS:</p> <ol style="list-style-type: none"> 1. Yahya S.M. Fundamentals of Compressible Flow, New Age International (P) Ltd., New Delhi, 2003. 2. Ganesan V, Gas Turbines, Tata McGraw-Hill Publishing Company Ltd., 2003. <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. Philip G Hill and Carl R. Peterton, Mechanics and Thermodynamics of Propulsion, Addison-Wesley Publishing Company, 1999. 2. Khajuria P.R and Dubey S.P., Gas turbines and Propulsive Systems, Dhanpat RaiPublications (P) Ltd, New Delhi 2003. 3. Cohen H. Rogers GFC, Saravanamuttoo HIH, Gas Turbines Theory, Addison-Wesley Long man Ltd., 2001. 4. freecomputerbooks.com/Total-Quality-Management-and-Six-Sigma.htm. 	
Course Description	
<p>To impart knowledge to the students on compressible flow through ducts, jet propulsion and space propulsion.</p> <p>To understand the basic difference between incompressible and compressible flow.</p> <p>To understand the phenomenon of shock waves and its effect on flow. To gain some basic knowledge about jet propulsion and Rocket Propulsion.</p>	
Prerequisites	Co-requisites
Heat and Mass Transfer	Nil
required, elective, or selected elective (as per Table 5-1)	
Non Major Elective	
Course Outcomes (COs)	
CO1	Will get knowledge to the students on compressible flow through ducts, jet propulsion and space propulsion.
CO2	Will understand the basic difference between incompressible and compressible flow.
CO3	Will understand the phenomenon of shock waves and its effect on flow.
CO4	Will understand the jet propulsion
CO5	To learn about the rocket propulsion
CO6	To learn about the types of rocket engine

Student Outcomes (SOs) from Criterion 3 covered by this Course

COs/SOs	a	b	c	d	e	f	g	h	i	j	k	l
CO1	H											
CO2		M										
CO3			H	M		H			H			
CO4					L			M				M
CO5							L			L	L	
CO6												

List of Topics Covered

UNIT I BASIC CONCEPTS OF COMPRESSIBLE FLOW

9

Compressible fluid flow-energy and momentum equations, stagnation stages, various regions of flow, reference velocities, effect of Mach number on compressibility. Types of waves, Mach cone, Mach angle.

UNIT II FLOW THROUGH DUCTS

9

Flow through variable area ducts-nozzles and diffusers, Mach number variation, stagnation and critical states, area ratio as a function of Mach number.

Flow through constant area ducts-with friction (Fanno flow), with heat transfer (Reyleigh flow), Variation of flow properties. Use of Gas Tables and Charts.

UNIT III NORMAL AND OBLIQUE SHOCKS

9

Governing equations, variation of flow parameters across the normal and oblique shocks. Prandtl Meyer relations. Flow in variable area ducts with normal shocks. Use of Tables and Charts.

UNIT IV JET PROPULSION

9

Types of jet engines-turboprop, turbojet, ramjet, pulsejet. Aircraft propulsion theory, performance analysis of jet engines, parameters affecting flight performance, thrust augmentation.

UNIT V ROCKET PROPULSION

9

Types of rocket engines, propellants, combustion instabilities, rocket propulsion theory, performance of rocket engine, multistage rockets, orbital and escape velocities.