

Course code	Course Name	L-T-P-Credits	Year of Introduction
ME462	Propulsion Engineering	3-0-0-3	2016
Prerequisite: Nil			
Course Objectives:			
<ul style="list-style-type: none"> • To give an overview of various air craft engines, rocket engines and their applications. • To provide knowhow on tools to analyze various rocket propulsion. • To know the testing of rocket engines . 			
Syllabus:			
Fundamentals of Propulsion, Types of propulsive devices, Efficiencies, Thermodynamics analysis of turbojet, Turbojet engine components, Rocket propulsion, Types of rockets, Flight Performance, Testing of rockets			
Expected Outcomes:			
The students will be able to			
<ol style="list-style-type: none"> i. Perform thermodynamic analysis of aircraft engines ii. Carry out performance analysis of aircraft systems and components iii. Formulate and solve rocket engine problems 			
Text books:			
<ol style="list-style-type: none"> 1. K Ramamurthi, Rocket Propulsion, Laxmi Publications, 2016 2. Saeed Farokhi, Aircraft Propulsion, Wiley, 2e, 2014 			
Reference books:			
<ol style="list-style-type: none"> 1. G. P. Sutton and Oscar Biblarz, Rocket Propulsion elements- John Wiley & Sons, 2013 2. J Mattingly, H von Ohain, Elements of Propulsion: Gas Turbines and Rockets, AIAA, 2006 3. Philip Hill, Carl Peterson: Mechanics and Thermodynamics of Propulsion, Pearson, 2014 4. Ronald D Flack, Fundamentals of Jet Propulsion with Applications, Cambridge University Press, 2005 			
COURSE PLAN			
Module	Contents	Hours	End Sem. Exam. Marks
I	Fundamentals of Propulsion- Classification types of propulsive devices-Airscrew, Turbojet, Turboprop, turbofan, Turboshaft, Ramjet, Scramjet, Pulsejet and Rocket engines. Comparative study of performance characteristics applications.	7	15%
II	Theory of propulsion – Thrust, thrust power and efficiencies of turbojet engine. Thermodynamics analysis of turbojet engine cycle, Propellers: Types of propellers	7	15%
FIRST INTERNAL EXAMINATION			

III	Turbojet engine components- air intakes, Compressors, Combustion chambers, turbines, nozzles turbine and compression matching – Thrust augmentation.	7	15%
IV	Rocket propulsion- general operating principles of chemical, electrical nuclear and solar rockets. Chemical Rockets-Classification. Performance parameters for chemical rockets and their relationship, Energy and efficiencies, simple problems, Solid propellants- Types- burning rate- grain Configurations, - Classification- Typical fuels and oxidizers, properties and specifications, Selection.	7	15%
SECOND INTERNAL EXAMINATION			
V	Liquid propellant feed systems, injectors, Starting and ignition, Igniters liquid propellant, Precautions in propellant handling. Hybrid Rockets combustion processes in SPR and LPR combustion instability- Control of instabilities –Cooling of Rocket motors	7	20%
VI	Flight Performance- Velocity and attitude in simplified vertical Refractory staging of rockets. Rocket Testing- Test facilities and safeguards. Measurement System Terminology, Flight Testing.	7	20%
END SEMESTER EXAMINATION			

Question Paper Pattern

Maximum marks: 100

Time: 3 hrs

The question paper should consist of three parts

Part A

There should be 2 questions each from module I and II

Each question carries 10 marks

Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B

There should be 2 questions each from module III and IV

Each question carries 10 marks

Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C

There should be 3 questions each from module V and VI

Each question carries 10 marks

Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: Each question can have a maximum of four sub questions, if needed.

APJ ABDUL KALAM
TECHNOLOGICAL
UNIVERSITY

KTU

Estd.



2014