Samrat Ashok Technological Institute, Vidisha

Department of Mechanical Engineering

Lecture Plan

Course Code:	ME-1873 (E-VI) (D)	**Year/Semester :**	BE IVth Year/ 7th Semester
Course Name:	Jet propulsion & rocketry	**Academic Year :**	2023/ ODD
L – P:	3	**Credit :**	3
Course Detail :	Theory	**Term Start Date :**	24/07/2023
Course Coordinator:	Dr. Gopal Kumar Deshmukh	**Term End Date :**	

Academic Year: 2023

Name of Teacher: Dr. Gopal Kumar Deshmukh

Subject: Jet propulsion & rocketry

Theory/Tutorial: Theory

Sr. No.	Name Of Unit/Topics	Hrs. Allotted	Actual Date	Teaching Aid Code	Remarks
01	***Unit: 1- Motion in Space-Requirements of Orbit:***				
	Introduction, Motion of Bodies in Space and Laws of Motion; Parameters describing Motion of Bodies,	2		2 & 4	
	Newton's laws of Motion, Universal Law of Gravitational Force, Gravitational Field; Requirements for Motion in Space,	2		2 & 4	
	Requirements for Motion in Space, Geosynchronous and Geostationary Orbits, Eccentricity and Inclination of Orbits,	2		2 & 4	
	Energy and Velocity Requirements to reach a Particular Orbit;	2		2 & 4	
	Escape Velocity, Freely Falling Bodies, Means of Providing the Required Velocities, small problems.	2		2 & 4	
02	***Unit: 2- Theory of Rocket Propulsion:***				
	Illustration by an Example of Motion of Sled Initially at Rest,	2		2 & 4	
	Motion of Giant Squid in Deep Seas; Rocket Principle and the Rocket Equation,	1		2 & 4	
	Mass Ratio of a Rocket, Desirable Parameters of a Rocket, Propulsive Efficiency of a Rocket,	2		2 & 4	
	Performance Parameters of a Rocket, Staging and Clustering of Rockets, Classification of Rockets, problems.	2		2 & 4	
03	***Unit: 3- Rocket Nozzle and Performance:***				
	Expansion of gas from a high pressure chamber, Shape of the Nozzle area Ratio, Performance loss in a conical Nozzle,	2		2 & 4	
	Flow seprtatin in nozzles Contour or Bell Nozzles, Unconventional Nozzles Mass Flow rates and characteristic Velocity,	2		2 & 4	
	Thrust developed by a Rocket; Thrust Coefficient Efficiencies, Specific Impulse and Correlation with C* and CF General Trends.	2		2 & 4	
04	***Unit: 4- Chemical Propellants and Solid Propellant Rockets:***				
	Chemical Propellants: Small Values of Molecular Mass and Specific Heat Ratio, Energy Release during Combustion of Propellants,	2		2 & 4	
	Criterion for Choice of Propellants, Solid Propellants, Liquid	2		2 & 4	

	Propellants, Hybrid Propellants				
	Solid Propellant Rockets: Mechanism of Burning and Burn Rate, Choice of Index n for Stable Operation of Solid Propellant Rockets, Propellant Grain Configuration	2		2 & 4	
	Ignition of Solid Propellant Rockets, Pressure Decay in the chamber after propellant Burns Out, Action time and Burn Time, Factors influencing Burn Rate Components of a Solid Propellant Rocket.	2		2 & 4	
05	***Unit: 5- Liquid Propellant Rockets and Liquid Monopropellant rockets:***				
	Liquid Propellant Rockets: Propellant Feed system, Thrust Chamber, Performance and Choice of Feed System Cycle, Turbo-pumps,	2		2 & 4	
	Gas requirements for draining of propellants from storage tanks, drainingunder microgravity conditions, Complexity of Liquid Propellant Rockets and simulation, Trends in the development of liquid propellant rockets.	3		2 & 4	
	Liquid Monopropellant rockets: Hydrazine, Monopropellant rockets, Catalyst bed loading, Performance and applications	2		2 & 4	

Teaching Aid Code:	
1	White board
2	L.C.D/overhead PROJECTOR
3	MODEL & CHART
4	PPT & VIDEO

Sign of Teacher: _____

LESSON PLANNING, Rev. no. :

Reference Books:

1. Barrere, M., Rocket Propulsion, Elsevier Pub. Co., 1990.
2. Sutton, G. P., Rocket Propulsion Elements, John Wiley, New York, 1993.
3. Ramamurthi K., Rocket Propulsion, Macmillan Publishers India Ltd., 2010.
4. Feedesiev, V. I. and Siniarev, G. B., Introduction to Rocket Technology, Academic Press, New York, 2000.
5. Sarvanamuttoo, H.I.H., Rogers, G. F. C. and Cohen, H., Gas Turbine Theory, 6th Edition, Pearson Prentice Hall, 2008.