

Gautam Buddha University; Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech. in Thermal Engg.	Aircraft and Rocket Propulsion	MET 520	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam
II	3	3-0-0	3 Hours

Unit – I

Principles of Jet Propulsion: Introduction; Fundamentals of jet propulsion; Air-Breathing Engines: Introduction; Thermodynamics of aircraft jet engines; Turbo jet; Turbo fan; Turbo prop and Ramjet engines; Typical engine performance. **(07 Hours)**

Unit – II

Aero Thermodynamics of Inlet; Combustors and Nozzles: Introduction; Subsonic inlets; Supersonic inlets; Gas turbine combustors; After burners and Ram jet combustors; Supersonic combustion; Exhaust nozzles. **(08 Hours)**

Unit – III

Performance of Rocket Vehicles: Introduction; Static performance; Vehicle acceleration; Gravity-free drag; Free space flight; Forces acting on a vehicle in the atmosphere; Basic relations of motion; Space flight; Flight maneuvers; Effect of propulsion system on vehicle performance; Flight vehicles; Military missiles; Flight stability; Chemical rockets. **(08 Hours)**

Unit – IV

Liquid Propellant Rocket Engine Fundamentals: Types of propellants; propellant tanks; Propellant feed systems; Gas pressure feed systems; Tank pressurization; Turbo-pump feed systems and engine cycles; Solid propellant rocket fundamentals; Basic relations and propellant burning rate; Other

performance issues; Propellant grain and grain configuration; Propellant grain stress and strain; Attitude control and side maneuvers with solid propellant rocket. **(09 Hours)**

Unit – V

Liquid Propellants: Propellant properties; Liquid oxidizers; Liquid fuels; Liquid monopropellants; Gelled propellants; Gaseous propellants; Safety and environmental Concerns. **(07 Hours)**

Unit – VI

Solid Propellants: Classification; Propellant characteristics; Hazards; Propellant ingredients; Other propellant categories; Liners; Insulators and inhibitors; Propellant processing and manufacture. **(06 Hours)**

Recommended Books:

1. Mechanics and Dynamics of Propulsion; Philip Hill and Carl Peterson; 2nd Edition; Addison-Wesley; 2009.
2. Rocket Propulsion Elements; P. Sutton & Oscar Billarz; 1st Edition; John Wiley & sons; 2011.
3. Gas Turbine Theory; Henry Cohen; G. F. C. Rogers; H. I. H. Saravanamuttoo; 2nd Edition; Pearson; 2001.
4. Rocket and Spacecraft Propulsion; Martin J. L. Turner; 3rd Edition; Springer; 2008.
5. Aircraft Propulsion Systems Technology and Design; G. C. Oates; AIAA Series; 1989.