

For Syllabus, Question Papers, Notes & many More

AE6504 PROPULSION - II

DETAILED SYLLABUS

UNIT I HYPERSONIC AIRBREATHING PROPULSION

Introduction to hypersonic air breathing propulsion, hypersonic vehicles and supersonic combustion- need for supersonic combustion for hypersonic propulsion – salient features of scramjet engine and its applications for hypersonic vehicles – problems associated with supersonic combustion –engine/airframe integration aspects of hypersonic vehicles – various types scramjet combustors – fuel injection schemes in scramjet combustors – one dimensional models for supersonic combustion using method of influence coefficients.

UNIT II FUNDAMENTALS OF CHEMICAL ROCKET PROPULSION

Operating principle – specific impulse of a rocket – internal ballistics – performance considerations of rockets – types of igniters- preliminary concepts in nozzle-less propulsion – air augmented rockets – pulse rocket motors – static testing of rockets & instrumentation –safety considerations

UNIT III SOLID ROCKET PROPULSION

Salient features of solid propellant rockets – selection criteria of solid propellants – estimation of solid propellant adiabatic flame temperature - propellant grain design considerations – erosive burning in solid propellant rockets – combustion instability – strand burner and T-burner – applications and advantages of solid propellant rockets.

UNIT IV LIQUID AND HYBRID ROCKET PROPULSION

Salient features of liquid propellant rockets – selection of liquid propellants – various feed systems and injectors for liquid propellant rockets -thrust control and cooling in liquid propellant rockets and the associated heat transfer problems – combustion instability in liquid propellant rockets – peculiar problems associated with operation of cryogenic engines - Introduction to hybrid rocket propulsion – standard and reverse hybrid systems- combustion mechanism in hybrid propellant rockets – applications and limitations.

For Syllabus, Question Papers, Notes & many More

UNIT V ADVANCED PROPULSION TECHNIQUES

Electric rocket propulsion– types of electric propulsion techniques - Ion propulsion – Nuclear rocket – comparison of performance of these propulsion systems with chemical rocket propulsion systems – future applications of electric propulsion systems - Solar sail.

TEXT BOOKS

1. Sutton, G.P., “Rocket Propulsion Elements”, John Wiley & Sons Inc., New York, 5th Edition, 1993.
2. Mathur, M.L., and Sharma, R.P., “Gas Turbine, Jet and Rocket Propulsion”, Standard Publishers and Distributors, Delhi, 1988.

REFERENCES

1. James Award, "Aerospace Propulsion System"
2. Hieter and Pratt, "Hypersonic Air Breathing Propulsion".

OBJECTIVES

To impart knowledge in non air- breathing and hypersonic propulsion methods to students so that they are familiar with various propulsion technologies associated with space launch vehicles, missiles and space probes.