

Introduction to Propulsion

Swayam Prabha Course Code: M50

PROFESSOR'S NAME	Prof. D.P. Mishra
DEPARTMENT	Department of Aerospace Engineering
INSTITUTE	Indian Institute Of Technology Kanpur
COURSE OUTLINE	Basic Principles of Propulsion, Historical background, Conservation Equations, Review of basic thermodynamics, Review of compressible flow; Quasi One dimensional flow, Normal shock, Oblique shock, Rayleigh flow, Fanno flow, Air intake, Nozzle flow, Boundary layer flow, Elements of combustion: Introduction to combustion; thermochemistry, Adiabatic temperature, premixed Flame and Diffusion Flame, Droplet combustion Jet engines: Thrust expressions and performance parameters Gas turbine ideal cycle analysis of ramjet, turbojet, turbofan and turboprop engines; Performance characteristics of various components of gas turbine engines: air-intake, compressor, combustor, turbine, and nozzle; Gas turbine Real cycle analysis Elements of Rocket Engine; Introduction rocket propulsion, classification of rocket engines, rocket engine performance, Types of propellant, Propellant and its composition, rocket engine nozzle and its performance; Solid rocket engine, liquid rocket engines and hybrid rocket engine.

COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1.	L1	Fundamentals of Aerospace Propulsion - I
2.	L2	Fundamentals of Aerospace Propulsion - II
3.	L3	Fundamentals of Aerospace Propulsion - III
4.	L4	Fundamentals of Aerospace Propulsion - IV
5.	L5	Fundamentals of Aerospace Propulsion - V
6.	L6	Fundamentals of Aerospace Propulsion - VI

7.	L7	Fundamentals of Aerospace Propulsion - VII
8.	L8	Fundamentals of Aerospace Propulsion - VIII
9.	L9	Fundamentals of Aerospace Propulsion - IX
10.	L10	Fundamentals of Aerospace Propulsion - X
11.	L11	Fundamentals of Aerospace Propulsion - XI
12.	L12	Fundamentals of Aerospace Propulsion - XII
13.	L13	Fundamentals of Aerospace Propulsion - XIII
14.	L14	Fundamentals of Aerospace Propulsion - XIV
15.	L15	Fundamentals of Aerospace Propulsion - XV
16.	L16	Fundamentals of Aerospace Propulsion - XVI
17.	L17	Fundamentals of Aerospace Propulsion - XVII
18.	L18	Fundamentals of Aerospace Propulsion - XVIII
19.	L19	Fundamentals of Aerospace Propulsion - XIX
20.	L20	Fundamentals of Aerospace Propulsion - XX
21.	L21	Fundamentals of Aerospace Propulsion - XXI
22.	L22	Fundamentals of Aerospace Propulsion - XXII
23.	L23	Fundamentals of Aerospace Propulsion - XXIII
24.	L24	Fundamentals of Aerospace Propulsion - XXIV
25.	L25	Fundamentals of Aerospace Propulsion - XXV
26.	L26	Fundamentals of Aerospace Propulsion - XXVI
27.	L27	Fundamentals of Aerospace Propulsion - XXVII
28.	L28	Fundamentals of Aerospace Propulsion - XXVIII
29.	L29	Fundamentals of Aerospace Propulsion - XXIX
30.	L30	Fundamentals of Aerospace Propulsion - XXX
31.	L31	Fundamentals of Aerospace Propulsion - XXXI
32.	L32	Fundamentals of Aerospace Propulsion - XXXII
33.	L33	Fundamentals of Aerospace Propulsion - XXXIII
34.	L34	Fundamentals of Aerospace Propulsion - XXXIV

35.	L35	Fundamentals of Aerospace Propulsion - XXXV
36.	L36	Fundamentals of Aerospace Propulsion - XXXVI
37.	L37	Fundamentals of Aerospace Propulsion - XXXVII
38.	L38	Fundamentals of Aerospace Propulsion - XXXVIII
39.	L39	Fundamentals of Aerospace Propulsion - XXXIX
40.	L40	Fundamentals of Aerospace Propulsion - XL

List of reference material/ books:

J D Mattingly, Elements of Gas Turbine Propulsion, McGraw Hill, 1997

H. Cohen, G F C Rogers and H I H Sarvanmatto, Gas Turbine Theory, Longman 1987

J P Holman, Heat Transfer, 2nd Ed., McGraw Hill

J L Kerrebrock, Aircraft Engine and Gas Turbine, MIT Press, 1991

Gordon C Oates, Aircraft Propulsion, System Technology & Design, AIAA Publications

P G Hill & C R Peterson, Mechanics and Thermodynamics of Propulsion, Addison Wesley, 1970.

D.P. Mishra, Fundamentals of Combustion, Prentice Hall of India, New Delhi, 2008.

D.P. Mishra, Engineering Thermodynamics, Cengage Learning, New Delhi, 2011.

Name and contact details of two referees for the course: