

PROFESSOR'S NAME	Prof. A M Pradeep Prof. Bhaskar Roy
DEPARTMENT	Department of Aerospace Engineering
INSTITUTE	Indian Institute of Technology Bombay
COURSE OUTLINE	Introduction to Aircraft Jet Propulsion. Jet Engine Cycles: Thermodynamic Analysis of real cycles. Compressors and Turbines. Combustion Systems. Intakes and Propelling Nozzles. Aircraft Engine Installed Performance, Sizing & Matching. Ramjets, Scramjets and Pulsejets.

COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1.	L1	Introduction & Development of Jet Aircraft Propulsion
2.	L2	How the Aircraft Jet Engines make Thrust
3.	L3	Jet Engine Basic Performance Parameters
4.	L4	Turbojet, Reheat Turbojet and Multi-spool Engines
5.	L5	Turbofan, Turbo-prop and Turboshift engines
6.	L6	Ideal and Real Brayton cycles
7.	L7	Jet Engine Cycles for Aircraft propulsion
8.	L8	Cycle components and component performances
9.	L9	Tutorial -I
10.	L10	Analysis of engine real cycles
11.	L11	Tutorial - II

12.	L12	Thermodynamics of Compressors
13.	L13	Thermodynamics of Turbines
14.	L14	Axial Compressors : two dimensional analytical model
15.	L15	Cascade analysis; Loss and Blade performance estimation
16.	L16	Free Vortex theory; Single-Multi-stage characteristics
17.	L17	Tutorial - III
18.	L18	Elements of centrifugal compressor
19.	L19	Centrifugal Compressor characteristics: Surging, Choking
20.	L20	Axial flow turbines; Turbine Blade 2-D (cascade) analysis
21.	L21	Multi-staging: Axial Turbine; Turbine Cooling Technology
22.	L22	Radial Turbine Aerodynamics & Thermodynamics; Losses
23.	L23	Tutorial - IV
24.	L24	Types of combustion chambers: mechanism & parameters
25.	L25	Pr. Loss, Combustion efficiency; Combustion intensity
26.	L26	Practical combustion system ; Stability, Fuel injection
27.	L27	Intakes for Powerplant: Transport / Military Aircraft
28.	L28	Subsonic, Transonic, Supersonic Intake Designs
29.	L29	Nozzle : fixed and variable geometry nozzles
30.	L30	Working of Convergent and C – D Nozzles
31.	L31	Tutorial - V
32.	L32	Engine Off Design Operations
33.	L33	Aircraft Engine component matching: Dimensional analysis
34.	L34	Engine component matching and Sizing
35.	L35	Installed Performance of Engine

36.	L36	Tutorial - VI
37.	L37	Use of Ramjets and Pulsejets in Aircraft propulsion
38.	L38	Thermodynamic Cycle & Performance Parameters
39.	L39	Flow in Diffusers, Combustors and Nozzles
40.	L40	Performance and Design of Ramjet & Scramjet Engines
41.	L41	Tutorial - VII
42.	L42	Future of Aircraft Propulsion

List of reference material/ books:

Kroes Michael J; Wild Thomas W; *Aircraft Powerplants*; 2010(7 Ed), Tata-Mcgraw-Hill.

Hill Philip, Peterson Carl, *Mechanics and Thermodynamics of Propulsion*, 1992, Addison Wesley,.

Roy Bhaskar, *Aircraft Propulsion*, 2008, Elsevier (India),

Mattingly J D , *Elements of Propulsion - Gas Turbines and Rockets*, 2006, AIAA Education series.

El-Sayed Ahmed, *Aircraft Propulsion and gas Turbine Engines* , 2008, Taylor and Francis (CRC press).

Saravanamuttoo, H.I.H., Rogers G.F.C., Cohen H. *Gas Turbine Theory*, 2001, Pearson.

Name and contact details of two referees for the course: