

PROFESSOR'S NAME	Dr. Vinayak Kulkarni Prof. Pranab K. Mondal
DEPARTMENT	Department of Mechanical Engineering
INSTITUTE	Indian Institute of Technology Guwahati
COURSE OUTLINE	This course deals with the gas power cycles. One part of the course is on IC engines and it focuses on the thermodynamic cycles for different fuels suitable for automobiles. Other part of the course has emphasis on thermodynamic cycle of aircraft engines and the components of the aircraft engine. Thus this course would provide an understanding on electricity generation or transportation application using gas as working medium.

COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1.	Module1_L1	External and Internal Combustion Engines, Engine Components, SI and CI Engines
2.	Module1_L2	Four-Stroke and Two-Stroke Engines
3.	Module2_L3	Classification of IC Engines
4.	Module2_L4	Engine Operating Characteristics
5.	Module2_L5	Otto, Diesel and Dual Cycles
6.	Module2_L6	Otto, Diesel and Dual Cycles (Contd.)
7.	Module2_L7	Otto, Diesel and Dual Cycles (Contd.)
8.	Module3_L8	Comparison Between the Cycles, Actual Cycles and their Analysis
9.	Module3_L9	Carburetor, Mixture Requirements
10.	Module3_L10	Carburetor, Mixture Requirements (Contd.)
11.	Module3_L11	Idling, Cruising and Power Ranges

12.	Module3_L12	Idling, Cruising and Power Ranges (Contd.)
13.	Module4_L13	CI Engine Injection Systems
14.	Module4_L14	SI Engine Injection Systems
15.	Module4_L15	Mechanical and Electronic Injection Systems
16.	Module4_L16	Battery Ignition Systems
17.	Module4_L17	Engine Friction, Lubrication Systems, Forces on Piston
18.	Module4_L18	Lubricating Oils, Thermochemistry of Fuels
19.	Module5_L19	IC Engine Fuels - Types, Requirement and Characteristics, Alternative Fuels
20.	Module5_L20	Combustion in SI Engines
21.	Module5_L21	Combustion in CI Engines
22.	Module5_L22	CI Engine Injection System
23.	Module5_L23	CI Engine Injection System (Contd.)
24.	Module6_L24	Heat Transfer and Energy Distribution
25.	Module6_L25	Cetane and Octane Number, Cooling Systems
26.	Module6_L26	Problems on IC Engine
27.	Module7_L27	Turbomachines, Gas Turbine Theory
28.	Module7_L28	Open Cycle Gas Turbine Power Plant, Twin Shaft Arrangement
29.	Module7_L29	Closed Cycle, Multi-Spool Arrangement, Steam Power Plant
30.	Module7_L30	Basic Thermodynamics
31.	Module8_L31	Brayton Cycle: Introduction and General Relationships
32.	Module8_L32	Brayton Cycle: Efficiency, Work Ratio and Optimum Work Output Condition
33.	Module8_L33	Brayton Cycle With Heat Exchanger/ Reheater
34.	Module8_L34	Brayton Cycle With Intercooler
35.	Module8_L35	Real Brayton Cycle, Solved Example for Ideal Cycle
36.	Module8_L36	Solved Examples for Real Brayton Cycle

37.	M9_L37	Introduction and Performance Parameters of Propulsion System
38.	Module9_L38	Basics of Various Aircraft Engine
39.	Module10_L39	Eularturbomachinary Equation
40.	Module10_L40	Introduction and Flow Analysis of Centrifugal Compressors
41.	Module10_L41	Thermodynamics Analysis of Centrifugal Compressors
42.	Module11_L42	Axial Compressor: Basics, Velocity Triangles,T-S Diagram and Work Intraction
43.	Module11_L43	Axial Compressor: Different Factors, Degree of Reaction and Free Vortex Condition
44.	Module11_L44	Complete Analysis of Axial Flow Gas Turbine
45.	Module11_L45	Solved Examples for Axial Compressors, Centrifugal Compressors and Turbine
46.	Module12_L46	Radial Flow Turbine, Solved Example of Free Vortex Condition
47.	Module12_L47	Nozzles and Diffuers: Introduction, Intake Efficiency, Nozzle Efficiency

List of reference material/ books:

Name and contact details of two referees for the course: