NPTEL Video Course - Aerospace Engineering - Introduction to Aerospace Propulsion

Subject Co-ordinator - Prof. Bhaskar Roy, Prof. A M Pradeep

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Course Intro & Historical development of flights
Lecture 2 - Early development of aircraft propulsive devices
Lecture 3 - Development of Jet propulsion for aircraft
Lecture 4 - Introduction to thermodynamics, Scope and method, Basic concepts
Lecture 5 - Quasi-static processes, zeroth law of thermodynamics and temperature, concept of energy and its v
Lecture 6 - Specific heats at constant pressure and volume Work and heat transfers
Lecture 7 - Tutorial
Lecture 8 - First law of thermodynamics for closed systems
Lecture 9 - First law of thermodynamics for open systems/flow processes
Lecture 10 - Second law of thermodynamics, heat engines, refrigerators and heat pumps, Kelvin-Planck and Clau
Lecture 11 - Reversible and irreversible processes, concept of entropy
Lecture 12 - Increase of entropy principle, third law of thermodynamics, absolute entropy, perpetual motion m
Lecture 13 - Tutorial
Lecture 14 - Carnot cycle, Carnot principle, thermodynamic temperature scale
Lecture 15 - Exergy, availability and second law efficiency
Lecture 16 - Tutorial
Lecture 17 - Gas and vapour power cycles, Otto cycle, Diesel cycle, Dual cycle
Lecture 18 - Rankine cycle, Brayton cycle, Stirling and Ericsson cycles
Lecture 19 - Thermodynamic property relations, Jacobean and Legendre transformations, Maxwellâ s equations
Lecture 20 - Tutorial
Lecture 21 - Properties of gas and vapour mixtures
Lecture 22(A) - One-dimensional compressible flows, isentropic flows
Lecture 22(B) - Flows with friction and heat transfer, normal and oblique shocks
Lecture 23 - Piston-prop engines
Lecture 24 - IC Engines for aircraft application
Lecture 25 - Performance parameters of IC engines
Lecture 26 - Supercharging of aircraft IC engines
Lecture 27 - Tutorial
Lecture 28 - Propeller fundamentals

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Lecture 29 - Propeller aerodynamic theories - I
Lecture 30 - Propeller aerodynamic theories - II
Lecture 31 - Tutorial
Lecture 32 - Ideal cycles for Jet engines
Lecture 33 - Ideal cycles for variants of jet engines
Lecture 34 - Tutorial
Lecture 35 - Fundamentals of Ramjets and Pulsejets
Lecture 36 - Fundamentals of Rocket engines
Lecture 37 - Fundamentals of Missile engines
Lecture 38 - Various space vehicles and their engines
Lecture 39 - Closure of the lecture series
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NPTEL Video Course - Aerospace Engineering - Jet Aircraft Propulsion

Subject Co-ordinator - Prof. A M Pradeep, Prof. Bhaskar Roy

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction & Development of Jet Aircraft Propulsion
Lecture 2 - How the Aircraft Jet Engines make Thrust
Lecture 3 - Jet Engine Basic Performance Parameters
Lecture 4 - Turbojet, Reheat Turbojet and Multi-spool Engines
Lecture 5 - Turbofan, Turbo-prop and Turboshaft engines
Lecture 6 - Ideal and Real Brayton cycles
Lecture 7 - Jet Engine Cycles for Aircraft propulsion
Lecture 8 - Cycle components and component performances
Lecture 9 - Tute-1
Lecture 10 - Analysis of engine real cycles
Lecture 11 - Tute-2
Lecture 12 - Thermodynamics of Compressors
Lecture 13 - Thermodynamics of Turbines
Lecture 14 - Axial Compressors
Lecture 15 - Cascade analysis; Loss and Blade performance estimation
Lecture 16 - Free Vortex theory; Single-Multi-stage characteristics
Lecture 17 - Tutes-3
Lecture 18 - Elements of centrifugal compressor
Lecture 19 - Centrifugal Compressor characteristics
Lecture 20 - Axial flow turbines; Turbine Blade 2-D (cascade) analysis
Lecture 21 - Multi-staging
Lecture 22 - Radial Turbine Aerodynamics & Thermodynamics; Losses
Lecture 23 - Tutes-4
Lecture 24 - Types of combustion chambers
Lecture 25 - Pr. Loss, Combustion efficiency; Combustion intensity
Lecture 26 - Practical combustion system ; Stability, Fuel injection
Lecture 27 - Intakes for Powerplant
Lecture 28 - Subsonic, Transonic, Supersonic Intake Designs
Lecture 29 - Nozzle

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Lecture 30 - C-D nozzle and their uses
Lecture 31 - Tute-5
Lecture 32 - Engine Off Design Operations
Lecture 33 - Aircraft Engine component matching
Lecture 34 - Engine component matching and Sizing
Lecture 35 - Installed Performance of Engine
Lecture 36 - Tute-6
Lecture 37 - Use of Ramjets and Pulsejets in Aircraft propulsion
Lecture 38 - Thermodynamic Cycle & Performance Parameters
Lecture 39 - Flow in Diffusers, Combustors and Nozzles
Lecture 40 - Performanace and Design of Ramjet & Scramjet Engines
Lecture 41 - Tute-7
Lecture 42 - Future of Aircraft Propulsion
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NPTEL Video Course - Aerospace Engineering - Turbomachinery Aerodynamics

Subject Co-ordinator - Prof. Bhaskar Roy, Prof. A M Pradeep

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Turbo machines Syllabus, References and Schedules
Lecture 2 - Axial Flow Compressors and Fans
Lecture 3 - A two dimensional analytical model
Lecture 4 - 2D losses in Axial flow Compressor Stage
Lecture 5 - Tutorial 1
Lecture 6 - 3D Flows in Blade Passages, Secondary Flows, Tip leakage Flow, Scrubbling
Lecture 7 - Three Dimensional Flow Analysis
Lecture 8 - Classical Blade Design Laws
Lecture 9 - Three Dimensional Flow Analysis in Axial Flow Compressor
Lecture 10 - Tutorial 2
Lecture 11 - Axial Compressor Characteristics
Lecture 12 - Instability in Axial Compressors
Lecture 13 - Inlet Distortion and Rotating Stall, Control of Instability
Lecture 14 - Transonic Compressors and Shock Structure Models, Transonic Compressor Characteristics
Lecture 15 - Axial Flow Compressor Design, Inter Spool Duct
Lecture 16 - Design of Compressor Blades, Aerofoil Design (Subsonic, Transonic, Supersonic Profiles)
Lecture 17 - Design of Compressor Blade
Lecture 18 - Noise Problem in Axial Compressors and Fans
Lecture 19 - Axial Flow Turbines
Lecture 20 - Axial Flow Turbines
Lecture 21 - Axial Flow Turbines
Lecture 22 - Axial Flow Turbines
Lecture 23 - Tutorial 3
Lecture 24 - Multi staging and Multi spooling of Turbine
Lecture 25 - 3D Flow in Turbine
Lecture 26 - Tutorial 4
Lecture 27 - Turbine Blade Cooling â Fundamentals of Heat Transfer, Blade Cooling Requirements
Lecture 28 - Turbine Blade Cooling Technologies
Lecture 29 - Turbine Blade Design

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Lecture 30 - Turbine Blade Design
Lecture 31 - Centrifugal Compressors
Lecture 32 - Centrifugal Compressors
Lecture 33 - Tutorial 5
Lecture 34 - Design of Centrifugal Compressors
Lecture 35 - Radial Turbines
Lecture 36 - Tutorial 6
Lecture 37 - Radial Turbine Characteristics and Design of Radial Turbines
Lecture 38 - CFD for Turbomachinery
Lecture 39 - CFD for Turbomachinery
Lecture 40 - CFD for Turbomachinery
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NPTEL Video Course - Aerospace Engineering - NOC:Introduction to Aerospace Engineering

Subject Co-ordinator - Prof. Rajkumar Pant

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable │ MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Course Layout and Brief Introduction of Course Instructor
Lecture 2 - Introduction to International Standard Atmosphere (ISA)
Lecture 3 - Pressure, Temperature, Density and Viscosity Variation with Altitude in ISA
Lecture 4 - Other Standard Atmospheres
Lecture 5 - Aircraft Component Nomenclature - Wing and its Components
Lecture 6 - Aircraft Component Nomenclature - Fuselage and its Components
Lecture 7 - Aircraft Component Nomenclature - Tail Plane and its Components
Lecture 8 - Tutorial 1 - Aircraft Component Nomenclature
Lecture 9 - Essentials of Incompressible Flow - Part I
Lecture 10 - Essentials of Incompressible Flow - Part II
Lecture 11 - Bernoulli's Equation and Coanda Effect
Lecture 12 - Mach Number
Lecture 13 - Tutorial 2 - Incompressible Flow and Flow Visualization
Lecture 14 - Viscous Flow and Reynolds Number
Lecture 15 - Introduction to Boundary Layer
Lecture 16 - Pressure Measurement
Lecture 17 - Air Speed Measurement - Pitot Static Tube
Lecture 18 - Air Speed Corrections
Lecture 19 - Altitude and ROC/ROD Measurement
Lecture 20 - Measurements in Compressible Flows
Lecture 21 - Non Pneumatic Instruments
Lecture 22 - Introduction to Aerofoils and Aerofoil Nomenclature
Lecture 23 - Aerofoils - A Visit to the Past
Lecture 24 - Thick Aerofoils
Lecture 25 - Low Reynolds Number Aerofoils
Lecture 26 - Lift Generation by Wings - Part I
Lecture 27 - Lift Generation by Wings - Part II
Lecture 28 - Coefficient of Lift and Coefficient of Pressure
Lecture 29 - Tutorial on Aerofoils

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Lecture 30 - Critical Mach Number
Lecture 31 - Wave Drag
Lecture 32 - Swept Wings
Lecture 33 - Introduction to Drag and Types of Drag
Lecture 34 - Factors Affecting Induced Drag
Lecture 35 - Skin Friction Drag
Lecture 36 - Tutorial on Critical Mach Number and Wave Drag
Lecture 37 - Introduction to Propulsion
Lecture 38 - Gas Turbine Engine Types - Part I
Lecture 39 - Gas Turbine Engine Types - Part II
Lecture 40 - Introduction to Electric Propulsion and Ion Propulsion
Lecture 41 - Steady Level Flight
Lecture 42 - Power Required for the Steady Level Flight
Lecture 43 - Steady Level Flight - A Pilot's View
Lecture 44 - Tutorial on Steady Level Flight
Lecture 45 - Gliding Flight
Lecture 46 - Climbing Flight and Ceiling
Lecture 47 - Introduction to Turning Flight
Lecture 48 - Turning Flight Equations
Lecture 49 - Instantaneous and Sustained Turn
Lecture 50 - Tutorial on Climbing Flight and Turning Flight
Lecture 51 - Introduction to Static Stability
Lecture 52 - Aerodynamic Center and Effect of Center of Gravity
Lecture 53 - Effect of Center of Gravity - A Practical Demonstration
Lecture 54 - Introduction to V-n Diagram
Lecture 55 - V-n Diagram as per FAR 23 Regulations
Lecture 56 - Effect of Gusts on V-n Diagram
Lecture 57 - Tutorial on Stability and Control
Lecture 58 - Range
Lecture 59 - Specific Fuel Consumption and Generalized Range Equation
Lecture 60 - Endurance
Lecture 61 - Take-off Performance of Flight - Part I
Lecture 62 - Take-off Performance of Flight - Part II
Lecture 63 - Landing Performance of Flight
Lecture 64 - Tutorial on Range Payload Diagram
Lecture 65 - Tutorial on Range and Endurance
Lecture 66 - Flapping Wing Aerodynamics - Part I
Lecture 67 - Flapping Wing Aerodynamics - Part II
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NPTEL Video Course - Aerospace Engineering - NOC:Introduction to Aircraft Design

Subject Co-ordinator - Prof. Rajkumar Pant

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - What is Aircraft Design
Lecture 2 - Aircraft Design Process
Lecture 3 - Design Stages
Lecture 4 - Phases in Aircraft Design
Lecture 5 - The Design Spiral
Lecture 6 - Importance of Cost in Aircraft Design
Lecture 7 - Basic Laws of Aircraft Design
Lecture 8 - Requirements Capture
Lecture 9 - Quality Function Deployment
Lecture 10 - House of Quality Chart
Lecture 11 - Example of HoQ for HALE UAV
Lecture 12 - Illustration of HOQ-GA aircraft
Lecture 13 - Airliners
Lecture 14 - Key Issues in Design of Airliners
Lecture 15 - Design Considerations - Future Airliners
Lecture 16 - Supersonic Transport Aircraft
Lecture 17 - Airliner and Supersonic Aircraft, some additional concepts
Lecture 18 - Design Considerations - Cargo Aircraft
Lecture 19 - Design Considerations - GA Aircraft
Lecture 20 - Types of Military Aircraft
Lecture 21 - Cargo, GA and Military Aircraft, Some additional concepts
Lecture 22 - Aircraft Configuration Design
Lecture 23 - Podded Engines on Wings
Lecture 24 - Wing Sweep
Lecture 25 - Canards and Flying Wing
Lecture 26 - Three Surface Aircraft
Lecture 27 - Winglets
Lecture 28 - Thrust Vectoring
Lecture 29 - Few Novel Concepts_01

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Lecture 30 - Aircraft Configuration Design - Closing Remarks
Lecture 31 - Choices in Aircraft Layout
Lecture 32 - Wing Geometry Definitions
Lecture 33 - Options for Wing layout
Lecture 34 - Propulsion System Layout
Lecture 35 - Tail Plane Layout
Lecture 36 - Landing Gear Layout - Part 1
Lecture 37 - Landing Gear Layout - Part 2
Lecture 38 - Landing Gear of some Famous Aircraft
Lecture 39 - Tutorial on OpenVSP
Lecture 40 - Initial Sizing in Aircraft Design
Lecture 41 - Estimation of Empty Weight Fraction
Lecture 42 - Estimation of Mission Segment Weights
Lecture 43 - Estimation of Fuel Weight Fractions
Lecture 44 - Estimation of maximum L/D
Lecture 45 - Estimation of engine parameters
Lecture 46 - Estimation of Design gross weight
Lecture 47 - Take-off weight build up
Lecture 48 - Tutorial on Initial Sizing of Transport Aircraft
Lecture 49 - Tutorial on Initial Sizing of Military Aircraft
Lecture 50 - Subsonic Parasite Drag Estimation
Lecture 51 - Component Buildup Method
Lecture 52 - Drag Estimation of Military Aircraft
Lecture 53 - Tutorial on Drag Polar Estimation of Military Aircraft
Lecture 54 - Estimation of Lift Coefficient
Lecture 55 - Estimation of Maximum Lift Coefficient
Lecture 56 - Flaps as High Lift Devices
Lecture 57 - Tutorial on Lift Coefficient Estimation of Transport Aircraft
Lecture 58 - Tutorial on Lift Coefficient Estimation of Military Aircraft
Lecture 59 - Constraint Analysis- Introductory Remarks
Lecture 60 - Constraint Analysis- Transport Aircraft - Part 1
Lecture 61 - Constraint Analysis- Transport Aircraft - Part 2
Lecture 62 - Tutorial on Constraint Analysis of Transport Aicraft - Part 1
Lecture 63 - Tutorial on Constraint Analysis of Transport Aicraft - Part 2
Lecture 64 - Constraint Analysis- Military Aircraft
Lecture 65 - Tutorial on Constraint Analysis of Military Aicraft - Part 1
Lecture 66 - Tutorial on Constraint Analysis of Military Aicraft - Part 2
Lecture 67 - Refined Sizing
Lecture 68 - Tutorial on Refined Sizing of Jet Fighter Aircraft
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Lecture 69 - Cost Estimation in Aircraft Conceptual Design
Lecture 70 - Aircraft Life Cycle Cost Estimation
Lecture 71 - Tutorial on RDT&E and Production Cost Estimation of Transport Aircraft
Lecture 72 - Tutorial on DT&E and Production Cost Estimation of HALE UAV
Lecture 73 - Estimation of Direct Operating Cost
Lecture 74 - Fighter Aircraft Life Cycle Cost Estimation Model
Lecture 75 - Range Payload Diagram - Part 1
Lecture 76 - Range Payload Diagram - Part 2
Lecture 77 - Tutorial on Range Payload Diagram of Transport Aircraft
Lecture 78 - Environmental issues in Aircraft Design
Lecture 79 - Limit Manoeuvre Envelope
Lecture 80 - Effect of Gust
Lecture 81 - Aircraft Loads
Lecture 82 - Tutorial on V-n Diagram of Transport Aircraft
Lecture 83 - High Altitude Long Endurance (HALE) Aircraft
Lecture 84 - Morphing of Aircraft Configurations
Lecture 85 - Guest Lecture on Air Power and Multi-role Fighter Aircraft - Part 1
Lecture 86 - Guest Lecture on Air Power and Multi-role Fighter Aircraft - Part 2

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NPTEL Video Course - Aerospace Engineering - NOC:Introduction to Launch Vehicle Analysis and Design

Subject Co-ordinator - Prof. Ashok Joshi

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Course Plan
Lecture 3 - Ascent Mission Basics
Lecture 4 - Force and Geometry Models - 1
Lecture 5 - Force and Geometry Models - 2
Lecture 6 - Idealized Performance
Lecture 7 - Trajectory Under Gravity
Lecture 8 - Impact of Gravity
Lecture 9 - Impact of Drag
Lecture 10 - Curvilinear Motion Concept
Lecture 11 - Constant Pitch Rate Solution
Lecture 12 - Constant Velocity Solution
Lecture 13 - Constant (T/m) Solution
Lecture 14 - Ascent Mission Design
Lecture 15 - Multi-stage Rocket Basics
Lecture 16 - Multi-stage Configuration Basics
Lecture 17 - Multi-stage Solution Basics
Lecture 18 - Multi-stage Problem Definition
Lecture 19 - Optimal Staging Strategy
Lecture 20 - Lagrange Solution
Lecture 21 - Approximate Staging Solution
Lecture 22 - Variant Concept
Lecture 23 - Variant Design Solution
Lecture 24 - Parallel Staging Concept
Lecture 25 - Parallel Staging Benefits
Lecture 26 - Jet Damping and Ballistic Missiles
Lecture 27 - Current Rocket Concepts
Lecture 28 - Launch Widow and SSTO Concepts
Lecture 29 - Reentry Concept

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NPTEL Video Course - Aerospace Engineering - NOC:Lighter than Air Systems

Subject Co-ordinator - Prof. Rajkumar Pant

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to the Course Content
Lecture 2 - Differences between LTA and HTA systems
Lecture 3 - The three conventional LTA systems
Lecture 4 - LTA gases, Types of Airships and their components
Lecture 5 - Introduction of Skyship 600 and USP of Airships
Lecture 6 - Applications of Airships
Lecture 7 - Tethered Aerostat systems
Lecture 8 - Why use Aerostats
Lecture 9 - Some Queries on Aerostats
Lecture 10 - Historical developments of LTA systems - Part I
Lecture 11 - Historical developments of LTA systems - Part II
Lecture 12 - Historical developments of LTA systems - Part III
Lecture 13 - Historical developments of LTA systems - Part IV
Lecture 14 - Historical developments of LTA systems - Part V
Lecture 15 - Historical developments of LTA systems - Part VI
Lecture 16 - Overview of PADD
Lecture 17 - Remote Controlled Airships
Lecture 18 - Autonomous Airships
Lecture 19 - Indoor Blimp Projects by students
Lecture 20 - Biomimetic Airships
Lecture 21 - Introduction to Buoyancy
Lecture 22 - Basic Concepts of Aerostatics
Lecture 23 - Ballasting, Weigh off and Fuel weight recovery
Lecture 24 - In flight Ballast Collection methods
Lecture 25 - Static Lift Prediction - Part I
Lecture 26 - Static Lift Prediction - Part II
Lecture 27 - Tutorial Problem 1 on Static Lift Estimation
Lecture 28 - Effect of Humidity and Vapour Pressure
Lecture 29 - Calculation of Ambient Air Density

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Lecture 30 - Tutorial Problem 2 and 3 on Static Lift Estimation
Lecture 31 - Effect of Lifting Gas Purity, Superpressure and Superheat
Lecture 32 - Ballonet Air Weight Estimation
Lecture 33 - Net Static Lift of non rigid airships
Lecture 34 - Net Static Lift for other LTA systems
Lecture 35 - Tutorial Problem 4 on Net Static Lift Estimation
Lecture 36 - Parameters affecting Static Lift
Lecture 37 - Effect of change in Atmospheric Pressure
Lecture 38 - Tutorial Problem 5 on Change in Atmospheric Pressure
Lecture 39 - Effect of Superpressure
Lecture 40 - Tutorial Problem 6 on effect of Superpressure
Lecture 41 - Effect of Slow change in Atmospheric Temperature and Superheat
Lecture 42 - Effect of Rapid change in Atmospheric Temperature
Lecture 43 - Tutorial Problem 7 on Change in Atmospheric Temperature and Superheat
Lecture 44 - Revision and Tutorial Problem 08 and 09 on Affecting Parameters of Static Lift
Lecture 45 - Effect of change in Relative Humidity
Lecture 46 - Effect of change in Lifting Gas Purity
Lecture 47 - Effect of change in Lifting Gas Volume
Lecture 48 - Determination of Inflation Fraction
Lecture 49 - Flight To Lower Ground Elevation
Lecture 50 - Tutorial Problem 10 on Helium Addition
Lecture 51 - Outdoor Hot Air Balloon
Lecture 52 - Pressure Height
Lecture 53 - Tutorial Problem 11 on Pressure Height Calculation
Lecture 54 - Sea Level Inflation Fraction
Lecture 55 - Flight above Pressure Height
Lecture 56 - Effect of Change in Operating Altitude
Lecture 57 - Tutorial Problem 12 on Lifting Gas Loss
Lecture 58 - Descent Following Exceedance
Lecture 59 - Pressure Height for other LTA Vehicles
Lecture 60 - Discussion of Practice Questions
Lecture 61 - Envelope Materials - Part I
Lecture 62 - Envelope Materials - Part II
Lecture 63 - Envelope Materials - Part III
Lecture 64 - Fabric Testing Machines - Part I
Lecture 65 - Fabric Testing Machines - Part II
Lecture 66 - Need for Ground Handling
Lecture 67 - Aerium Hanger for CL 160 Airship
Lecture 68 - Ground Handling of Airships
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Lecture 69 - Types of Mooring Masts and Design Requirements
Lecture 70 - Nose Battens for Envelopes
Lecture 71 - Need for Airship Design Methodology
Lecture 72 - Overview of Airship Design Methodology ADM
Lecture 73 - Details of Airship Design Methodology ADM
Lecture 74 - Inputs to Airship Design Methodology - Part 1
Lecture 75 - Inputs to Airship Design Methodology - Part 2
Lecture 76 - Design Constants in Airship Design Methodology
Lecture 77 - Outputs from Airship Design Methodology
Lecture 78 - Statistical Data Used in Airship Design Methodology
Lecture 79 - Validation of Airship Design Methodology
Lecture 80 - Envelope Shapes for LTA Systems
Lecture 81 - Example of Application of Airship Design Methodology
Lecture 82 - Conclusions and Limitations of Airship Design Methodology
Lecture 83 - Sizing Procedure for Indoor Remotely Controlled Airships - Part 1
Lecture 84 - Sizing Procedure for Indoor Remotely Controlled Airships - Part 2
Lecture 85 - Sizing Procedure for Indoor Remotely Controlled Airships - Part 3
Lecture 86 - Tutorial on Sizing of an Indoor Non Rigid Remotely Controlled Airship
Lecture 87 - Transportation Problems Faced by Remote Regions
Lecture 88 - Airships vs Helicopters - Part I
Lecture 89 - Airships vs Helicopters - Part II
Lecture 90 - Chaar Dham Yatra - Part I
Lecture 91 - Chaar Dham Yatra - Part II
Lecture 92 - Chaar Dham Yatra - Part III
Lecture 93 - Steam and IC engines for Airships
Lecture 94 - Electric motors for Airships
Lecture 95 - Turboprops for Airships
Lecture 96 - Solar Propulsion and Thrust Vectoring on Airships
Lecture 97 - Lectuer on Dynamics
Lecture 98 - Lectuer on Drag
Lecture 99 - Aerodynamic Stability
Lecture 100 - Added Mass Effects
Lecture 101 - Introduction to Aerostat Design Methodology
Lecture 102 - Inputs for Aerostat Design Methodology
Lecture 103 - Design Constants in Aerostat Design Methodology
Lecture 104 - Overview of Aerostat Design Methodology
Lecture 105 - Equilibrium Analysis of Aerostats - Part I
Lecture 106 - Equilibrium Analysis of Aerostats - Part II
Lecture 107 - Methodology for Tether Profile Estimation

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Lecture 108 - Sizing of Reusable Indoor Hot Air Balloon
Lecture 109 - Tutorial on Sizing of RIHAB
Lecture 110 - Features of Hybrid Airships
Lecture 111 - Technological challenges in HALE Platforms development - Part I
Lecture 112 - Technological challenges in HALE Platforms development - Part II
Lecture 113 - Initial sizing of Stratospheric Airships
Lecture 114 - Introduction to Hybrid Airships
Lecture 115 - Lockheed Martin's P 791 Hybrid Airship
Lecture 116 - Aeroscraft ML 866 Hybrid Airship
Lecture 117 - SkyCat Hybrid Airship
Lecture 118 - Rotary and Winged Hybrid Airships
Lecture 119 - Hybrid Ultra Heavy Lift Cargo Vehicle Transport
Lecture 120 - Features of Hybrid Airships
Lecture 121 - Solar Powered Airships
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NPTEL Video Course - Aerospace Engineering - NOC:Elements of Mechanical Vibration

Subject Co-ordinator - Prof. Ashish K Darpe

Co-ordinating Institute - IIT - Delhi

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1
Lecture 2
Lecture 3
Lecture 4
Lecture 5
Lecture 6
Lecture 7
Lecture 8
Lecture 9
Lecture 10
Lecture 11
Lecture 12
Lecture 13
Lecture 14
Lecture 15
Lecture 16
Lecture 17
Lecture 18
Lecture 19
Lecture 20
Lecture 21
Lecture 22
Lecture 23
Lecture 24
Lecture 25
Lecture 26
Lecture 27
Lecture 28 - LABORATORY SESSION (Introduction)
Lecture 29 - EXPERIMENT 1

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Lecture 30 - EXPERIMENT 2
Lecture 31 - EXPERIMENT No. 2
Lecture 32
Lecture 33
Lecture 34
Lecture 35 - LABORATORY SESSION #3
Lecture 36 - LABORATORY SESSION #4
Lecture 37 - LABORATORY SESSION #5
Lecture 38
Lecture 39
Lecture 40
Lecture 41 - LABORATORY SESSION #6
Lecture 42 - LABORATORY SESSION #7
Lecture 43 - LABORATORY SESSION #8
Lecture 44
Lecture 45
Lecture 46
Lecture 47
Lecture 48
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NPTEL Video Course - Aerospace Engineering - Aero Elasticity

Subject Co-ordinator - Prof. C. Venkatesan

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Aero elasticity
Lecture 2 - Aero elasticity
Lecture 3 - Aero elasticity
Lecture 4 - Aero elasticity
Lecture 5 - Aero elasticity
Lecture 6 - Aero elasticity
Lecture 7 - Aero elasticity
Lecture 8 - Aero elasticity
Lecture 9 - Aero elasticity
Lecture 10 - Aero elasticity
Lecture 11 - Aero elasticity
Lecture 12 - Aero elasticity
Lecture 13 - Aero elasticity
Lecture 14 - Aero elasticity
Lecture 15 - Aero elasticity
Lecture 16 - Aero elasticity
Lecture 17 - Aero elasticity
Lecture 18 - Aero elasticity
Lecture 19 - Aero elasticity
Lecture 20 - Aero elasticity
Lecture 21 - Aero elasticity
Lecture 22 - Aero elasticity
Lecture 23 - Aero elasticity
Lecture 24 - Aero elasticity
Lecture 25 - Aero elasticity
Lecture 26 - Aero elasticity

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NPTEL Video Course - Aerospace Engineering - Foundation of Scientific Computing

Subject Co-ordinator - Prof. Tapan K. Sengupta

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable │ MP3 Audio Lectures - Available / Unavailable

Lecture 1
Lecture 2
Lecture 3
Lecture 4
Lecture 5
Lecture 6
Lecture 7
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Lecture 9
Lecture 10
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Lecture 14
Lecture 15
Lecture 16
Lecture 17
Lecture 18
Lecture 19
Lecture 20
Lecture 21
Lecture 22
Lecture 23
Lecture 24 (Same as Lecture 23)
Lecture 25
Lecture 26
Lecture 27
Lecture 28
Lecture 29

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Lecture 30
Lecture 31
Lecture 32
Lecture 33
Lecture 34
Lecture 35
Lecture 36
Lecture 37
Lecture 38
Lecture 39
Lecture 40
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NPTEL Video Course - Aerospace Engineering - Instability and Transition of Fluid Flows

Subject Co-ordinator - Prof. Tapan K. Sengupta

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Instability and Transition of Fluid Flows
Lecture 2 - Instability and Transition of Fluid Flows
Lecture 3 - Instability and Transition of Fluid Flows
Lecture 4 - Instability and Transition of Fluid Flows
Lecture 5 - Instability and Transition of Fluid Flows
Lecture 6 - Instability and Transition of Fluid Flows
Lecture 7 - Instability and Transition of Fluid Flows
Lecture 8 - Instability and Transition of Fluid Flows
Lecture 9 - Instability and Transition of Fluid Flows
Lecture 10 - Instability and Transition of Fluid Flows
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Lecture 25 - Instability and Transition of Fluid Flows
Lecture 26 - Instability and Transition of Fluid Flows
Lecture 27 - Instability and Transition of Fluid Flows
Lecture 28 - Instability and Transition of Fluid Flows
Lecture 29 - Instability and Transition of Fluid Flows

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Lecture 30 - Instability and Transition of Fluid Flows
Lecture 31 - Instability and Transition of Fluid Flows
Lecture 32 - Instability and Transition of Fluid Flows
Lecture 33 - Instability and Transition of Fluid Flows
Lecture 34 - Instability and Transition of Fluid Flows
Lecture 35 - Instability and Transition of Fluid Flows
Lecture 36 - Instability and Transition of Fluid Flows
Lecture 37 - Instability and Transition of Fluid Flows
Lecture 38 - Instability and Transition of Fluid Flows
Lecture 39 - Instability and Transition of Fluid Flows
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NPTEL Video Course - Aerospace Engineering - Introduction to Helicopter Aerodynamics and Dynamics

Subject Co-ordinator - Prof. A.R. Manjunath, Prof. C. Venkatesan

Co-ordinating Institute - IIT - Kanpur | HAL

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 2 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 3 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 4 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 5 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 6 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 7 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 8 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 9 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 10 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 11 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 12 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 13 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 14 - Introduction to Helicopter Aerodynamics and Dynamics
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Lecture 22 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 23 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 24 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 25 - Introduction to Helicopter Aerodynamics and Dynamics
Lecture 26 - Introduction to Helicopter Aerodynamics and Dynamics

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NPTEL Video Course - Aerospace Engineering - Introduction to Propulsion

Subject Co-ordinator - Dr. D.P. Mishra

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Fundamentals of Aerospace Propulsion
Lecture 2 - Fundamentals of Aerospace Propulsion
Lecture 3 - Fundamentals of Aerospace Propulsion
Lecture 4 - Fundamentals of Aerospace Propulsion
Lecture 5 - Fundamentals of Aerospace Propulsion
Lecture 6 - Fundamentals of Aerospace Propulsion
Lecture 7 - Fundamentals of Aerospace Propulsion
Lecture 8 - Fundamentals of Aerospace Propulsion
Lecture 9 - Fundamentals of Aerospace Propulsion
Lecture 10 - Fundamentals of Aerospace Propulsion
Lecture 11 - Fundamentals of Aerospace Propulsion
Lecture 12 - Fundamentals of Aerospace Propulsion
Lecture 13 - Fundamentals of Aerospace Propulsion
Lecture 14 - Fundamentals of Aerospace Propulsion
Lecture 15 - Fundamentals of Aerospace Propulsion
Lecture 16 - Fundamentals of Aerospace Propulsion
Lecture 17 - Fundamentals of Aerospace Propulsion
Lecture 18 - Fundamentals of Aerospace Propulsion
Lecture 19 - Fundamentals of Aerospace Propulsion
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Lecture 22 - Fundamentals of Aerospace Propulsion
Lecture 23 - Fundamentals of Aerospace Propulsion
Lecture 24 - Fundamentals of Aerospace Propulsion
Lecture 25 - Fundamentals of Aerospace Propulsion
Lecture 26 - Fundamentals of Aerospace Propulsion
Lecture 27 - Fundamentals of Aerospace Propulsion
Lecture 28 - Fundamentals of Aerospace Propulsion
Lecture 29 - Fundamentals of Aerospace Propulsion

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Lecture 30 - Fundamentals of Aerospace Propulsion
Lecture 31 - Fundamentals of Aerospace Propulsion
Lecture 32 - Fundamentals of Aerospace Propulsion
Lecture 33 - Fundamentals of Aerospace Propulsion
Lecture 34 - Fundamentals of Aerospace Propulsion
Lecture 35 - Fundamentals of Aerospace Propulsion
Lecture 36 - Fundamentals of Aerospace Propulsion
Lecture 37 - Fundamentals of Aerospace Propulsion
Lecture 38 - Fundamentals of Aerospace Propulsion
Lecture 39 - Fundamentals of Aerospace Propulsion
Lecture 40 - Fundamentals of Aerospace Propulsion
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NPTEL Video Course - Aerospace Engineering - Jet and Rocket Propulsion

Subject Co-ordinator - Dr. A. Kushari

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Jet and Rocket Propulsion
Lecture 2 - Jet and Rocket Propulsion
Lecture 3 - Jet and Rocket Propulsion
Lecture 4 - Jet and Rocket Propulsion
Lecture 5 - Jet and Rocket Propulsion
Lecture 6 - Jet and Rocket Propulsion
Lecture 7 - Jet and Rocket Propulsion
Lecture 8 - Jet and Rocket Propulsion
Lecture 9 - Jet and Rocket Propulsion
Lecture 10 - Jet and Rocket Propulsion
Lecture 11 - Jet and Rocket Propulsion
Lecture 12 - Jet and Rocket Propulsion
Lecture 13 - Jet and Rocket Propulsion
Lecture 14 - Jet and Rocket Propulsion
Lecture 15 - Jet and Rocket Propulsion
Lecture 16 - Jet and Rocket Propulsion
Lecture 17 - Jet and Rocket Propulsion
Lecture 18 - Jet and Rocket Propulsion
Lecture 19 - Jet and Rocket Propulsion
Lecture 20 - Jet and Rocket Propulsion
Lecture 21 - Jet and Rocket Propulsion
Lecture 22 - Jet and Rocket Propulsion
Lecture 23 - Jet and Rocket Propulsion
Lecture 24 - Jet and Rocket Propulsion
Lecture 25 - Jet and Rocket Propulsion
Lecture 26 - Jet and Rocket Propulsion
Lecture 27 - Jet and Rocket Propulsion
Lecture 28 - Jet and Rocket Propulsion
Lecture 29 - Jet and Rocket Propulsion

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Lecture 30 - Jet and Rocket Propulsion
Lecture 31 - Jet and Rocket Propulsion
Lecture 32 - Jet and Rocket Propulsion
Lecture 33 - Jet and Rocket Propulsion
Lecture 34 - Jet and Rocket Propulsion
Lecture 35 - Jet and Rocket Propulsion
Lecture 36 - Jet and Rocket Propulsion
Lecture 37 - Jet and Rocket Propulsion
Lecture 38 - Jet and Rocket Propulsion
Lecture 39 - Jet and Rocket Propulsion
Lecture 40 - Jet and Rocket Propulsion
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NPTEL Video Course - Aerospace Engineering - NOC:Introduction to Airplane Performance

Subject Co-ordinator - Dr. A.K. Ghosh, Dr. Deepu Philip

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable │ MP3 Audio Lectures - Available / Unavailable

Lecture 1 - General Introduction
Lecture 2 - George Cayley
Lecture 3 - Introduction to airplane and its components
Lecture 4 - Hansa 3 Aircraft and its Primary Systems
Lecture 5 - Concept of Lift Aerofoil
Lecture 6 - Drag Polar
Lecture 7 - Revision
Lecture 8 - Standard Atmosphere
Lecture 9 - Measuring Instruments
Lecture 10 - Equations of Motion
Lecture 11 - Thrust Required, Power Required
Lecture 12 - Excess Thrust and Power
Lecture 13 - Review
Lecture 14 - Thrust Required
Lecture 15 - Modeling of CL
Lecture 16 - A Closer Look
Lecture 17 - Estimation of Drag Polar Through Flight Test
Lecture 18 - Estimation of Rate of Climb
Lecture 19 - Revision.
Lecture 20 - Range and Endurance
Lecture 21 - Range and Endurance
Lecture 22 - Gliding Flight
Lecture 23 - Accelerated Flight
Lecture 24 - V-n Diagram
Lecture 25 - Revision..
Lecture 26 - V stall
Lecture 27 - Flaps
Lecture 28 - Take off
Lecture 29 - Take off Performance

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Lecture 30 - Take off Performance
Lecture 31 - Revision...
Lecture 32 - Landing Performance
Lecture 33 - Landing Performance
Lecture 34 - Challanges in Takeoff and Landing
Lecture 35 - Introduction to Static Stability
Lecture 36 - Positioning of Center of Pressure for Static Stability
Lecture 37 - Revision.....
Lecture 38 - Stability and Control
Lecture 39 - Stability and Control
Lecture 40 - Longitudinal Control
Lecture 41 - Contribution of Wing and Tail
Lecture 42 - Stability
Lecture 43 - Control
Lecture 44 - Control
Lecture 45 - Control
Lecture 46 - Design Basics
Lecture 47 - Design Basics
Lecture 48 - Revision.
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NPTEL Video Course - Aerospace Engineering - NOC:Stability and control of aircraft

Subject Co-ordinator - Dr. A.K. Ghosh

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Introduction to Static Stability
Lecture 3 - Stability and Trim
Lecture 4 - Stability
Lecture 5 - Stability
Lecture 6 - Problems
Lecture 7 - Problems
Lecture 8 - Neutral Point and Fuselage Contribution Completed
Lecture 9 - Longitudinal Control Completed
Lecture 10 - Longitudinal Control (Continued...)
Lecture 11 - Control
Lecture 12 - CL_trim Vs ????e_trim
Lecture 13 - Neutral Point
Lecture 14 - Contribution of Engine towards Stability
Lecture 15 - Revision
Lecture 16 - Trim
Lecture 17 - Trim
Lecture 18 - Maneuvering Point
Lecture 19 - Numerical
Lecture 20 - Revision (Lecture20)
Lecture 21 - Directional Stability
Lecture 22 - Directional Control
Lecture 23 - Lateral Stability and Control
Lecture 24 - Numericals
Lecture 25 - Lecture - 25 Revision
Lecture 26 - Stick Free Stability
Lecture 27 - Stick Free Stability (Continued...)
Lecture 28 - Hinge Moment and Hinge Moment Derivative
Lecture 29 - Aircraft Handling Qualities

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Lecture 30 - Aircraft Handling Qualities (Continued...)
Lecture 31 - Reversible Control
Lecture 32 - Numericals
Lecture 33 - Numericals
Lecture 34 - Handling Qualities
Lecture 35 - Determination of Neutral Point and Maneuvering Point by Flight Experiment
Lecture 36 - Ponit Mass Equation of Motion
Lecture 37 - Forces and Moments
Lecture 38 - Aircraft Equations of Motion
Lecture 39 - Six Degrees of Freedom of an Aircraft
Lecture 40 - 6 DoF
Lecture 41 - Vector in a Rotating Frame
Lecture 42 - Euler Angles
Lecture 43 - Small Perturbation Theory
Lecture 44 - Small Perturbation Theory (Continued...)
Lecture 45 - Perturbed Equations of Motion
Lecture 46 - Perturbed Force
Lecture 47 - Perturbed Force
Lecture 48 - Perturbed Pitching Moment
Lecture 49 - Longitudinal Dimensional Stability Derivatives
Lecture 50 - Dynamic Stability
Lecture 51 - Longitudinal Modes
Lecture 52 - Short Period and Phugoid Approximations
Lecture 53 - Pure Pitching Motion
Lecture 54 - Stability Augmentation System (SAS)
Lecture 55 - Lateral-Directional Motion
Lecture 56 - Tutorial - 1
Lecture 57 - Tutorial - 2
Lecture 58 - Tutorial - 3
Lecture 59 - Tutorial - 4
Lecture 60 - History of Aviation

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NPTEL Video Course - Aerospace Engineering - NOC:Engineering Thermodynamics

Subject Co-ordinator - Dr. D.P. Mishra

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Thermodynamics and its Applications
Lecture 2 - System and its Surroundings
Lecture 3 - Property of System
Lecture 4 - Energy and its Various Forms
Lecture 5 - Concepts of Equilibrium and its State
Lecture 6 - Energy and its Interactions
Lecture 7 - Heat Interactions
Lecture 8 - Thermodynamic Properties of Fluids - 1
Lecture 9 - Thermodynamic Properties of Fluids - 2
Lecture 10 - Thermodynamic Properties of Fluids - 3
Lecture 11 - Thermodynamic Properties of Fluids - 4
Lecture 12 - Thermodynamic Properties of Fluids - 5
Lecture 13 - First Law of Thermodynamics for Cyclic Process
Lecture 14 - First Law of Thermodynamics for Non-cyclic Process - 1
Lecture 15 - First Law of Thermodynamics for Non-cyclic Process - 2
Lecture 16 - Control Mass and Control Volume
Lecture 17 - First Law of Thermodynamics for Steady Flow Processes
Lecture 18 - First Law of Thermodynamics for Unsteady Flow Processes
Lecture 19 - First Law of Thermodynamics to Reacting Systems
Lecture 20 - Second Law of Thermodynamics
Lecture 21 - Second Law of Thermodynamics
Lecture 22 - Second Law of Thermodynamics
Lecture 23 - Second Law of Thermodynamics
Lecture 24 - Applications of Second Law of Thermodynamics
Lecture 25 - Applications of Second Law of Thermodynamics
Lecture 26 - Exergy
Lecture 27 - Gas Turbine Cycle
Lecture 28 - Vapor Power Cycle - 1
Lecture 29 - Vapor Power Cycle - 2

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Lecture 30 - Vapor Power Cycle - 3
Lecture 31 - Gas Power Cycles - 1
Lecture 32 - Gas Power Cycles - 2
Lecture 33 - Refrigeration Cycles
Lecture 34 - Non-Reacting Mixture and Psychrometry
Lecture 35 - Gas-Vapor Mixture and Air Conditioning - 1
Lecture 36 - Gas-Vapor Mixture and Air Conditioning - 2
Lecture 37 - Thermodynamic Property Relations - 1
Lecture 38 - Thermodynamic Property Relations - 2

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NPTEL Video Course - Aerospace Engineering - NOC:Aircraft Dynamic Stability and Design Stability Augmentation

Subject Co-ordinator - Dr. A.K. Ghosh

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Dynamic Stability
Lecture 2 - Spring-Mass-Damper System
Lecture 3 - Spring-Mass-Damper System
Lecture 4 - Laplace Transform
Lecture 5 - Pitch Dynamics
Lecture 6 - Numericals
Lecture 7 - Aircraft Rigid Body Equation of Motion
Lecture 8 - Six Degree of Freedom Equation of Motion
Lecture 9 - Vector in Rotating Frame
Lecture 10 - Forces and Moments on Aircraft
Lecture 11 - Euler Angles
Lecture 12 - Trajectory of the Aircraft
Lecture 13 - Small Perturbation Theory
Lecture 14 - Perturbed Aerodynamic Forces and Moments
Lecture 15 - U-derivatives
Lecture 16 - Alpha - derivatives
Lecture 17 - Alpha Dot Derivatives
Lecture 18 - q and delta Derivatives
Lecture 19 - Dimensional Stability Derivatives
Lecture 20 - Longitudinal Characteristic Equation
Lecture 21 - Routh's Criteria and Longitudinal Dynamic Stability
Lecture 22 - Longitudinal Modes
Lecture 23 - Short period Mode Approximation
Lecture 24 - Long Period Mode (Phugoid) Approximation
Lecture 25 - Lateral Directional Stability Derivatives
Lecture 26 - Lateral Directional Stability Derivatives (Continued...)
Lecture 27 - Perturbed Equation of Motion for Lateral Dynamics
Lecture 28 - Modes of Lateral Directional Dynamics
Lecture 29 - Spiral and Dutch Roll modes Approximation

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Lecture 30 - RouthÂ Hurwitz Stability Criterion
Lecture 31 - Introduction to Stability Augmentation
Lecture 32 - Pure Yawing and Pure Rolling Motion
Lecture 33 - SAS for Longitudinal Dynamics
Lecture 34 - SAS for Lateral Dynamics
Lecture 35 - Flight Handling Qualities
Lecture 36 - Numericals
Lecture 37 - Revision
Lecture 38 - Mode Shape
Lecture 39 - Mode Shape
Lecture 40 - Numericals
Lecture 41 - Stability Augmentation System
Lecture 42 - Numericals
Lecture 43 - Numericals
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NPTEL Video Course - Aerospace Engineering - NOC:Introduction to Ancient Indian Technology

Subject Co-ordinator - Dr. D.P. Mishra

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Ancient Indian Civilization
Lecture 2 - Ancient Indian Civilizationâ s Gift to the World
Lecture 3 - Why do we need to look at Ancient Indian Science and Technology?
Lecture 4 - Glimpses of Ancient Indian Science and Technology
Lecture 5 - Brief Review of Ancient Indian Scriptures
Lecture 6 - Basic Principles of carrying out science and technology
Lecture 7 - Arrays of Physics, chemistry and Indoor games
Lecture 8 - Marvels of Ancient Indian Technology
Lecture 9 - Introduction to Indian Agriculture
Lecture 10 - Problems arising due to modern agricultural practices
Lecture 11 - Pesticides and soil degradation
Lecture 12 - Agriculture - A Primary Productive Activity
Lecture 13 - An Agricultural Tools - A Plough
Lecture 14 - Soil and seeds
Lecture 15 - Sowing Methods
Lecture 16 - Indigenous cattle and manuring
Lecture 17 - Availability of Water and Freshwater
Lecture 18 - Ancient Indian Wells
Lecture 19 - Temple Water tanks and Dams
Lecture 20 - Tank Irrigation system and Rainwater Harvesting
Lecture 21 - Waterbodies - Lakes and Canals
Lecture 22 - Sluices and Embankments
Lecture 23 - Ancient Indian Textile Technology
Lecture 24 - Handlooms and Charkha
Lecture 25 - Different types of Handlooms
Lecture 26 - Ancient Rural Indian Housing
Lecture 27 - Thatched Roof House
Lecture 28 - Rural Walls and Roof materials
Lecture 29 - Indus Valley and Harappan Civilization

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Lecture 30 - First and Second of Indian Civilization
Lecture 31 - Town topologies and Brick and Tile making process
Lecture 32 - Cooling and Ventilation System in Building
Lecture 33 - Temple Architecture in ancient India - Part 1
Lecture 34 - Temple Architecture in ancient India - Part 2
Lecture 35 - World of Materials
Lecture 36 - Metals - Gold Silver Lead
Lecture 37 - History of Copper
Lecture 38 - Iron during Vedic period
Lecture 39 - Iron smelting process in ancient India
Lecture 40 - Iron and Steel crafts in ancient India
Lecture 41 - Extraction and smelting of Zinc in Ancient India
Lecture 42 - Wootz Steel Technology
Lecture 43 - Metal Casting in Ancient India
Lecture 44 - Glass Technology in Ancient India
Lecture 45 - Environmental Consciousness in Ancient India
Lecture 46 - Environmental Policy in Ancient India
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NPTEL Video Course - Aerospace Engineering - NOC:Introduction to Experiments in Flight

Subject Co-ordinator - Prof. Mahendra Verma, Dr. A.K. Ghosh

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Weighment and Calculation of CG (Theory)
Lecture 2 - Cruise Experiment (Theory)
Lecture 3 - Weighment Experiment and cockpit panel description
Lecture 4 - Drag Polar Experiment
Lecture 5 - CG and Climb Experiment
Lecture 6 - Calibration of Control Surface
Lecture 7 - Calibration of Control Surfaces (Experiment)
Lecture 8 - Introduction to Flight Data Recorder
Lecture 9 - Sensors - Part I
Lecture 10 - Sensors - Part II
Lecture 11 - Data Acquisition using MEMS devices
Lecture 12 - Estimation of Stick-Fixed Neutral Point
Lecture 13 - Estimation of Stick-Free Neutral Point and Stick-Free Maneuvering Point
Lecture 14 - Static
Lecture 15 - Static
Lecture 16 - Steady Coordinated Turn
Lecture 17 - Introduction to Parameter Estimation
Lecture 18 - Parameter Estimation using Least Squares Method
Lecture 19 - Aerodynamic Parameter Estimation using Least Squares Method
Lecture 20 - Aerodynamic Parameter Estimation using Delta Method
Lecture 21 - Aerodynamic Parameter Estimation using Delta Method (Continued...)

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NPTEL Video Course - Aerospace Engineering - NOC:Engineering Thermodynamics (2017)

Subject Co-ordinator - Dr. Jayant K. Singh

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Fundamental laws of nature, system definitions and applications
Lecture 2 - Thermodynamic property, state, equilibrium and process
Lecture 3 - Temperature scale and pressure
Lecture 4 - Macroscopic and microscopic forms of energy
Lecture 5 - Different forms of work, energy transfer and sign convention
Lecture 6 - First law of thermodynamics and energy balance
Lecture 7 - Efficiency of mechanical and electrical devices
Lecture 8 - Examples on basic concept and energy balance
Lecture 9 - Phase change of a pure substance
Lecture 10 - Property diagrams of pure substances
Lecture 11 - Thermodynamic properties of a pure substance from a property table
Lecture 12 - Thermodynamic properties of a pure substance
Lecture 13 - Equations of state and compressibility chart
Lecture 14 - Examples on properties of pure substances
Lecture 15 - Quasi equilibrium, moving boundary work
Lecture 16 - Polytropic process
Lecture 17 - Energy analysis of closed system and unrestrained expansion
Lecture 18 - Internal energy, enthalpy, and specific heats of ideal gas
Lecture 19 - Internal energy, enthalpy, and specific heats of solids and liquids
Lecture 20 - Examples on energy balance for closed systems and moving boundary work
Lecture 21 - Conservation of mass and steady flow processes
Lecture 22 - Flow work and energy of flowing fluid
Lecture 23 - Energy balance for steady flow devices
Lecture 24 - Throttling valve, mixing chamber and heat exchanger
Lecture 25 - Energy analysis of steady and unsteady flow devices
Lecture 26 - Examples on mass and energy analysis of open systems
Lecture 27 - Second law of thermodynamics, heat engine and cyclic devices
Lecture 28 - COP of refrigerator and heat pump, second law statements
Lecture 29 - Perpetual motion machines, reversible and irreversible processes, Carnot cycle

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Lecture 30 - Carnot principles, thermodynamic temperature scale, Carnot HE and HP
Lecture 31 - Examples on second law of thermodynamics
Lecture 32 - Clausius inequality, application of second law
Lecture 33 - Entropy, increase in entropy principle, isentropic process
Lecture 34 - Change in entropy of solids, liquids and ideal gases
Lecture 35 - Reversible flow work, multistage compressor, efficiency of pump and compressors
Lecture 36 - Entropy balance in closed system and control volume
Lecture 37 - Examples on entropy change in a system
Lecture 38 - Exergy and second law efficiency
Lecture 39 - Exergy of a fixed mass and flowing stream
Lecture 40 - Exergy transfer due to heat, mass and work, exergy destruction
Lecture 41 - Exergy balance and second law efficiency for closed systems and steady flow devices
Lecture 42 - Examples related to exergy change and exergy destruction
Lecture 43 - Gas power cycles and air-standard assumptions
Lecture 44 - An overview of reciprocating engines and otto cycle
Lecture 45 - Analysis of Diesel cycle
Lecture 46 - Analysis of Brayton cycle
Lecture 47 - Examples on gas power cycles such as Otto, Diesel and Brayton
Lecture 48 - Rankin and Carnot vapour power cycles
Lecture 49 - Ideal regenerative Rankin cycle and combined gas-vapour cycle
Lecture 50 - Refrigeration cycles
Lecture 51 - Examples on vapour power cycles
Lecture 52 - Thermodynamic property relations
Lecture 53 - hermodynamic property relations
Lecture 54 - Thermodynamic property relations
Lecture 55 - Combustion and conservation of mass in a chemical reaction
Lecture 56 - Energy balance for reacting systems
Lecture 57 - Enthalpy of formation and combustion, adiabatic flame temperature
Lecture 58 - Examples on property relations and reaction thermodynamics
```

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NPTEL Video Course - Aerospace Engineering - NOC:Aircraft Design

Subject Co-ordinator - Dr. A.K. Ghosh

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Wing Loading and Thrust Loading
Lecture 3 - Basic Design - Lift and Drag
Lecture 4 - Range and Endurance
Lecture 5 - Mission Requirements
Lecture 6 - Range and Endurance
Lecture 7 - Fuel Consumption
Lecture 8 - L/D for Maximum Range and Endurance
Lecture 9 - Range and endurance for Jet-driven Aircraft
Lecture 10 - Estimation of Fuel for a Mission
Lecture 11 - Design Considerations
Lecture 12 - Design Considerations
Lecture 13 - Design Considerations
Lecture 14 - Wing Design
Lecture 15 - Wing Design
Lecture 16 - Wing Design
Lecture 17 - Wing Design
Lecture 18 - Wing Arrangements
Lecture 19 - Tail Arrangements
Lecture 20 - Tail Arrangements (Continued...)
Lecture 21 - Aircraft Structure
Lecture 22 - Wing Loading and Power Loading
Lecture 23 - Thrust Loading and Wing Loading
Lecture 24 - Thrust Loading
Lecture 25 - Wing Loading
Lecture 26 - Wing Loading
Lecture 27 - Take off
Lecture 28 - Take off
Lecture 29 - Wing Loading

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Lecture 30 - Revision (Wing Loading and Thrust Loading)
Lecture 31 - Numerical
Lecture 32 - Wing Loading
Lecture 33 - Stability Considerations
Lecture 34 - Static Stability Basics
Lecture 35 - Wing and tail contribution to Longitudinal Static Stability
Lecture 36 - Conceptual Design
Lecture 37 - Conceptual design (Continued...)
Lecture 38 - Elevator Effectiveness
Lecture 39 - Elevator Effectiveness (Continued...)
Lecture 40 - Numerical - Pitching moment
Lecture 41 - Numerical - Elevator Effectiveness
Lecture 42 - Aircraft Maintenance Guidelines
Lecture 43 - Inspection for Aircraft
Lecture 44 - Numerical of Weight Fraction
Lecture 45 - Inspection of Sinus 912 Motor Glider
Lecture 46 - Numericals
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NPTEL Video Course - Aerospace Engineering - NOC:Fundamentals Of Combustion-I

Subject Co-ordinator - Dr. D.P. Mishra

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to fundamentals of combustion
Lecture 2 - Scope and applications of combustion
Lecture 3 - Scope of combustion (Continued...) and types of fuel and oxidizers
Lecture 4 - Characterization of liquid and gaseous fuel
Lecture 5 - Properties of liquid and solid fuels, various modes of combustion
Lecture 6 - Thermodynamics of combustion
Lecture 7 - Thermodynamics of combustion (Continued...)
Lecture 8 - Laws of thermodynamics and Stoichiometry
Lecture 9 - Stoichiometric calculations for air-gas mixture
Lecture 10 - Mixture fraction calculation for diffusion flames
Lecture 11 - Thermochemistry
Lecture 12 - Heat of reaction and bond energy
Lecture 13 - Adiabatic flame temperature
Lecture 14 - Adiabatic flame temperature and its effect on various parameters
Lecture 15 - Introduction to chemical equilibrium
Lecture 16 - Chemical equilibrium and Gibbs free energy
Lecture 17 - Equilibrium constants and Le chatlier principle
Lecture 18 - Determination of chemical equilibrium composition
Lecture 19 - Chemical and reaction kinetics
Lecture 20 - Compact notation and reaction rate of chemical reaction
Lecture 21 - Collision Theory
Lecture 22 - Collision theory (Continued...)
Lecture 23 - Collision frequency of molecules
Lecture 24 - Specific reaction rate and Arrhenius law
Lecture 25 - First order, Second order and Third-order reactions
Lecture 26 - Classification of chemical reactions
Lecture 27 - Elementary chain reactions
Lecture 28 - Quasi-steady state and partial equilibrium approximation
Lecture 29 - Physics of combustion

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Lecture 30 - Transport equations and molecular model for transport process
Lecture 31 - Mean free path length
Lecture 32 - Lennard-Jones potential model for diffusivity
Lecture 33 - Lennard-Jones potential model (Continued...)
Lecture 34 - Mass conservation law
Lecture 35 - Momentum conservation equation
Lecture 36 - Introduction to mass transfer
Lecture 37 - Species transport equation
Lecture 38 - Energy conservation equation
Lecture 39 - Conserved scalar approach for one dimensional flows
Lecture 40 - Introduction to turbulent combustion
```

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NPTEL Video Course - Aerospace Engineering - NOC:Aircraft Maintenance

Subject Co-ordinator - Dr. A.K. Ghosh

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Rules and Regulations for Civil Aviation in India
Lecture 2 - Rules and Regulations for Civil Aviation in India (Continued...)
Lecture 3 - Aircraft Hydraulic System
Lecture 4 - Aircraft Fuel System
Lecture 5 - Aircraft Landing Gear System
Lecture 6 - Aircraft Wheels
Lecture 7 - Aircraft Brakes System
Lecture 8 - Basic Aircraft Design
Lecture 9 - Aircraft Electrical System
Lecture 10 - Aircraft Electrical Circuit
Lecture 11 - Inspection of Aircraft
Lecture 12 - Maintenance Schedule
Lecture 13 - Maintenance Schedule (Continued...)
Lecture 14 - Inspection of Cessna 206

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NPTEL Video Course - Aerospace Engineering - NOC:Fundamentals of Combustion - Part 2

Subject Co-ordinator - Dr. D.P. Mishra

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Combustion Modes and Classsification of Flames
Lecture 2 - Analysis of One Dimensional Combustion Wave
Lecture 3 - Analysis of One Dimensional Combustion Wave (Continued...)
Lecture 4 - Introduction to Laminar Premixed Flame
Lecture 5 - Structure of One Dimensional Premixed Flame
Lecture 6 - Laminar Flame Theory for Premixed Flames
Lecture 7 - Laminar Flame Theory for Premixed Flames (Continued...)
Lecture 8 - Determination of Laminar Burning Velocity for Premixed Flames
Lecture 9 - Flame Thickness and Burning Velocity Measurement Methods
Lecture 10 - Stationary Flame Method for Burning Velocity Measurement
Lecture 11 - Effects of Chemical and Physical Variables on Burning Velocity
Lecture 12 - Effects of Chemical and Physical Variables on Burning Velocity (Continued...)
Lecture 13 - Effect of Inert Additives on Burning Velocity and Flame Extinction
Lecture 14 - Simplified Analysis for Quenching Diameter
Lecture 15 - Flammability Limits and Flame Stabilization
Lecture 16 - Ignition in Premixed Flames
Lecture 17 - Introduction to Turbulent Premixed Flames
Lecture 18 - Turbulent Burning Velocity and Premixed Flame Regimes
Lecture 19 - Intoduction to Gaseous Jet Diffusion Flame
Lecture 20 - Phenomenological Analysis of a Laminar Jet Diffusion Flame
Lecture 21 - Theoretical Analysis of a Two-Dimensional Diffusion Flame
Lecture 22 - Theoretical Analysis of a Two-Dimensional Diffusion Flame (Continued...)
Lecture 23 - Flame Height Estimation and Smoke point in Diffusion Flames
Lecture 24 - Mechanism of Soot Formation and Introduction to Liquid Fuel Combustion
Lecture 25 - Introduction to Droplet Combustion
Lecture 26 - Liquid Droplet Combustion
Lecture 27 - Droplet Combustion (Continued...)
Lecture 28 - Droplet Combustion in Convective Environment
Lecture 29 - Droplet Combustion in Convective Environment and Introduction to Spray Combution Mode

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Lecture 30 - Spray Combustion Model
Lecture 31 - Introduction to Solid Fuel Combustion
Lecture 32 - Solid Fuel Combustion (Continued...)
Lecture 33 - Diffusional theory for Carbon Combustion
Lecture 34 - Carbon Burning Rate
Lecture 35 - Carbon Burning Rate (Continued...)
Lecture 36 - Carbon Sphere in Convective Environment
Lecture 37 - Combustion and Effects on Environment
Lecture 38 - Chemicals from Combustion
Lecture 39 - Emission Control Methods
Lecture 40 - Combustion Modification Methods
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NPTEL Video Course - Aerospace Engineering - NOC:Design of Fixed Wing Unmanned Aerial Vehicles

Subject Co-ordinator - Prof. Saderla Subrahmanyam

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction, course content and classification of UAVs
Lecture 2 - Measurement of Flight Velocity and Standard Atmosphere
Lecture 3 - Anatomy of Airplane and Airfoil Nomenclature
Lecture 4 - Examples, Pitot and static tube and differential pressure sensor
Lecture 5 - Generation of Lift and Drag
Lecture 6 - Aerodynamic center and center of pressure, Various wing planform
Lecture 7 - Lifting line theory, NACA airfoil nomenclature
Lecture 8 - Airfoil and Finite wing, Various wing planform
Lecture 9 - Interpreting airfoil data, Cl vs Alpha and drag polar, selection of airfoil
Lecture 10 - Introduction to Airplane performance, Equation of motion
Lecture 11 - Thrust required and Power required
Lecture 12 - Calculation of Performance parameters and selection of power plant
Lecture 13 - Climb Performance, Engine Sizing and Power Plant selection
Lecture 14 - Weight Estimation , Common propulsion systems
Lecture 15 - Weight Estimation contd., Electric propulsion, Battery Sizing
Lecture 16 - Iterative weight estimation and Wing sizing
Lecture 17 - Wing Planform selection and sizing and Flight test of Cropped delta wing UAVs
Lecture 18 - Effect of variation of CG location and Static Stability
Lecture 19 - C.G. location and Longitudinal Static stability
Lecture 20 - Tutorial 1
Lecture 21 - Contribution of tail in static stability and Neutral point.
Lecture 22 - Tutorial 2
Lecture 23 - Tutorial 3

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NPTEL Video Course - Aerospace Engineering - NOC:Introduction to Finite Volume Methods-I

Subject Co-ordinator - Prof. Ashoke De

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Finite Volume Method
Lecture 2 - Governing Equations and Discretization
Lecture 3 - Boundary Conditions and Classification of PDEs
Lecture 4 - Mathematical Description of fluid flow - I
Lecture 5 - Mathematical description of fluid flow - II
Lecture 6 - Discretization Process - I
Lecture 7 - Discretization Process - II
Lecture 8 - Discretization Process - III
Lecture 9 - Taylor Series - I
Lecture 10 - Taylor Series - II
Lecture 11 - Derivatives and Errors - I
Lecture 12 - Derivatives and errors - II
Lecture 13 - Grid Transformation
Lecture 14 - Finite Volume Formulation - I
Lecture 15 - Finite Volume Formulation - II
Lecture 16 - Properties of discretized equations
Lecture 17 - Introduction to Finite Volume Mesh
Lecture 18 - Structured Mesh System
Lecture 19 - Unstructured Mesh System - I
Lecture 20 - Unstructured Mesh System - II
Lecture 21 - Properties of Unstructured Mesh - I
Lecture 22 - Properties of Unstructured Mesh - II
Lecture 23 - Finite Volume discretization of Diffusion Equation - I
Lecture 24 - Finite Volume discretization of Diffusion equation - II
Lecture 25 - Finite Volume discretization of Diffusion equation - III
Lecture 26 - Discretization of Diffusion Equation for Cartesian orthogonal systems - I
Lecture 27 - Discretization of Diffusion Equation for Cartesian orthogonal systems - II
Lecture 28 - Calculation of Diffusivity
Lecture 29 - Discretization of Diffusion Equation for non-Cartesian orthogonal systems - I

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Lecture 30 - Discretization of Diffusion Equation for non-orthogonal systems - I
Lecture 31 - Discretization of Diffusion Equation for non-orthogonal systems - II
Lecture 32 - Discretization of Diffusion Equation for non-orthogonal systems - III
Lecture 33 - Gradient Calculation for Diffusion Equation - I
Lecture 34 - Gradient Calculation for Diffusion Equation - II
Lecture 35 - Gradient Calculation for Diffusion Equation - III
Lecture 36 - Properties of matrices - I
Lecture 37 - Properties of matrices - II
Lecture 38 - Error Analysis - I
Lecture 39 - Error Analysis - II
Lecture 40 - Error Analysis - III
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NPTEL Video Course - Aerospace Engineering - NOC:Advance Aircraft Maintenance

Subject Co-ordinator - Dr. A.K. Ghosh, Mr. V. Mathur

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Engines
Lecture 2 - Introduction to Engines (Continued...)
Lecture 3 - Construction of Reciprocating Engine
Lecture 4 - Construction of Reciprocating Engine (Continued...)
Lecture 5 - Construction of Reciprocating Engine (Continued...)
Lecture 6 - Lubrication System
Lecture 7 - Lubrication System Demonstration
Lecture 8 - Lubrication System (Continued...)
Lecture 9 - Induction System
Lecture 10 - Induction System (Continued...)
Lecture 11 - Cooling System
Lecture 12 - Exhaust System
Lecture 13 - Cooling and Exhaust System (Lab Session)
Lecture 14 - Engine fuel and Fuel Metering Systems
Lecture 15 - Engine Fuel and Fuel Metering Systems (Continued...)
Lecture 16 - Engine Fuel and Fuel Metering Systems (Lab Session)
Lecture 17 - Carburetor troubleshooting and Fuel Injection System
Lecture 18 - Fuel injection Systems (Continued...)
Lecture 19 - Fuel System
Lecture 20 - Ignition system
Lecture 21 - Ignition system (Continued...)
Lecture 22 - Ignition system (Lab session)
Lecture 23 - Basics of propeller and maintenance
Lecture 24 - Aircraft Reciprocating Engine Inspection - Part 1
Lecture 25 - Aircraft Reciprocating Engine Inspection - Part 2
Lecture 26 - Aircraft Reciprocating Engine Inspection - Part 3
Lecture 27 - Checklist for Aircraft Reciprocating Engine Maintenance
Lecture 28 - Aircraft Maintenance (Aircraft Performance Point of View)

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NPTEL Video Course - Aerospace Engineering - NOC:Introduction to Finite Volume Methods-II

Subject Co-ordinator - Prof. Ashoke De

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Linear solvers - I
Lecture 2 - Linear solvers - II
Lecture 3 - Linear solvers - III
Lecture 4 - Linear solvers - IV
Lecture 5 - Linear solvers - V
Lecture 6 - Linear solvers - VI
Lecture 7 - Linear solvers - VII
Lecture 8 - Linear solvers - VIII
Lecture 9 - Convection term discretisation - I
Lecture 10 - Convection term discretisation - II
Lecture 11 - Convection term discretisation - III (Private)
Lecture 12 - Convection term discretisation - IV (Private)
Lecture 13 - Convection term discretisation - V (Private)
Lecture 14 - Convection term discretisation - VI (Private)
Lecture 15 - Convection term discretisation - VII (Private)
Lecture 16 - Convection term discretisation - VIII
Lecture 17 - Convection term discretisation - IX
Lecture 18 - High Resolution Schemes - I
Lecture 19 - High Resolution Schemes - II
Lecture 20 - High Resolution Schemes - III
Lecture 21 - High Resolution Schemes - IV
Lecture 22 - High Resolution Schemes - V
Lecture 23 - High Resolution Schemes - VI
Lecture 24 - High Resolution Schemes - VII
Lecture 25 - Temporal discretisation - I
Lecture 26 - Temporal discretisation - II
Lecture 27 - Temporal discretisation - III
Lecture 28 - Temporal discretisation - IV
Lecture 29 - Discretisation of the Source Term, Relaxation and Other Details - I

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Lecture 30 - Discretisation of the Source Term, Relaxation and Other Details - II
Lecture 31 - Fluid Flow Computation
Lecture 32 - Fluid Flow Computation
Lecture 33 - Fluid Flow Computation
Lecture 34 - Fluid Flow Computation
Lecture 35 - Fluid Flow Computation
Lecture 36 - Fluid Flow Computation
Lecture 37 - Fluid Flow Computation
Lecture 38 - Fluid Flow Computation
Lecture 39 - Fluid Flow Computation
Lecture 40 - Some Advanced Topics - I
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NPTEL Video Course - Aerospace Engineering - NOC:Introduction to Rocket Propulsion

Subject Co-ordinator - Dr. D.P. Mishra

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - A Brief History of Rocket Propulsion and ISRO
Lecture 3 - Types of Rocket Engine
Lecture 4 - Fundamentals of Aero-thermodynamics
Lecture 5 - Control Volume Analysis and Governing Equations
Lecture 6 - Adiabatic Steady 1-D flow and Speed of Sound
Lecture 7 - Basics of Thermochemistry
Lecture 8 - Adiabatic Flame Temperature and Chemical Equilibrium
Lecture 9 - Ideal Rocket Engine, Thrust Equation and Performance Parameters
Lecture 10 - Performance Parameters of Rocket Engine
Lecture 11 - Performance Parameters of Rocket Engine (Continued...)
Lecture 12 - Ideal Nozzle
Lecture 13 - Rocket Nozzle
Lecture 14 - Convergent Nozzle
Lecture 15 - Convergent-Divergent Nozzle and Shock Reflection
Lecture 16 - Effect of Back Pressure and Thrust Coefficient
Lecture 17 - Thrust Coefficient
Lecture 18 - Characteristics Velocity, Combustion Efficiency and Thrust Effectiveness
Lecture 19 - Actual Rocket Nozzle Characteristics
Lecture 20 - Flight Performance of a Rocket Vehicle
Lecture 21 - Flight Performance of a Rocket Vehicle
Lecture 22 - Flight Trajectory of Single Stage Rocket Vehicle
Lecture 23 - Orbital Mechanics
Lecture 24 - Types of Orbits
Lecture 25 - Orbital and Escape Velocity
Lecture 26 - Interplanetary Transfer Path
Lecture 27 - Multi-staging Rocket
Lecture 28 - Chemical Propellants-Characteristics and Classification
Lecture 29 - Solid and Composite Propellants

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Lecture 30 - Composite Propellants and it's Manufacturing
Lecture 31 - Classification of Liquid Propellants
Lecture 32 - Solid Propellant Rocket Engine
Lecture 33 - Propellant Burning Mechanism and Flame Structure
Lecture 34 - Composite Propellant Combustion
Lecture 35 - Regression Rate of Solid Propellant and Effect of Operating Parameters
Lecture 36 - Characteristics of Solid Propellants
Lecture 37 - Effect of Acceleration and Particle Size on Burning Rate
Lecture 38 - Erosive Burning, Effect of Propellant Temperature and Thermal Model
Lecture 39 - Chamber Pressure in Solid Propellant Rocket Engine
Lecture 40 - Types of Propellant Grains
Lecture 41 - Types of Solid Propellant Grains and Evolution of Burning Surface
Lecture 42 - Burning Stability and Ignition System in SPRE
Lecture 43 - Liquid Propellant Rocket Engine
Lecture 44 - Injection System in LPRE
Lecture 45 - Atomization of Liquid Propellants
Lecture 46 - Types of Injection System in LPRE
Lecture 47 - Analysis of Impinging Atomizer
Lecture 48 - Injection Distributor and Combustion Process in LPRE
Lecture 49 - Variation of Gas Specific Volume and Combustion Chamber Geometry
Lecture 50 - Liquid Propellant Feed System in LPRE
Lecture 51 - Turbo-Pump Feed Configuration
Lecture 52 - Ignition System in LPRE
Lecture 53 - Cooling of Thrust Chamber and Nozzle of a Rocket Engine
Lecture 54 - Cooling System of Rocket Engine (Continued...)
Lecture 55 - Modes of Heat Transfer through combustion Chamber Wall and Nozzle Wall
Lecture 56 - Heat Transfer Analysis of Cooling System
Lecture 57 - Hybrid Propellant Rocket Engine
Lecture 58 - Regression Rate of Solid Fuel Grain in HPRE and Types of Port Configurations
Lecture 59 - Non-Chemical Rocket Engine
Lecture 60 - Electromagnetic Thruster, Nuclear and Solar Rocket Engine
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NPTEL Video Course - Aerospace Engineering - NOC:UAV Design - Part II

Subject Co-ordinator - Prof. Saderla Subrahmanyam

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable │ MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Design Algorithms
Lecture 2 - Thrust Generation and Power Required
Lecture 3 - Lift and Drag for Infinite Wing
Lecture 4 - Lift and Drag for an Infinite Wing (Continued...)
Lecture 5 - Relation between Aerodynamic center and Center of Pressure
Lecture 6 - Aerodynamic Characteristics of Wing
Lecture 7 - Stability and Criteria for Longitudinal Static Stability
Lecture 8 - Numericals
Lecture 9 - Longitudinal Static Stability - Wing Contribution
Lecture 10 - Flight Demonstration of Flat Plate
Lecture 11 - Numericals (Continued...)
Lecture 12 - Example Problems for Wing alone Configuration
Lecture 13 - Wing-Tail Contribution and Neutral Point
Lecture 14 - Example problems of wing and tail combination
Lecture 15 - Example problems of wing and tail combination (Continued...)
Lecture 16 - Flight demonstration of same wing and tail combination
Lecture 17 - Matlab Tutorial
Lecture 18 - Trim Requirements of UAV
Lecture 19 - Example on performance analysis of UAV
Lecture 20 - Weight Estimation and wing Sizing with Example
Lecture 21 - Power Plant Selection with Example
Lecture 22 - Subroutine for takeoff performance (Powerplant selection)
Lecture 23 - Subroutine for Climb Performance (Powerplant Selection)
Lecture 24 - Subroutine for Weight Estimation
Lecture 25 - Subroutine for Planform Geometry Selection
Lecture 26 - Subroutine for Airfoil Selection

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NPTEL Video Course - Aerospace Engineering - NOC:Introduction to Airbreathing Propulsion

Subject Co-ordinator - Prof. Ashoke De

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable


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Lecture 1 - Introduction
Lecture 2 - Introduction (Continued...)
Lecture 3 - Introduction (Continued...)
Lecture 4 - Review of Fluid Mechanics
Lecture 5 - Review of Fluid Mechanics, Thermodynamics
Lecture 6 - Review of Compressible Flows
Lecture 7 - Review of Compressible Flows (Continued...)
Lecture 8 - Review of Compressible Flows (Continued...)
Lecture 9 - Review of Compressible Flows (Continued...)
Lecture 10 - Review of Compressible Flows (Continued...)
Lecture 11 - Introduction to gas turbine engines
Lecture 12 - Introduction to gas turbine engines (Continued...)
Lecture 13 - Introduction to gas turbine engines (Continued...)
Lecture 14 - Introduction to gas turbine engines (Continued...)
Lecture 15 - Introduction to gas turbine engines (Continued...)
Lecture 16 - Introduction to gas turbine engines (Continued...)
Lecture 17 - Introduction to gas turbine engines (Continued...)
Lecture 18 - Piston Engines and Propellers
Lecture 19 - Piston Engines and Propellers (Continued...)
Lecture 20 - Piston Engines and Propellers (Continued...)
Lecture 21 - Piston Engines and Propellers (Continued...)
Lecture 22 - Piston Engines and Propellers (Continued...)
Lecture 23 - Piston Engines and Propellers (Continued...)
Lecture 24 - Performance/cycle analysis
Lecture 25 - Performance/cycle analysis
Lecture 26 - Performance/cycle analysis
Lecture 27 - Performance/cycle analysis
Lecture 28 - Performance/cycle analysis
Lecture 29 - Performance/cycle analysis
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Lecture 30 - Performance/cycle analysis
Lecture 31 - Performance/cycle analysis
Lecture 32 - Performance/cycle analysis
Lecture 33 - Performance/cycle analysis
Lecture 34 - Performance/cycle analysis
Lecture 35 - Performance/cycle analysis
Lecture 36 - Stationary components
Lecture 37 - Stationary components
Lecture 38 - Stationary components
Lecture 39 - Introduction to turbomachinery
Lecture 40 - Centrifugal compressor
Lecture 41 - Centrifugal compressor (Continued...)
Lecture 42 - Centrifugal compressor (Continued...)
Lecture 43 - Centrifugal compressor (Continued...)
Lecture 44 - Centrifugal compressor (Continued...)
Lecture 45 - Centrifugal compressor (Continued...)
Lecture 46 - Centrifugal compressor (Continued...)
Lecture 47 - Axial compressor
Lecture 48 - Axial compressor (Continued...)
Lecture 49 - Axial compressor (Continued...)
Lecture 50 - Axial compressor (Continued...)
Lecture 51 - Axial compressor (Continued...)
Lecture 52 - Axial compressor (Continued...)
Lecture 53 - Axial compressor (Continued...)
Lecture 54 - Axial compressor (Continued...)
Lecture 55 - Axial turbine
Lecture 56 - Axial turbine (Continued...)
Lecture 57 - Axial turbine (Continued...)
Lecture 58 - Axial turbine (Continued...)
Lecture 59 - Axial turbine (Continued...)
Lecture 60 - Radial Flow Turbine, Module Matching
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NPTEL Video Course - Aerospace Engineering - NOC:Computational Science in Engineering

Subject Co-ordinator - Prof. Ashoke De

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Linear Algebra: Introduction
Lecture 2 - Linear Algebra: Introduction (Continued...)
Lecture 3 - Linear Algebra: Permutation Matrix, Existence of Solution
Lecture 4 - Linear Algebra: Permutation Matrix, Existence of Solution (Continued...)
Lecture 5 - Linear Algebra: Linear Independence, Basis Vector and Dimensions
Lecture 6 - Linear Algebra: Null Space, Column Space, Row Space, Introduction to Orthogonal System
Lecture 7 - Linear Algebra: Orthogonal System, Projection, Determinant
Lecture 8 - Linear Algebra: Orthogonal System, Projection, Determinant (Continued...)
Lecture 9 - Linear Algebra: Properties of Determinant, Cramer's Rule, Introduction to Eigen Values
Lecture 10 - Linear Algebra: Eigen Values, Eigen Vectors, SVD
Lecture 11 - Linear Algebra: Eigen Values, Eigen Vectors, SVD (Continued...)
Lecture 12 - ODE: Introduction to ODEs, Initial Value Problem, Separation of Variables
Lecture 13 - ODE: Solution of Exact ODEs, First Order Linear Systems
Lecture 14 - ODE: Solution of Second Order Linear ODEs
Lecture 15 - ODE: Existence and Uniqueness of Solution, Non-Homogeneous System
Lecture 16 - ODE: Higher Order Linear ODEs, Variation of Parameters, System of ODEs
Lecture 17 - ODE: Linear Systems, Superposition for Homogeneous Systems
Lecture 18 - Fourier Analysis, Orthogonality of Trigonometric Systems, Euler's Formula
Lecture 19 - Parseval's Theorem, Fourier Integrals, Laplace Transforms
Lecture 20 - PDE: Introduction to PDEs, Solution of PDEs using Characteristics Curve
Lecture 21 - PDE: First Order PDEs, Dilation Invariant Solution of Differential Equations
Lecture 22 - PDE: Solution of Linear PDEs
Lecture 23 - PDE: Separation of Variables, Eigenvalue Problem, Poisson Integral Representation
Lecture 24 - PDE: Boundary Conditions, Solution of 2D systems
Lecture 25 - Introduction to Numerical Methods, Mathematical Models, Errors
Lecture 26 - Errors, Numerical Differentiation, Stability
Lecture 27 - Roots of Equations: Graphical Method, Bi-Section Mehtod, False-Position Method
Lecture 28 - Secant Method, Brent's Method, Multipoint Iteration Method, Derative Free Method
Lecture 29 - Complex Roots, Birge-Vieta Method, Bairstow's method

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Lecture 30 - Solution of Linear Algebric Equations, Gauss Elimination Method
Lecture 31 - Direct Methods: Gauss Elimination, Gauss-Jordan, Crout's Method, Cholesky Method, Iterative Meth
Lecture 32 - Extrapolation Method, Eigenvalue Problem, Jacobi Method, Householder's Method for Symmetric Matr
Lecture 33 - Interpolation: Taylor's Series, Lagrange and Newton Interpolation, Iterated Interpolation, Hermi
Lecture 34 - Piecewise and Spline Interpolation, Bivariate Interpolation, Least Square Approximation, Uniform
Lecture 35 - Numerical Differentiation and Intergration, Methods Based on Finite Differences, Methods based o
Lecture 36 - Numerical Integration: Newton-Cotes Method, Gaussian Integration Methods, Lobatto Integration Me
Lecture 37 - Double Integration: Trapezoidal Rule, Simpson's Rule, Solution of ODEs: Difference Equation, Sin
Lecture 38 - Runge-Kutta Methods, Euler-Cauchy Method, Multi-step Methods, Predictor-Corrector Methods
Lecture 39 - System of Differential Equations, Stability Analysis, Solution of Boundary Value Problem: Shooti
Lecture 40 - Numerical Approach to Solution of PDEs: Heat Conduction Equation, Convergence and Stability
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NPTEL Video Course - Aerospace Engineering - NOC:Introduction to Aircraft Control System

Subject Co-ordinator - Prof. Dipak Kumar Gir

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1
Lecture 2
Lecture 3
Lecture 4
Lecture 5
Lecture 6
Lecture 7
Lecture 8
Lecture 9
Lecture 10
Lecture 11
Lecture 12
Lecture 13
Lecture 14
Lecture 15
Lecture 16
Lecture 17
Lecture 18
Lecture 19
Lecture 20
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Lecture 22
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Lecture 25
Lecture 26
Lecture 27
Lecture 28
Lecture 29

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Lecture  30
Lecture  31
Lecture  32
Lecture  33
Lecture  34
Lecture  35
Lecture  36
Lecture  37
Lecture  38
Lecture  39
Lecture  40
Lecture  41
Lecture  42
Lecture  43
Lecture  44
Lecture  45
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Lecture  47
Lecture  48
Lecture  49
Lecture  50
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Lecture  58
Lecture  59
Lecture  60
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NPTEL Video Course - Aerospace Engineering - NOC:Applied Computational Fluid Dynamics

Subject Co-ordinator - Prof. Rajesh Ranjan

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - CFD Introduction - I
Lecture 2 - CFD Introduction - II
Lecture 3 - CFD Introduction - III
Lecture 4 - CFD Approaches, Compressible Flows - I
Lecture 5 - CFD Approaches, Compressible Flows - II
Lecture 6 - Thermodynamics - I
Lecture 7 - Thermodynamics - II
Lecture 8 - Governing Equations - I
Lecture 9 - Governing Equations - II
Lecture 10 - Governing Equations - III
Lecture 11 - Governing Equations - IV
Lecture 12 - Governing Equations (Energy) - I
Lecture 13 - Governing Equations (Energy) - II
Lecture 14 - Non-dimensionalization - I
Lecture 15 - Non-dimensionalization - II
Lecture 16 - Classification of PDEs - I
Lecture 17 - Classification of PDEs - II
Lecture 18 - Numerical Discretization - I
Lecture 19 - Numerical Discretization - II
Lecture 20 - Compact Schemes - I
Lecture 21 - Compact Schemes - II
Lecture 22 - Model Equations - I
Lecture 23 - Model Equations - II
Lecture 24 - Numerical Schemes: MPDE - I
Lecture 25 - Numerical Schemes: MPDE - II
Lecture 26 - MPDE, Lax Theorem - I
Lecture 27 - MPDE, Lax Theorem - II
Lecture 28 - Stability
Lecture 29 - Dissipation/Dispersion Error - I

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Lecture 30 - Dissipation/Dispersion Error - II
Lecture 31 - Advanced Schemes - I
Lecture 32 - Advanced Schemes - II
Lecture 33 - Multistep Schemes, MATLAB Linear - I
Lecture 34 - Multistep Schemes, MATLAB Linear - II
Lecture 35 - Solution Nonlinear/Eulers equations, Shock Tube - I
Lecture 36 - Solution Nonlinear/Eulers equations, Shock Tube - II
Lecture 37 - Introduction to FV - I
Lecture 38 - Introduction to FV - II
Lecture 39 - Introduction to FV - III
Lecture 40 - Introduction to FV - IV
Lecture 41 - Introduction to FV - I
Lecture 42 - Introduction to FV - II
Lecture 43 - Turbulent Flows - I
Lecture 44 - Turbulent Flows - II
Lecture 45 - Incompressible RANS Equations
Lecture 46 - RANS Equations, Eddy Viscosity Model - I
Lecture 47 - RANS Equations, Eddy Viscosity Model - II
Lecture 48 - Turbulence Models
Lecture 49 - Advanced Turbulence Models - I
Lecture 50 - Advanced Turbulence Models - II
Lecture 51 - Boundary Conditions - I
Lecture 52 - Boundary Conditions - II
Lecture 53 - Boundary Conditions - III
Lecture 54 - Boundary Conditions - IV
Lecture 55 - LES/DNS
Lecture 56 - LES
Lecture 57
Lecture 58
Lecture 59
Lecture 60
Lecture 61
Lecture 62
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NPTEL Video Course - Aerospace Engineering - NOC:Advanced Aircraft Control Systems with MATLAB-SIMULINK

Subject Co-ordinator - Prof. Dipak Kumar Giri, Prof. Prabhjeet Singh

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Basics of Linear Algebra
Lecture 3 - State Space Equation and its Solution
Lecture 4 - Example
Lecture 5 - Linear Transformation of States
Lecture 6 - Example of Linear Transformation
Lecture 7 - State Space Analysis of Aircraft Longitudinal Dynamics
Lecture 8 - Introduction to State Feedback Controller Design
Lecture 9 - Controller Design in the Presence of Noice
Lecture 10 - Tracking Controller Design
Lecture 11 - Observability and Observer Design
Lecture 12 - Example of Observer Design
Lecture 13 - Ackermann's Formula
Lecture 14 - Example to Demonstrate use of Ackermann's Formula
Lecture 15 - Separation Principle
Lecture 16 - Example of Separation Principle
Lecture 17 - Example of Control Design for Aircraft System
Lecture 18 - Example of Observer Design for Aircraft System
Lecture 19 - Linear Quadratic Regulator
Lecture 20 - Example of Linear Quadratic Regulator Design
Lecture 21 - Stability Augmentation for Pitch Dynamics
Lecture 22 - Stability Augmentation System for Short Period Longitudinal Dynamics
Lecture 23 - Stability Augmentation System for full Longitudinal Dynamics
Lecture 24 - Stability Augmentation for Lateral Dynamics
Lecture 25 - Stability Augmentation for Lateral-Directional Dynamics
Lecture 26 - Altitude Hold Auto-Pilot Design
Lecture 27 - Introduction to Nonlinear Systems
Lecture 28 - Stability of Nonlinear Systems
Lecture 29 - Classification of Equilibrium Points of Planar Nonlinear Systems

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Lecture 30 - Limit Cycles
Lecture 31 - Lyapunov's First Method
Lecture 32 - Sign Definiteness of Scalar Functions
Lecture 33 - Lyapunov Stability Theorem
Lecture 34 - Krasovskii's Theorem
Lecture 35 - Feedback Linearization
Lecture 36 - Feedback Linearization (Continued...)
Lecture 37 - Feedback Linearization Control for Longitudinal Dynamics
Lecture 38 - Feedback Linearization Based Control for Lateral Dynamics
Lecture 39 - Introduction to Backstepping Control
Lecture 40 - Backstepping Controller (Continued...)
Lecture 41 - Backstepping Controller (Continued...)
Lecture 42 - Backstepping Controller for Longitudinal Dynamics of Aircraft
Lecture 43 - Backstepping Control for Lateral-Directional Dynamics of Aircraft
Lecture 44 - Introduction to Sliding Mode Control
Lecture 45 - Chattering Reduction in Sliding Mode Control
Lecture 46 - Sliding Mode Control for Longitudinal Dynamics of Aircraft
Lecture 47 - Quasi-Sliding Mode control and Backstepping-Sliding Mode Control for Longitudinal Dynamics of Ai
Lecture 48 - Adaptive Sliding Mode Control
Lecture 49 - Adaptive Back-Stepping Control
Lecture 50 - MATLAB Implementation of First Order Systems
Lecture 51 - Second Order System and its Solution
Lecture 52 - MATLAB Simulation of Mass Spring Damper System
Lecture 53 - SIMULINK Implementation of Pendulum System
Lecture 54 - SIMULINK Implementation of Pendulum System (Continued...)
Lecture 55 - Aircraft Equations of Motion for SIMULINK Block
Lecture 56 - MATLAB and SIMULINK Implementation of Aircraft Dynamics
Lecture 57 - 6 Dof Aircraft Equations of Motion
Lecture 58 - MATLAB and SIMULINK Implementation of Complete 6 Dof Aircraft Dynamics
Lecture 59 - Recap and Conclusion
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NPTEL Video Course - Aerospace Engineering - NOC:Wind Energy

Subject Co-ordinator - Prof. Ashoke De

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Renewable Energy
Lecture 2 - Introduction to Renewable Energy (Continued...)
Lecture 3 - Fluid Mechanics - Basics
Lecture 4 - Fluid Mechanics - Integral Form of Conservation Equations
Lecture 5 - Fluid Mechanics - Dimensional Similarity
Lecture 6 - Fluid Mechanics - External Flows
Lecture 7 - Fluid Mechanics - Boundary Layer and Turbulence
Lecture 8 - Wind Turbine Basics
Lecture 9 - Wind Turbine Basics (Continued...)
Lecture 10 - Wind Turbine Technology
Lecture 11 - Wind Turbine Technology (Continued...)
Lecture 12 - Wind Turbine Technology (Continued...)
Lecture 13 - Mechanics of Wind
Lecture 14 - Mechanics of Wind (Continued...)
Lecture 15 - Atmospheric Boundary Layer
Lecture 16 - Atmospheric Boundary Layer (Continued...)
Lecture 17 - Wind Velocity profile
Lecture 18 - Wind Data Analysis
Lecture 19 - Wind Data Analysis (Continued...)
Lecture 20 - Turbine Calculations
Lecture 21 - HAWT-History
Lecture 22 - HAWT-Components
Lecture 23 - Momentum Theory
Lecture 24 - Momentum Theory with wake rotation
Lecture 25 - BEM Theory
Lecture 26 - BEM Example
Lecture 27 - Airfoil Nomenclature
Lecture 28 - Wake
Lecture 29 - Blade Design with Momentum Theory

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Lecture 30 - Rotor Blade Design
Lecture 31 - Off-design Performance Issues
Lecture 32 - Blade Shape Optimization
Lecture 33 - HAWT Performance Calculation
Lecture 34 - HAWT Optimum Performance Analysis
Lecture 35 - VAWT
Lecture 36 - VAWT (Continued...)
Lecture 37 - VAWT Performance Calculation
Lecture 38 - VAWT Performance Calculation (Continued...)
Lecture 39 - Aerodynamic of Darrieus and Savonius Turbines
Lecture 40 - Mechanics and Dynamics
Lecture 41 - Mechanics: Beam Analysis
Lecture 42 - Mechanics: Oscillations and Eigenmodes
Lecture 43 - Mechanics: Dynamic Beam Analysis
Lecture 44 - Mechanics: Tower Oscillations
Lecture 45 - Mechanics: Blade Oscillations
Lecture 46 - Mechanics: Linearized Analysis
Lecture 47 - Mechanics: Wind Turbine Rotor Dynamics
Lecture 48 - Mechanics: Simplified Hinge-Spring Model
Lecture 49 - Mechanics: Flapping Blade Model (Free Motion)
Lecture 50 - Mechanics: Flapping Blade Model (Forced Motion)
Lecture 51 - Mechanics: Flapping Blade Model (Forced Motion) (Continued...)
Lecture 52 - Mechanics: Linearized Aerodynamic Model
Lecture 53 - Mechanics: Linearized Aerodynamic Model (Continued...)
Lecture 54 - Mechanics: Full Flapping Blade Model
Lecture 55 - Mechanics: Solution of Flapping Equation
Lecture 56 - Mechanics: Solution of Flapping Equation (Continued...)
Lecture 57 - Mechanics: General Solution of Flapping Equation
Lecture 58 - Control and miscellaneous aspects of wind turbines
Lecture 59 - CFD aspects of wind turbines
Lecture 60 - CFD and Alternative Wind Energy Systems
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NPTEL Video Course - Aerospace Engineering - High Speed Aero Dynamics

Subject Co-ordinator - Dr. K.P. Sinhamahapatra

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction and Review of Thermodynamics
Lecture 2 - Review of Thermodynamics (Continued...)
Lecture 3 - Review of Thermodynamics (Continued...)
Lecture 4 - Review of Thermodynamics (Continued...)
Lecture 5 - One-dimensional gas dynamics
Lecture 6 - One-dimensional gas dynamics (Continued...)
Lecture 7 - One-dimensional gas dynamics (Continued...)
Lecture 8 - One-dimensional waves
Lecture 9 - One-dimensional waves (Continued...)
Lecture 10 - One-dimensional waves (Continued...)
Lecture 11 - Waves and Supersonic Flow
Lecture 12 - Waves and Supersonic Flow (Continued...)
Lecture 13 - Waves and Supersonic Flow (Continued...)
Lecture 14 - Waves and Supersonic Flow (Continued...)
Lecture 15 - Shock Expansion Theory
Lecture 16 - Flow through ducts and channels
Lecture 17 - Flow in ducts
Lecture 18 - Flow in ducts (Continued...)
Lecture 19 - Adiabatic Flow in ducts with friction
Lecture 20 - Adiabatic flow in ducts with friction (Continued...)
Lecture 21 - Isothermal flow in ducts with friction
Lecture 22 - Flow in uniform duct with heating
Lecture 23 - Multi - dimensional flow problems
Lecture 24 - Multi - dimensional flow problems (Continued...)
Lecture 25 - Linearized flow problems
Lecture 26 - Linearized flow problems (Continued...)
Lecture 27 - Linearized flow problems (Continued...)
Lecture 28 - Linearized flow problems (Continued...)
Lecture 29 - Linearized flow problems (Continued...)

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Lecture 30 - Linearized flow problems (Continued...)
Lecture 31 - Linearized flow problems (Continued...)
Lecture 32 - Linearized Problems - Forces on Slender Bodies
Lecture 33 - Linearized Problems - Forces on Slender Bodies (Continued...)
Lecture 34 - Similarity Rules for High Speed Flows
Lecture 35 - Similarity Rules for High Speed Flows (Continued...)
Lecture 36 - Similarity Rules for High Speed Flows (Continued...)
Lecture 37 - Similarity Rules in Hypersonic Flow
Lecture 38 - Transonic Flow
Lecture 39 - Transonic Flow (Continued...)
Lecture 40 - Transonic Flow (Continued...)
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NPTEL Video Course - Aerospace Engineering - Space Flight Mechanics

Subject Co-ordinator - Dr. Manoranjan Sinha

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Space Flight Mechanics
Lecture 2 - Particle Kinematics
Lecture 3 - Particle Kinematics (Continued...)
Lecture 4 - Conic Section
Lecture 5 - Two Body Problem
Lecture 6 - Two Body Problem (Continued...1)
Lecture 7 - Two Body Problem (Continued...2)
Lecture 8 - Two Body Problem (Continued...3)
Lecture 9 - Two Body Problem (Continued...4)
Lecture 10 - Two Body Problem (Continued...5)
Lecture 11 - Two Body Problem (Continued...6)
Lecture 12 - Two Body Problem (Continued...7) & Three Body Problem
Lecture 13 - Three Body Problem (Continued...1)
Lecture 14 - Three Body Problem (Continued...2)
Lecture 15 - Three Body Problem (Continued...3)
Lecture 16 - Three Body Problem (Continued...4)
Lecture 17 - Three Body Problem (Continued...5)
Lecture 18 - Three Body Problem (Continued...6)
Lecture 19 - Three Body Problem (Continued...7)
Lecture 20 - Three Body Problem (Continued...8)
Lecture 21 - Trajectory Transfer
Lecture 22 - Trajectory Transfer (Continued...1)
Lecture 23 - Trajectory Transfer (Continued...2)
Lecture 24 - Trajectory Transfer (Continued...3)
Lecture 25 - Trajectory Transfer (Continued...4)
Lecture 26 - Trajectory Transfer (Continued...5)
Lecture 27 - Trajectory Transfer (Continued...6)
Lecture 28 - Trajectory Transfer (Continued...7)
Lecture 29 - Trajectory Transfer (Continued...8)

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Lecture 30 - Trajectory Transfer (Continued...9)
Lecture 31 - Trajectory Transfer (Continued...10)
Lecture 32 - Trajectory Transfer (Continued...11) and Attitude Dynamics
Lecture 33 - Attitude Dynamics (Continued...1)
Lecture 34 - Attitude Dynamics (Continued...2)
Lecture 35 - Attitude Dynamics (Continued...3)
Lecture 36 - Attitude Dynamics (Continued...4)
Lecture 37 - Attitude Dynamics (Continued...5)
Lecture 38 - Attitude Dynamics (Continued...6)
Lecture 39 - Attitude Dynamics (Continued...7)
Lecture 40 - Attitude Dynamics (Continued...8)
Lecture 41 - Attitude Dynamics (Continued...9)
Lecture 42 - Propulsion
Lecture 43 - Propulsion (Continued...1)
Lecture 44 - Propulsion (Continued...2)
Lecture 45 - Propulsion (Continued...3)
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NPTEL Video Course - Aerospace Engineering - Introduction to Aerodynamics

Subject Co-ordinator - Dr. K.P. Sinhamahapatra

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Aircraft and Aerodynamic Forces and Moments
Lecture 2 - Aircraft and Aerodynamic Forces and Moments (Continued...)
Lecture 3 - Fluids and Forces in Fluids
Lecture 4 - Fluids and Forces in Fluids (Continued...)
Lecture 5 - Forces in Fluids
Lecture 6 - Forces in Fluids (Continued...)
Lecture 7 - Kinematics of fluid motion
Lecture 8 - Kinematics of fluid motion (Continued...)
Lecture 9 - Kinematics of fluid motion (Continued...)
Lecture 10 - Kinematics of fluid motion (Continued...)
Lecture 11 - Kinematics of fluid motion - Velocity with specified extension and vorticity
Lecture 12 - Kinematics of fluid motion - Velocity with specified extension and vorticity (Continued...)
Lecture 13 - Kinematics of fluid motion - Vorticity Distribution
Lecture 14 - Kinematics of fluid motion - Velocity without expansion and vorticity
Lecture 15 - Irrotational Solenoidal Flow in Multiply Connected region
Lecture 16 - Irrotational Solenoidal Flow in Multiply Connected region (Continued...)
Lecture 17 - Equations of Fluid Motion - Navier - Stokes Equation
Lecture 18 - Equations of Fluid Motion - Navier - Stokes Equation (Continued...)
Lecture 19 - Equations of Fluid Motion - Navier - Stokes Equation (Continued...)
Lecture 20 - Conservation of Energy and Energy Equation
Lecture 21 - Equations of Motions
Lecture 22 - Equations of Motion (Continued...)
Lecture 23 - Exact Solution for Simple Problems
Lecture 24 - Exact Solution for Simple Problems (Continued...)
Lecture 25 - Non-dimensional Form of the Equations and Possible Simplifications
Lecture 26 - High Reynolds Number Approximation
Lecture 27 - Conditions fior Incompressibility
Lecture 28 - Potential Flow
Lecture 29 - Potential Flow - Combination of Basic Solutions

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Lecture 30 - Potential Flow - Combination of Basic Solutions (Continued...)
Lecture 31 - Potential Flow - Combination of Basic Solutions (Continued...)
Lecture 32 - Potential Flow - Combination of Basic Solutions (Continued...) - Lifting Cylinder
Lecture 33 - Conformal Transformation
Lecture 34 - Conformal Transformation (Continued...)
Lecture 35 - Zhukovsky Transformation
Lecture 36 - Zhukovsky Transformation (Continued...)
Lecture 37 - Zhukovsky Transformation - Applications
Lecture 38 - Zhukovsky Transformation - Applications (Continued...)
Lecture 39 - Zhukovsky Transformation - Applications (Continued...)
Lecture 40 - Transformation
Lecture 41 - Transformation (Continued...)
Lecture 42 - Boundary - Layer Theory
Lecture 43 - Boundary - Layer Theory (Continued...)
Lecture 44 - Boundary - Layer Theory (Continued...)
Lecture 45 - Boundary - Layer Theory (Continued...)
Lecture 46 - Boundary - Layer Theory (Continued...)
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NPTEL Video Course - Aerospace Engineering - NOC:Satellite Attitude Dynamics and Control

Subject Co-ordinator - Dr. Manoranjan Sinha

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Kinematics of Rotation
Lecture 2 - Kinematics of Rotation (Continued...)
Lecture 3 - Kinematics of Rotation (Continued...)
Lecture 4 - Kinematics of Rotation (Continued...)
Lecture 5 - Kinematics of Rotation (Continued...)
Lecture 6 - Kinematics of Rotation (Continued...)
Lecture 7 - Rotation
Lecture 8 - Rotation (Continued...)
Lecture 9 - Rotation (Continued...)
Lecture 10 - Rotation (Continued...)
Lecture 11 - Rotational Kinematics
Lecture 12 - Rotational Kinematics (Continued...)
Lecture 13 - Rotational Kinematics (Continued...)
Lecture 14 - Rotational Kinematics (Continued...)
Lecture 15 - Rotational Dynamics (Rigid Body Dynamics)
Lecture 16 - Rotational Dynamics (Rigid Body Dynamics) (Continued...)
Lecture 17 - Rotational Dynamics (Rigid Body Dynamics) (Continued...)
Lecture 18 - Rigid Body Dynamics
Lecture 19 - Rigid Body Dynamics (Continued...)
Lecture 20 - Rigid Body Dynamics (Continued...)
Lecture 21 - Rigid Body Dynamics (Continued...)
Lecture 22 - Rigid Body Dynamics (Continued...)
Lecture 23 - Rigid Body Dynamics (Continued...)
Lecture 24 - Rigid Body Dynamics (Continued...)
Lecture 25 - Rigid Body Dynamics (Continued...)
Lecture 26 - Stability of Torque Free Rotation
Lecture 27 - Stability of Torque Free Rotation (Continued...)
Lecture 28 - Gravity-gradient Satellite
Lecture 29 - Gravity-gradient Satellite (Continued...)

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Lecture 30 - Gravity-gradient Satellite (Continued...)
Lecture 31 - Gravity-gradient Satellite (Continued...)
Lecture 32 - Gravity-gradient Satellite (Continued...)
Lecture 33 - Gravity-gradient Satellite (Continued...)
Lecture 34 - Gravity-gradient Satellite (Continued...)
Lecture 35 - Gravity-gradient Satellite (Continued...)
Lecture 36 - Gravity-gradient Satellite (Continued...)
Lecture 37 - Gravity-gradient Satellite (Continued...)
Lecture 38 - Spin Stabilization
Lecture 39 - Spin Stabilization (Continued...)
Lecture 40 - Spin Stabilization (Continued...)
Lecture 41 - Spin Stabilization (Continued...)
Lecture 42 - Spin Stabilization (Continued...)
Lecture 43 - Control Moment Gyroscope
Lecture 44 - Control Moment Gyroscope (Continued...)
Lecture 45 - Gyroscope/Top Motion
Lecture 46 - Gyroscope/Top Motion (Continued...)
Lecture 47 - Gyroscopic Motion
Lecture 48 - Gyroscopic Motion (Continued...)
Lecture 49 - Reaction Wheel/Gyrostat
Lecture 50 - Reaction Wheel/Gyrostat (Continued...)
Lecture 51 - Gyrostat
Lecture 52 - Gyrostat (Continued...)
Lecture 53 - Gyrostat (Continued...)
Lecture 54 - Gyrostat (Continued...)
Lecture 55 - Control Moment Gyro
Lecture 56 - Control Moment Gyro (Continued...)
Lecture 57 - Control Moment Gyro (Continued...)
Lecture 58 - Control Moment Gyro (Continued...)
Lecture 59 - Satellite Dynamics with Control Moment Gyro
Lecture 60 - Satellite Dynamics with Control Moment Gyro (Continued...)
Lecture 61 - Satellite Dynamics with Control Moment Gyro (Continued...)
Lecture 62 - Simplified Control Gyro for Satellite Attitude Control
Lecture 63 - Satellite Attitude Control using Magnetic Torquer
Lecture 64 - Satellite Attitude Control using Magnetic Torquer (Continued...)
Lecture 65 - Satellite Attitude Control using Magnetic Torquer (Continued...)
Lecture 66 - Satellite Attitude Control using Magnetic Torquer (Continued...)
Lecture 67 - Satellite Attitude Control using Magnetic Torquer (Continued...)
Lecture 68 - Satellite Attitude Control using Lorentz Force
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Lecture 69 - Satellite Attitude Control using Thruster
Lecture 70 - Atmospheric Drag on the Satellite
Lecture 71 - Atmospheric Force and Moment on the Satellite
Lecture 72 - Atmospheric Force and Moment on the Satellite (Continued...)
Lecture 73 - Solar Radiation Force and Moment on the Satellite

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NPTEL Video Course - Aerospace Engineering - NOC:Vibration and Structural Dynamics

Subject Co-ordinator - Prof. Mira Mitra

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Undamped Free Vibration
Lecture 3 - Damped Free Vibration
Lecture 4 - Damped Free Vibration (Continued...)
Lecture 5 - Damped Free Vibration (Continued...)
Lecture 6 - Force Vibration
Lecture 7 - Harmonic Loading
Lecture 8 - Harmonic Loading (Continued...)
Lecture 9 - Harmonic Loading (Continued...)
Lecture 10 - Harmonic Loading (Continued...)
Lecture 11 - Impulse Load and Arbitrary Load
Lecture 12 - Impulse Load and Arbitrary Load (Continued...)
Lecture 13 - MDOF, 2-Dof System
Lecture 14 - Normal Mode of Vib
Lecture 15 - Natural Frequency and Mode Shapes
Lecture 16 - Mode Shapes of MDOF
Lecture 17 - Mode Shapes and Free Vibration Response of MODF
Lecture 18 - Example on MODF
Lecture 19 - Example on MODF (Continued...)
Lecture 20 - Modal Expansion Theorem, Generalized Coordinate
Lecture 21 - Examples on Modal Analysis
Lecture 22 - Damping
Lecture 23 - Rigid Body Modes
Lecture 24 - Numerical Time Integration
Lecture 25 - Continuous System
Lecture 26 - Axial Vibration of Bar
Lecture 27 - Axial Vibration of Bar (Continued...)
Lecture 28 - Bending Vibration in Beam
Lecture 29 - Bending Vibration in Beam (Continued...)

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Lecture 30 - Bending Vibration in Beam (Continued...)
Lecture 31 - Modal Analysis
Lecture 32 - Modal Analysis (Continued...)
Lecture 33 - Modal Analysis of Continuous System
Lecture 34 - Modal Analysis of Continuous System (Continued...)
Lecture 35 - Approximate Method
Lecture 36 - Approximate Methods (Continued...)
Lecture 37 - Collocation Method
Lecture 38 - Analytical Methods
Lecture 39 - Analytical Methods (Continued...)
Lecture 40 - Analytical Methods (Continued...)
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NPTEL Video Course - Aerospace Engineering - NOC:Space Flight Mechanics

Subject Co-ordinator - Dr. Manoranjan Sinha

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Conic Section
Lecture 2 - Conic Section (Continued...)
Lecture 3 - Conic Section (Continued...)
Lecture 4 - Central Force Motion
Lecture 5 - Gravitational Central Force Motion
Lecture 6 - Gravitational Central Force Motion (Continued...)
Lecture 7 - Gravitational Central Force Motion (Continued...)
Lecture 8 - 2-Body Problem
Lecture 9 - 2-Particle System Motion Under Mutual Gravitational Attraction
Lecture 10 - 2-Particle Body Problem
Lecture 11 - 2-Particle Body System
Lecture 12 - Classical Orbital Elements / Parameters
Lecture 13 - Classical Orbital Elements / Parameters (Continued...)
Lecture 14 - Classical Orbital Elements / Parameters (Continued...)
Lecture 15 - Classical Orbital Elements and Its Inverse Problems
Lecture 16 - Inverse Problem of Orbit Determination (Classical Orbital Elements)
Lecture 17 - Problem Solving on 2-Body Problem Related to Orbit and Orbital Elements
Lecture 18 - Problem Related to Orbital Elements
Lecture 19 - Kepler's Equation / Kepler's Problem
Lecture 20 - Kepler's Problem (Continued...)
Lecture 21 - Kepler's Problem (Continued...)
Lecture 22 - Kepler's Equation
Lecture 23 - Kepler's Equation (Continued...)
Lecture 24 - Kepler's Equation (Continued...)
Lecture 25 - Kepler's Equation (Continued...)
Lecture 26 - Kepler's Equation (Continued...)
Lecture 27 - Kepler's Equation (Continued...)
Lecture 28 - Kepler's Equation (Continued...)
Lecture 29 - 3-Body Problem

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Lecture 30 - 3-Body Problem (Continued...)
Lecture 31 - 3-Body Problem (Continued...)
Lecture 32 - 3-Body Problem (Continued...)
Lecture 33 - 3-Body Problem (Continued...)
Lecture 34 - Restricted 3-Body Problem
Lecture 35 - Restricted 3-Body Problem (Continued...)
Lecture 36 - Restricted 3-Body Problem (Continued...)
Lecture 37 - Restricted 3-Body Problem (Continued...)
Lecture 38 - Restricted 3-Body Problem (Continued...)
Lecture 39 - Restricted 3-Body Problem (Continued...)
Lecture 40 - Restricted 3-Body Problem (Continued...)
Lecture 41 - Restricted 3-Body Problem (Continued...)
Lecture 42 - Restricted 3-Body Problem (Continued...)
Lecture 43 - Restricted 3-Body Problem (Continued...)
Lecture 44 - Restricted 3-Body Problem (Continued...)
Lecture 45 - Restricted 3-Body Problem (Continued...)
Lecture 46 - Restricted 3-Body Problem (Continued...)
Lecture 47 - General Perturbation Theory
Lecture 48 - General Perturbation Theory (Continued...)
Lecture 49 - General Perturbation Theory (Continued...)
Lecture 50 - General Perturbation Theory (Continued...)
Lecture 51 - General Perturbation Theory (Continued...)
Lecture 52 - General Orbit Perturbation Theory
Lecture 53 - General Orbit Perturbation Theory (Continued...)
Lecture 54 - General Orbit Perturbation Theory (Continued...)
Lecture 55 - General Orbit Perturbation Theory (Continued...)
Lecture 56 - General Orbit Perturbation Theory (Continued...)
Lecture 57 - General Orbit Perturbation Theory (Continued...)
Lecture 58 - General Orbit Perturbation Theory (Continued...)
Lecture 59 - General Orbit Perturbation Theory (Continued...)
Lecture 60 - General Orbit Perturbation Theory (Continued...)
Lecture 61 - General Orbit Perturbation Theory (Continued...)
Lecture 62 - General Orbit Perturbation Theory (Continued...)
Lecture 63 - General Orbit Perturbation Theory (Continued...)
Lecture 64 - General Orbit Perturbation Theory (Continued...)
Lecture 65 - General Orbit Perturbation Theory (Continued...)
Lecture 66 - General Orbit Perturbation Theory (Continued...)
Lecture 67 - General Orbit Perturbation Theory (Continued...)
Lecture 68 - Orbit Determination
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Lecture 69 - Orbit Determination (Continued...)
Lecture 70 - Orbit Determination (Continued...)
Lecture 71 - Orbit Determination (Continued...)
Lecture 72 - Transformation from Celestial to Earth Fixed Reference Frame
Lecture 73 - Time
Lecture 74 - Time (Continued...)
Lecture 75 - Orbit Determination
Lecture 76 - Orbit Determination (Continued...)
Lecture 77 - Orbit Determination (Continued...)
Lecture 78 - Orbit Determination (Continued...)
Lecture 79 - Trajectory Transfer
Lecture 80 - Trajectory Transfer (Continued...)
Lecture 81 - Trajectory Transfer (Continued...)
Lecture 82 - Trajectory Transfer (Continued...)
Lecture 83 - Trajectory Transfer (Continued...)
Lecture 84 - Trajectory Transfer (Continued...)
Lecture 85 - Trajectory Transfer (Continued...)
Lecture 86 - Trajectory Transfer (Continued...)
Lecture 87 - Interplanetary Transfer
Lecture 88 - Interplanetary Transfer (Continued...)
Lecture 89 - Interplanetary Transfer (Continued...)
Lecture 90 - Patched Conic Section Method for Interplanetary Transfer
Lecture 91 - Interplanetary Mission
Lecture 92 - Interplanetary Mission (Continued...)
Lecture 93 - Interception in Coplanar Orbit
Lecture 94 - Interception in Coplanar Orbit (Continued...)
Lecture 95 - Interception in non-coplanar Orbit
Lecture 96 - Interception in non-coplanar Orbit (Continued...)
Lecture 97 - Interception in non-coplanar Orbit (Continued...)
Lecture 98 - Non Coplanar Transfer
Lecture 99 - Sphere of Influence
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NPTEL Video Course - Aerospace Engineering - NOC:Aircraft Structures - I

Subject Co-ordinator - Dr. Anup Ghosh

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Introduction (Continued...)
Lecture 3 - Introduction (Continued...)
Lecture 4 - Load Encountered by a Typical Aircraft
Lecture 5 - Conceptual Structural Details of a Typical Aircraft
Lecture 6 - Airworthiness of An Aircraft
Lecture 7 - Aerodynamic Loads and Load Factors
Lecture 8 - Loads From A Symmetric Manoeuvre Of An Aircraft
Lecture 9 - Shear and Moment on Wing An Aircraft
Lecture 10 - Distribution Of Load On The Fuselage
Lecture 11 - Unit Load Analysis Of Fuselage
Lecture 12 - Truss System
Lecture 13 - Truss System (Continued...)
Lecture 14 - Space Structures
Lecture 15 - Space Structures (Continued...)
Lecture 16 - Wing Truss System
Lecture 17 - Introduction to Energy Methods
Lecture 18 - Dummy and Unit Load Method
Lecture 19 - Dummy and Unit Load Method - Examples
Lecture 20 - Castigliano's Theorems
Lecture 21 - Rayleigh - Ritz Method
Lecture 22 - Statically Indeterminate Structures
Lecture 23 - Theory of Elasticity - Stress
Lecture 24 - Theory of Elasticity - Equilibrium
Lecture 25 - Stress Transformation and Principal Stress
Lecture 26 - Theory of Elasticity - Principal Stress Boundary Condition
Lecture 27 - Shear Stresses
Lecture 28 - Introduction of Strain
Lecture 29 - Introduction of strain - Equations of compatibility

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Lecture 30 - Formulation of Elasticity Problems
Lecture 31 - Inverse Method of Solution
Lecture 32 - Semi-Inverse Method of Solution
Lecture 33 - Equilibrium Equation in Polar Coordinate System
Lecture 34 - Compatibility Condition in Polar Cordinate System
Lecture 35 - Effects of Circular Hole on Stress Distributions in a Plate
Lecture 36 - Effects of Circular Hole on Stress Distributions in a Plate
Lecture 37 - Effects of Circular Hole on Stress Distributions in a Plate
Lecture 38 - Theory of Elasticity - Torsion Problems
Lecture 39 - Theory of Elasticity - Torsion Problems (Continued...)
Lecture 40 - Torsion of an Elliptical Bar
Lecture 41 - Membrane Analogy for Torsion Problem
Lecture 42 - Membrane Analogy for Torsion Problem (Continued...)
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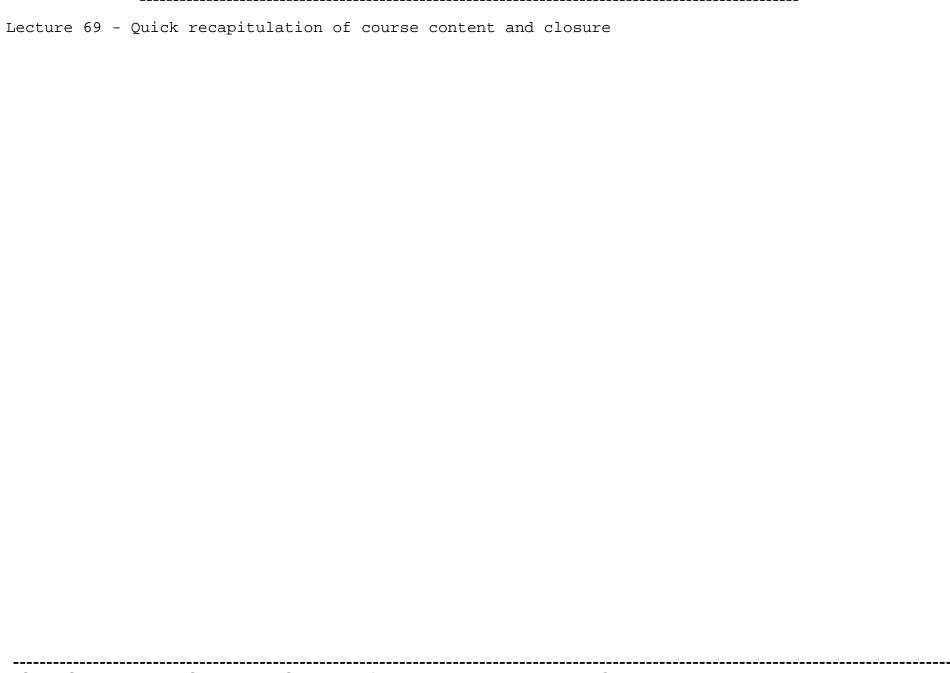
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NPTEL Video Course - Aerospace Engineering - NOC:Introduction to CFD

Subject Co-ordinator - Prof. Arnab Roy

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Brief Overview of CFD
Lecture 2 - Governing Equations of Fluid Flow
Lecture 3 - Governing Equations of Fluid Flow (Continued...)
Lecture 4 - Classification of PDEs
Lecture 5 - Classification of PDEs (Continued...)
Lecture 6 - Methods for Approximate Solution of PDEs
Lecture 7 - Finite Difference Method
Lecture 8 - Methods for Approximate Solution of PDEs (Continued...)
Lecture 9 - Methods for Approximate Solution of PDEs (Continued...)
Lecture 10 - Methods for Approximate Solution of PDEs (Continued...)
Lecture 11 - Methods for Approximate Solution of PDEs (Continued...)
Lecture 12 - Taylor Table Approach for Constructing Finite Difference Schemes
Lecture 13 - Taylor Table Approach for Constructing Finite Difference Schemes (Continued...)
Lecture 14 - Taylor Table Approach for Constructing Finite Difference Schemes (Continued...)
Lecture 15 - Taylor Table Approach for Constructing Finite Difference Schemes (Continued...)
Lecture 16 - Taylor Table Approach for Constructing Finite Difference Schemes (Continued...)
Lecture 17 - Numerical Solution of Steady State Heat Conduction (Elliptic PDE)
Lecture 18 - Numerical Solution of Steady State Heat Conduction (Elliptic PDE) (Continued...)
Lecture 19 - Numerical Solution of Steady State Heat Conduction (Elliptic PDE) (Continued...)
Lecture 20 - Numerical Solution of Steady State Heat Conduction (Elliptic PDE) (Continued...)
Lecture 21 - Numerical Solution of Steady State Heat Conduction (Elliptic PDE) (Continued...)
Lecture 22 - Numerical Solution of Unsteady Heat Conduction (Parabolic PDE)
Lecture 23 - Numerical Solution of Unsteady Heat Conduction (Parabolic PDE) (Continued...)
Lecture 24 - Numerical Solution of Unsteady Heat Conduction (Parabolic PDE) (Continued...)
Lecture 25 - Numerical Solution of Unsteady Heat Conduction (Parabolic PDE) (Continued...)
Lecture 26 - Numerical Solution of Unsteady Heat Conduction (Parabolic PDE) (Continued...)
Lecture 27 - Numerical Solution of Linear Wave Equation (Hyperbolic PDE)
Lecture 28 - Numerical Solution of Linear Wave Equation (Hyperbolic PDE) (Continued...)
Lecture 29 - Numerical Solution of Linear Wave Equation (Hyperbolic PDE) (Continued...)

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Lecture 30 - Numerical Solution of Linear Wave Equation (Hyperbolic PDE) (Continued...)
Lecture 31 - Numerical Solution of Linear Wave Equation (Hyperbolic PDE) (Continued...)
Lecture 32 - Numerical Solution of Linear Wave Equation (Hyperbolic PDE) (Continued...)
Lecture 33 - Numerical Solution of One Dimensional Convection - Diffusion Equation
Lecture 34 - Numerical Solution of One Dimensional Convection - Diffusion Equation (Continued...)
Lecture 35 - Numerical Solution of One Dimensional Convection - Diffusion Equation (Continued...)
Lecture 36 - Numerical Solution of One Dimensional Convection - Diffusion Equation (Continued...)
Lecture 37 - Numerical Solution of One Dimensional Convection - Diffusion Equation (Continued...)
Lecture 38 - Numerical Solution of One Dimensional Convection - Diffusion Equation (Continued...)
Lecture 39 - Numerical Solution of Two Dimensional Incompressible Navier Stokes Equations
Lecture 40 - Numerical Solution of Two Dimensional Incompressible Navier Stokes Equations (Continued...)
Lecture 41 - Numerical Solution of Two Dimensional Incompressible Navier Stokes Equations (Continued...)
Lecture 42 - Numerical Solution of Two Dimensional Incompressible Navier Stokes Equations (Continued...)
Lecture 43 - Numerical Solution of Two Dimensional Incompressible Navier Stokes Equations (Continued...)
Lecture 44 - Numerical Solution of Two Dimensional Incompressible Navier Stokes Equations (Continued...)
Lecture 45 - Numerical Solution of One Dimensional Euler Equation for Shock Tube Problem
Lecture 46 - Numerical Solution of One Dimensional Euler Equation for Shock Tube Problem (Continued...)
Lecture 47 - Numerical Solution of One Dimensional Euler Equation for Shock Tube Problem (Continued...)
Lecture 48 - Numerical Solution of One Dimensional Euler Equation for Shock Tube Problem (Continued...)
Lecture 49 - Numerical Solution of One Dimensional Euler Equation for Shock Tube Problem (Continued...)
Lecture 50 - Basics of Interface Capturing Methods for Applications in Multiphase Flow
Lecture 51 - Basics of Interface Capturing Methods for Application in Multiphase Flow (Continued...)
Lecture 52 - Basics of Interface Capturing Methods for Application in Multiphase Flow (Continued...)
Lecture 53 - Basics of Interface Capturing Methods for Application in Multiphase Flow (Continued...)
Lecture 54 - Basics of Interface Capturing Methods for Application in Multiphase Flow (Continued...)
Lecture 55 - Basics of Turbulence Modeling
Lecture 56 - Basics of Turbulence Modeling (Continued...)
Lecture 57 - Basics of Turbulence Modeling (Continued...)
Lecture 58 - Basics of Turbulence Modeling (Continued...)
Lecture 59 - Basics of Turbulence Modeling (Continued...)
Lecture 60 - Basics of Turbulence Modeling (Continued...)
Lecture 61 - Structured and Unstructured Grid Generation
Lecture 62 - Structured and Unstructured Grid Generation (Continued...)
Lecture 63 - Structured and Unstructured Grid Generation (Continued...)
Lecture 64 - Structured and Unstructured Grid Generation (Continued...)
Lecture 65 - Structured and Unstructured Grid Generation (Continued...)
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NPTEL Video Course - Aerospace Engineering - NOC:Fundamentals of Theoretical and Experimental Aerodynamics

Subject Co-ordinator - Prof. Arnab Roy

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction on Aerodynamics-its relevance and applications
Lecture 2 - Atmosphere
Lecture 3 - Flow velocity, pressure, skin friction
Lecture 4 - Generation of aerodynamic forces and moments on an aircraft
Lecture 5 - Generation of aerodynamic forces and moments on an aircraft (Continued...)
Lecture 6 - Generation of aerodynamic forces and moments on an aircraft (Continued...)
Lecture 7 - Eulerian and Lagrangian perspectives of flow: Fluid element trajectories
Lecture 8 - Fluid element trajectories, Angular velocity, and vorticity
Lecture 9 - Irrotational and Rotational flow, Strain of a fluid element, Gradient
Lecture 10 - Line Surface and Volume Integrals, Circulation, Velocity
Lecture 11 - Conservation equations of mass, momentum and energy
Lecture 12 - Conservation equations of momentum and energy
Lecture 13 - Inviscid and viscous flows
Lecture 14 - Inviscid and viscous flows (Continued...)
Lecture 15 - Bernoulliâ s equation and its applications
Lecture 16 - Bernoulliâ s equation applications; Potential flow; Boundary layer flow
Lecture 17 - Boundary layer flow
Lecture 18 - Boundary Layer (Continued...) and Laminar and turbulent flow
Lecture 19 - Airfoil Geometry, forces and moments acting on an airfoil
Lecture 20 - Pressure distribution on an airfoil, Airfoil nomenclature and characteristics
Lecture 21 - Airfoil characteristics; Aerodynamic center; Some more elementary flows
Lecture 22 - Elementary flows- Doublet and Point Vortex; Vortex sheet
Lecture 23 - Kutta condition; Kelvinâ s circulation theorem; Introduction to thin airfoil theory
Lecture 24 - Results of thin airfoil theory for symmetric
Lecture 25 - Multi element airfoils, Laminar and turbulent
Lecture 26 - Finite wing geometry and flow features
Lecture 27 - Biot Savart Law; Prandtlâ s lifting line theory
Lecture 28 - Prandtl lifting theory for finite wings
Lecture 29 - Finite wing aerodynamics; Delta wing aerodynamics

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Lecture 30 - Delta wing aerodynamics; Unsteady aerodynamics
Lecture 31 - Fundamentals of high speed flows
Lecture 32 - Velocity potential equation and its application; Finite Waves
Lecture 33 - Normal shocks
Lecture 34 - Normal shocks, Mach waves and oblique shocks
Lecture 35 - Oblique shock; Prandtl Meyer expansion
Lecture 36 - Shock expansion theory; Flow through converging diverging nozzle
Lecture 37 - Flow through converging diverging nozzle under different back pressure
Lecture 38 - Priliminary concepts of hypersonic flow; Shock tube
Lecture 39 - Computing aerodynamic flows - trying to connect with the theory
Lecture 40 - Computing aerodynamic flows - trying to connect with the theory (Continued...)
Lecture 41 - Some more on flow physics; The different steps involved in flow computations
Lecture 42 - An introduction to Panel Method
Lecture 43 - Panel method and Vortex Lattice Method
Lecture 44 - Mathematical classification of PDEs and their physical behavior
Lecture 45 - Basics of grid and discretization of governing PDEs
Lecture 46 - Different aspects of numerical schemes
Lecture 47 - Basics of Euler Equation
Lecture 48 - Basics of Compressible Navier Stokes Equations
Lecture 49 - Wind tunnel-an experimental tool in aerodynamics; Types of wind tunnels
Lecture 50 - Wind Tunnel design basics - Subsonic Wind Tunnels
Lecture 51 - Wind Tunnel design basics - Subsonic wind tunnels (Continued...)
Lecture 52 - Wind Tunnel design basics - Supersonic wind tunnels
Lecture 53 - Continuous closed circuit supersonic wind tunnel
Lecture 54 - Scalling of wind tunnel models; Safety issues in wind tunnel handling
Lecture 55 - Flow visualization techniques
Lecture 56 - Schlieren and Shadowgraph techniques
Lecture 57 - Measurement of Pressure using mechanical instruments
Lecture 58 - Rayleigh Pitot tube; Drag measurement using wake survey and direct weighing method
Lecture 59 - Mechanical balance
Lecture 60 - Electronic transducers
Lecture 61 - Wheatstone bridge circuits for force and moment measurement
Lecture 62 - Strain gauge based balances; Electronic pressure gauges
Lecture 63 - Absolute-Gauge-Differential pressure sensors; Data Acquisition System
Lecture 64 - Measurement error and uncertainty
Lecture 65 - Velocity measurement using Particle Image Velocimetry
Lecture 66 - Velocity measurement using Particle Image Velocimetry (Continued...)
Lecture 67 - Particle image velocimetry (Continued...)
Lecture 68 - How wind tunnel and associated instrumentation are used
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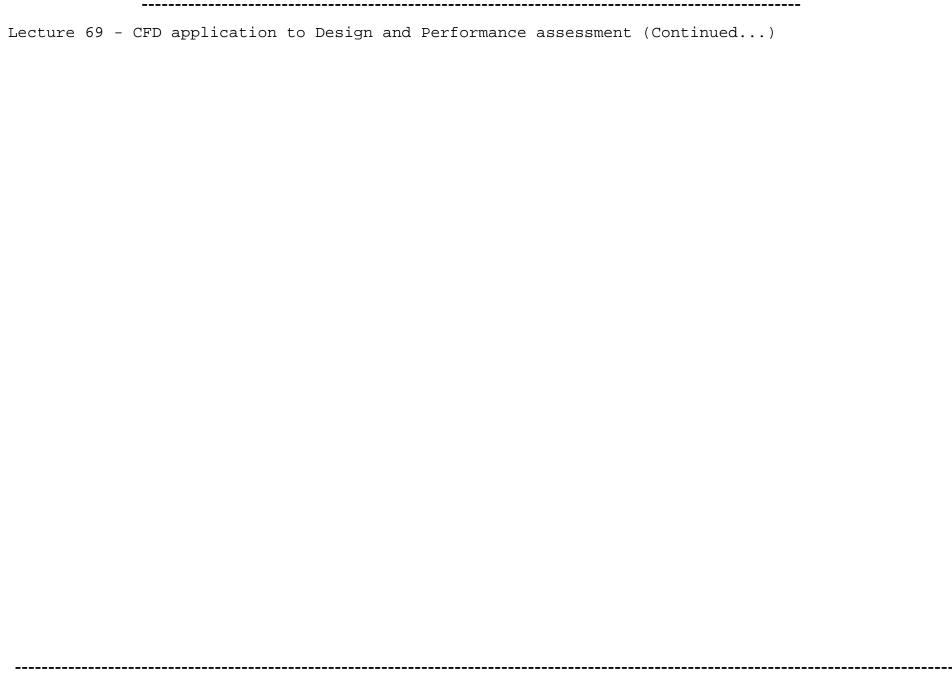

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Lecture 69 - Quick recapitulation of course content and closure

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NPTEL Video Course - Aerospace Engineering - NOC:Aerodynamic Design of Axial Flow Compressors and Fans

Subject Co-ordinator - Prof. Chetankumar Sureshbhai Mistry

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Introduction (Continued...)
Lecture 3 - Introduction (Continued...)
Lecture 4 - Introduction (Continued...)
Lecture 5 - Introduction (Continued...)
Lecture 6 - Introduction (Continued...)
Lecture 7 - Stage Configurations and Parameters
Lecture 8 - Stage Configurations and Parameters (Continued...)
Lecture 9 - Stage Configurations and Parameters (Continued...)
Lecture 10 - Stage Configurations and Parameters (Continued...)
Lecture 11 - Stage Configurations and Parameters (Continued...)
Lecture 12 - Stage Configurations and Parameters (Continued...)
Lecture 13 - Stage Configurations and Parameters (Continued...)
Lecture 14 - Stage Configurations and Parameters (Continued...)
Lecture 15 - Stage Configurations and Parameters (Continued...)
Lecture 16 - Design Concepts
Lecture 17 - Design Concepts (Continued...)
Lecture 18 - Design Concepts (Continued...)
Lecture 19 - Design Concepts (Continued...)
Lecture 20 - Design Concepts (Continued...)
Lecture 21 - Design Concepts (Continued...)
Lecture 22 - Design Concepts (Continued...)
Lecture 23 - Cascade Aerodynamics
Lecture 24 - Cascade Aerodynamics (Continued...)
Lecture 25 - Cascade Aerodynamics (Continued...)
Lecture 26 - Cascade Aerodynamics (Continued...)
Lecture 27 - Cascade Aerodynamics (Continued...)
Lecture 28 - Selection of Design Parameters
Lecture 29 - Selection of Design Parameters (Continued...)

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Lecture 30 - Selection of Design Parameters (Continued...)
Lecture 31 - Selection of Design Parameters (Continued...)
Lecture 32 - Selection of Design Parameters (Continued...)
Lecture 33 - Design Strategies
Lecture 34 - Design Strategies (Continued...)
Lecture 35 - Design Strategies (Continued...)
Lecture 36 - Design Strategies (Continued...)
Lecture 37 - Design of Low Speed Compressor
Lecture 38 - Design of Low Speed Compressor (Continued...)
Lecture 39 - Design of Low Speed Compressor (Continued...)
Lecture 40 - Design of Low Speed Compressor (Continued...)
Lecture 41 - Design of Low Speed Compressor (Continued...)
Lecture 42 - Design of Low Speed Compressor (Continued...)
Lecture 43 - Design of Low Speed Contra rotating Fan
Lecture 44 - Design of Low Speed Contra rotating Fan (Continued...)
Lecture 45 - Design of Low Speed Contra rotating Fan (Continued...)
Lecture 46 - Design of Low Speed Contra rotating Fan (Continued...)
Lecture 47 - Design of Low Speed Contra rotating Fan (Continued...)
Lecture 48 - Design of Low Speed Contra rotating Fan (Continued...)
Lecture 49 - Transonic Compressors
Lecture 50 - Transonic Compressors (Continued...)
Lecture 51 - Transonic Compressors (Continued...)
Lecture 52 - Transonic Compressors (Continued...)
Lecture 53 - Transonic Compressors (Continued...)
Lecture 54 - Design of Transonic Compressor
Lecture 55 - Design of Transonic Compressor (Continued...)
Lecture 56 - Design of Transonic Compressor (Continued...)
Lecture 57 - Design of Transonic Compressor (Continued...)
Lecture 58 - Design of Transonic Compressor (Continued...)
Lecture 59 - Design of Transonic Compressor (Continued...)
Lecture 60 - Design of Industrial fan
Lecture 61 - Design of Industrial fan (Continued...)
Lecture 62 - Design of Industrial fan (Continued...)
Lecture 63 - Design of Industrial fan (Continued...)
Lecture 64 - Design of Industrial fan (Continued...)
Lecture 65 - CFD application to Design and Performance assessment
Lecture 66 - CFD application to Design and Performance assessment (Continued...)
Lecture 67 - CFD application to Design and Performance assessment (Continued...)
Lecture 68 - CFD application to Design and Performance assessment (Continued...)
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Lecture 69 - CFD application to Design and Performance assessment (Continued...)

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NPTEL Video Course - Aerospace Engineering - NOC:Smart Structures

Subject Co-ordinator - Prof. Mohammed Rabius Sunny

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Smart Structures (Continued...)
Lecture 2 - Introduction to Smart Structures (Continued...)
Lecture 3 - Introduction to Smart Structures (Continued...)
Lecture 4 - Introduction to Piezoelectric Materials
Lecture 5 - Introduction to Piezoelectric Materials (Continued...)
Lecture 6 - Mathematical Preliminaries
Lecture 7 - 3D Constitutive Modeling of Piezoelectric Materials - 1
Lecture 8 - 3D Constitutive Modeling of Piezoelectric Materials - 2
Lecture 9 - 3D Constitutive Modeling of Piezoelectric Materials - 3
Lecture 10 - 3D Constitutive Modeling of Piezoelectric Materials - 4
Lecture 11 - Piezoelectric Sensors and Actuators
Lecture 12 - Numercial Problems and Solutions
Lecture 13 - Induced Strain Actuation - Static Analysis
Lecture 14 - Induced Strain Actuation - Static Analysis (Continued...)
Lecture 15 - Induced Strain Actuation - Static Analysis
Lecture 16 - Induced Strain Actuation - Static Analysis (Continued...)
Lecture 17 - Induced Strain Actuation - Static Analysis (Continued...)
Lecture 18 - Induced Strain Actuation - Static Analysis - Numerical Examples
Lecture 19 - Introduction to Energy Principles for Structural Analysis
Lecture 20 - Introduction to Energy Principles for Structural Analysis (Continued...)
Lecture 21 - Statis Analysis of beam for Induced Strain Actuation using Energy Principles
Lecture 22 - Static Analysis of beam for Induced Strain Actuation using Energy Principles (Continued...)
Lecture 23 - Static Analysis of beam for Induced Strain Actuation using Energy Principles (Continued...)
Lecture 24 - Static Analysis of beam for Induced strain Actuation using Energy Principles Numerical
Lecture 25 - Dynamic Analysis of Beam for Induced Strain Actuation Using Energy Principle
Lecture 26 - Dynamic Analysis of Beam for Induced Strain Actuation Using (Continued...)
Lecture 27 - Energy Harvesting and Vibration Control
Lecture 28 - Energy Harvesting and Vibration Control (Continued...)
Lecture 29 - Solution of Coupled Linear Ordinary Differential Equations

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Lecture 30 - Introduction to Fibre Reinforced Plastic Composites
Lecture 31 - Constitutive Relation of Unidirectional FRP Composite Ply
Lecture 32 - Constitutive Relation of Unidirectional FRP Composite Ply (Continued...)
Lecture 33 - Constitutive Relation of Unidirectional FRP Composite Ply (Continued...)
Lecture 34 - Mechanics of FRP Composite Laminate Numerical Examples
Lecture 35 - Mechanics of FRP Composite Laminate Numerical Examples (Continued...)
Lecture 36 - Analysis of composite laminate with piezoelectric patches (Continued...)
Lecture 37 - Analysis of composite laminate with piezoelectric patches (Continued...)
Lecture 38 - Analysis of composite laminate with piezoelectric patches (Continued...)
Lecture 39 - Analysis of composite laminate with piezoelectric patches (Continued...)
Lecture 40 - Analysis of composite laminate with piezoelectric patches - computer programming
Lecture 41 - Introduction to Shape Memory Alloys
Lecture 42 - Temperature and Stress Dependent Phase Transformation Modeling
Lecture 43 - Temperature and Stress Dependent Phase Transformation Modeling (Continued...)
Lecture 44 - Stress-strain Curve at Low Temperature, Pseudo elasticity Two Way Shape Memory Effect
Lecture 45 - Constitutive Relations of Shape Memory Alloys
Lecture 46 - Constitutive Relations of Shape Memory Alloys (Continued...)
Lecture 47 - Constitutive Relations of Shape Memory Alloys (Continued...)
Lecture 48 - Constitutive Relations of Shape Memory Alloys (Continued...)
Lecture 49 - Constitutive Relations of Shape Memory Alloys (Continued...)
Lecture 50 - Finite Element Formulation of Euler - Bernoulli Beam
Lecture 51 - Finite Element Formulation of Euler - Bernoulli Beam (Continued...)
Lecture 52 - Anlsysis of a Beam with Shape Memory Alloy Wire
Lecture 53 - Analysis of a Beam with Shape Memory Alloy Wire (Continued...)
Lecture 54 - Introduction to Electro and Magneto Rheological Fluids
Lecture 55 - Analaysis of Electro and Magneto Rheological Fluid Flow
Lecture 56 - Analaysis of Electro and Magneto Rheological Fluid Flow (Continued...)
Lecture 57 - Analaysis of Electro and Magneto Rheological Fluid Flow (Continued...)
Lecture 58 - Analaysis of Electro and Magneto Rheological Fluid Flow (Continued...)
Lecture 59 - Analaysis of Electro and Magneto Rheological Fluid Flow
Lecture 60 - 60 Analaysis of Electro and Magneto Rheological Fluid Flow (Continued...)
Lecture 61 - Analaysis of Electro and Magneto Rheological Fluid Flow (Continued...)
Lecture 62 - Analysis of a Beam with ER/MR Fluid Layer
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NPTEL Video Course - Aerospace Engineering - NOC:Aeroengine Gas Turbine Cycles

Subject Co-ordinator - Prof. Chetankumar Sureshbhai Mistry

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Introduction (Continued...)
Lecture 3 - Introduction (Continued...)
Lecture 4 - Introduction (Continued...)
Lecture 5 - Introduction (Continued...)
Lecture 6 - Introduction (Continued...)
Lecture 7 - Component Performance
Lecture 8 - Component Performance (Continued...)
Lecture 9 - Component Performance (Continued...)
Lecture 10 - Component Performance (Continued...)
Lecture 11 - Component Performance (Continued...)
Lecture 12 - Turbojet Engine - I
Lecture 13 - Turbojet Engine - I (Continued...)
Lecture 14 - Turbojet Engine - I (Continued...)
Lecture 15 - Turbojet Engine - I (Continued...)
Lecture 16 - Turbojet Engine - I (Continued...)
Lecture 17 - Turbojet Engine - I (Continued...)
Lecture 18 - Turbojet Engine - II
Lecture 19 - Turbojet Engine - II (Continued...)
Lecture 20 - Turbojet Engine - II (Continued...)
Lecture 21 - Turbojet Engine - II (Continued...)
Lecture 22 - Turbojet Engine - II (Continued...)
Lecture 23 - Turbofan Engine - I
Lecture 24 - Turbofan Engine - I (Continued...)
Lecture 25 - Turbofan Engine - I (Continued...)
Lecture 26 - Turbofan Engine - I (Continued...)
Lecture 27 - Turbofan Engine - I (Continued...)
Lecture 28 - Turbofan Engine - II
Lecture 29 - Turbofan Engine - II (Continued...)

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Lecture 30 - Turbofan Engine - II (Continued...)
Lecture 31 - Turbofan Engine - II (Continued...)
Lecture 32 - Turbofan Engine - II (Continued...)
Lecture 33 - Turbofan Engine - III
Lecture 34 - Turbofan Engine - III (Continued...)
Lecture 35 - Turbofan Engine - III (Continued...)
Lecture 36 - Turbofan Engine - III (Continued...)
Lecture 37 - Turbofan Engine - III (Continued...)
Lecture 38 - Turbofan Engine - IV
Lecture 39 - Turbofan Engine - IV (Continued...)
Lecture 40 - Turbofan Engine - IV (Continued...)
Lecture 41 - Turbofan Engine - IV (Continued...)
Lecture 42 - Turbofan Engine - IV (Continued...)
Lecture 43 - Turbofan Engine - IV (Continued...)
Lecture 44 - Recent Advances in Turbofan Engines
Lecture 45 - Recent Advances in Turbofan Engines (Continued...)
Lecture 46 - Recent Advances in Turbofan Engines (Continued...)
Lecture 47 - Recent Advances in Turbofan Engines (Continued...)
Lecture 48 - Recent Advances in Turbofan Engines (Continued...)
Lecture 49 - Recent Advances in Turbofan Engines (Continued...)
Lecture 50 - Turboprop Engine
Lecture 51 - Turboprop Engine (Continued...)
Lecture 52 - Turboprop Engine (Continued...)
Lecture 53 - Turboprop Engine (Continued...)
Lecture 54 - Turboprop Engine (Continued...)
Lecture 55 - Turboshaft Engine
Lecture 56 - Turboshaft Engine (Continued...)
Lecture 57 - Turboshaft Engine (Continued...)
Lecture 58 - Turboshaft Engine (Continued...)
Lecture 59 - Turboshaft Engine (Continued...)
Lecture 60 - Component Matching and Testing
Lecture 61 - Component Matching and Testing (Continued...)
Lecture 62 - Component Matching and Testing (Continued...)
Lecture 63 - Component Matching and Testing (Continued...)
Lecture 64 - Aircraft Engine Testing
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NPTEL Video Course - Aerospace Engineering - NOC:Combustion of Solid Fuels and Propellants

Subject Co-ordinator - Prof. Srinibas Karmakar

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Basic Principle of Rocket
Lecture 2 - Basic Principle of Rocket (Continued...)
Lecture 3 - Performance Parameters
Lecture 4 - Performance Parameters (Continued...)
Lecture 5 - Performance Parameters (Example problems)
Lecture 6 - Solid Propellant Rocket - Brief Description
Lecture 7 - Solid Propellants - Introduction
Lecture 8 - Solid Propellants - Selection Criteria
Lecture 9 - Solid Propellants - Selection Criteria (Continued...)
Lecture 10 - Solid Propellants - Selection Criteria (Continued...)
Lecture 11 - Propellants Ingredients (Continued...) and Classification of Solid Propellants
Lecture 12 - Tutorial Problems
Lecture 13 - Combustion of Solid Propellants - Introduction
Lecture 14 - Combustion of Double-Base Propellants
Lecture 15 - Combustion of Double-Base Propellants (Continued...)
Lecture 16 - Combustion of Double-Base Propellants (Continued...)
Lecture 17 - Evaluation of Burn Rate of DB Propellants
Lecture 18 - Evaluation of Burn Rate of DB Propellants (Continued...)
Lecture 19 - Combustion of Composite Propellants - Introduction
Lecture 20 - Combustion of Composite Propellants (Continued...)
Lecture 21 - Evaluation of Burn Rate of Composite Propellants
Lecture 22 - Effect of Various Parameters on Burn Rate of Composite Propellants
Lecture 23 - Effect of Transients, Vehicle Acceleration, Binder, Catalysts on Burning Rate of CP
Lecture 24 - Effect of Catalysts on Burning Rate of CP (Continued...)
Lecture 25 - Combustion of Nitra mine Composite Propellants
Lecture 26 - Combustion of CMDB Propellants
Lecture 27 - Choice of Pressure Index (n); Tutorial Problems
Lecture 28 - Metal Combustion Classification-Introduction
Lecture 29 - Metal Combustion Classification (Continued...)

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Lecture 30 - Metal Combustion Classification (Continued...)
Lecture 31 - Metal Particle Combustion Regimes
Lecture 32 - Metal Particle Combustion Regimes (Continued...)
Lecture 33 - Combustion Times for Diffusion and Kinetic Controlled Regimes
Lecture 34 - Ignition and Combustion of Boron Particle
Lecture 35 - Ignition and Combustion of Boron Particle (Continued...)
Lecture 36 - Ignition and Combustion of Aluminum Particle,Recent Future Developments on Metal Fuels
Lecture 37 - Erosive Burning in Solid Propellant Rockets - Introduction
Lecture 38 - Methods for Determination of Erosive Function
Lecture 39 - Methods for Determination of Erosive Function (Continued...)
Lecture 40 - Erosive Burning Theories

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NPTEL Video Course - Aerospace Engineering - NOC:Aerospace Structural Analysis

Subject Co-ordinator - Prof. Mira Mitra

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Aerospace Structures
Lecture 2 - Introduction to Aerospace Structures
Lecture 3 - Recap of Theory of Elasticity
Lecture 4 - Torsion of Circular Cross-Section Shaft
Lecture 5 - Torsion of Non-Circular Cross-Section Shaft
Lecture 6 - Torsion of Non-Circular Cross-Section Shaft
Lecture 7 - Torsion of Non-Circular Cross-Section Shaft
Lecture 8 - Torsion of Non-Circular Cross-Section Shaft
Lecture 9 - Membrane Analogy
Lecture 10 - Membrane Analogy
Lecture 11 - Torsion of Thin-Walled Cross-Section
Lecture 12 - Torsion of Thin-Walled Cross-Section
Lecture 13 - Torsion of Thin-Walled Closed Cross-Section
Lecture 14 - Torsion of Thin-Walled Closed Cross-Section
Lecture 15 - Torsion of Thin-Walled Closed Cross-Section
Lecture 16 - Bi-directional Bending
Lecture 17 - Bi-directional Bending
Lecture 18 - Bi-directional Bending
Lecture 19 - Deflection in Bi-directional Bending
Lecture 20 - Deflection in Bi-directional Bending
Lecture 21 - Shear Stresses due to Shear Forces
Lecture 22 - Shear Stresses due to Shear Forces
Lecture 23 - Shear Stresses due to Shear Forces
Lecture 24 - Shear Center
Lecture 25 - Shear Center
Lecture 26 - Shear Flow in Thin-walled Closed Cross-Section due to Shear Force
Lecture 27 - Shear Flow in Thin-walled Closed Cross-Section due to Shear Force
Lecture 28 - Shear Flow in Thin-walled Closed Cross-Section due to Shear Force
Lecture 29 - Shear Flow in Thin-walled Closed Cross-Section due to Shear Force

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Lecture 30 - Skin-Stringer Idealization
Lecture 31 - Skin-Stringer Idealization
Lecture 32 - Skin-Stringer Idealization
Lecture 33 - Skin-Stringer Idealization
Lecture 34 - Skin-Stringer Idealization
Lecture 35 - Skin-Stringer Idealization
Lecture 36 - Buckling of Column
Lecture 37 - Buckling of Column
Lecture 38 - Buckling of Column with Initial Imperfection
Lecture 39 - Buckling of Column with Different Boundary Conditions
Lecture 40 - Buckling of Column with Different Boundary Conditions
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NPTEL Video Course - Aerospace Engineering - NOC:Fundamentals of Supersonic and Hypersonic Flow

Subject Co-ordinator - Prof. Arnab Roy

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to supersonic and hypersonic flows
Lecture 2 - Introduction to supersonic and hypersonic flows (Continued...)
Lecture 3 - Characteristics of these two flow regimes
Lecture 4 - Characteristics of these two flow regimes (Continued...)
Lecture 5 - Where do these flows occur
Lecture 6 - Basic Concepts and Governing Equations of Compressible Flow
Lecture 7 - Basic Concepts and Governing Equations of Compressible Flow (Continued...)
Lecture 8 - Basic Concepts and Governing Equations of Compressible Flow (Continued...)
Lecture 9 - Basic Concepts and Governing Equations of Compressible Flow (Continued...)
Lecture 10 - Basic Concepts and Governing Equations of Compressible Flow (Continued...)
Lecture 11 - Brief introduction to waves
Lecture 12 - Shocks and Expansion waves
Lecture 13 - Shock and expansion wave relations in the high Mach number limit
Lecture 14 - Revisiting Waves, Conservation Equations and Shocks
Lecture 15 - More on shock and expansion wave relations
Lecture 16 - Introduction to viscous compressible flow
Lecture 17 - Introduction to viscous compressible flow - boundary layer equations
Lecture 18 - Compressible Boundary Layer Equations (Continued...)
Lecture 19 - Compressible Boundary Layer Equations (Continued...)
Lecture 20 - Compressible Boundary Layer Equations - aerodynamic heating and drag
Lecture 21 - Introduction to High Temperature Gas Dynamics
Lecture 22 - Introduction to High Temperature Gas Dynamics (Continued...)
Lecture 23 - Introduction to High Temperature Gas Dynamics (Continued...)
Lecture 24 - Thermodynamics and chemistry of high temperature gases
Lecture 25 - Equilibrium chemically reacting gas mixture
Lecture 26 - Introduction to Statistical Thermodynamics
Lecture 27 - Macrostates and Microstates and counting of microstates
Lecture 28 - Most probable macrostate - Boltzmann Distribution
Lecture 29 - Partition function and its role in finding thermodynamic properties of a single

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Lecture 30 - Equilibrium composition of high temperature air
Lecture 31 - Introduction to Hypersonic Non Equilibrium Flows
Lecture 32 - Basics of Kinetic Theory of Gases
Lecture 33 - Kinetic Theory of Gases (Continued...)
Lecture 34 - Vibrational Nonequilibrum
Lecture 35 - Chemical Nonequilibrum
Lecture 36 - Inviscid High Temperature Equilibrium Flow
Lecture 37 - Inviscid High Temperature Equilibrium Flow (Continued...)
Lecture 38 - Governing equations of Inviscid High Temperature Equilibrium Flow
Lecture 39 - Inviscid High Temperature Equilibrium Flow-normal and oblique shock
Lecture 40 - Inviscid High Temperature Equilibrium Flow-flow through CD nozzle
Lecture 41 - Inviscid High Temperature Non Equilibrium Flow - Introduction
Lecture 42 - Inviscid High Temperature Non Equilibrium Flow - Introduction (Continued...)
Lecture 43 - Inviscid High Temperature Non Equilibrium Flow - Governing Equations
Lecture 44 - Inviscid High Temperature Non Equilibrium Flow - frozen, equilibrium
Lecture 45 - Inviscid High Temperature Non Equilibrium Flow - shocks, nozzle flow
Lecture 46 - Viscous High Temperature Flows - Introduction
Lecture 47 - Viscous High Temperature Flows - Introduction (Continued...)
Lecture 48 - Transport properties and Governing Equations of Viscous High Temperature Flows
Lecture 49 - Governing Equations of Viscous High Temperature Flows, Boundary layer Equations
Lecture 50 - Introduction to radiative heat transfer, computational results on viscous
Lecture 51 - Recapitulating the basics of high speed aerodynamics from an application perspective
Lecture 52 - Recapitulating the basics of high speed aerodynamics from an application perspective
Lecture 53 - Supersonic and Hypersonic Shock Interactions
Lecture 54 - Supersonic and hypersonic shock interactions (Continued...); Hypersonic Flight
Lecture 55 - Hypersonic Flight Trajectories (Continued...), Basics of wave rider, Recapitulation
Lecture 56 - Reference Temperature Method; Brief discussion on boundary layer transition
Lecture 57 - Recapitulation of the Reference Temperature Method; Governing equations
Lecture 58 - Some numerical simulations on shock diffraction, shock wave boundary
Lecture 59 - High speed intakes; scramjet engines; other applications of shock waves
Lecture 60 - Other applications of shock waves - astrophysical flows, a quick
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NPTEL Video Course - Aerospace Engineering - Acoustic Instabilities in Aerospace Propulsion

Subject Co-ordinator - Prof. R.I. Sujith

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Thermoacoustic Instabilities
Lecture 2 - Part I
Lecture 3 - Wave Equation and its Solution in Time Domain
Lecture 4 - Part I
Lecture 5 - Standing Waves - 1
Lecture 6 - Standing Waves - 2
Lecture 7 - Power Flow and Acoustic Admittance
Lecture 8 - Impedance Tube Technique
Lecture 9 - Admittance and Standing Waves
Lecture 10 - Admittance, Stability and Attenuation
Lecture 11 - Attenuation
Lecture 12 - Sound Propagation Through Inhomogeneous Media - 2
Lecture 13 - Sound Propagation Through Inhomogeneous Media - 3
Lecture 14 - Multidimensional Acoustic Fields - 1
Lecture 15 - Multidimensional Acoustic Fields - 2
Lecture 16 - Interaction between Sound and Combustion
Lecture 17 - Reference Books Derivation of Rayleigh Criteria
Lecture 18 - Effect of Heat release on the Acoustic Field
Lecture 19 - Modal Analysis of Thermoacoustic Instability - 1
Lecture 20 - Modal Analysis of Thermoacoustic Instability - 2
Lecture 21 - Active Control of Thermoacoustic Instability
Lecture 22 - Toy model for a Rijke tube in Time Domain
Lecture 23 - Galerkin Technique for Thermoacoustics
Lecture 24 - Evolution Equation for Thermoacoustics
Lecture 25 - Non linear analysis of Thermoacoustic Instability
Lecture 26 - Non-normality, Transient Growth and Triggering Instability - 1
Lecture 27 - Non-normality, Transient Growth and Triggering Instability - 2
Lecture 28 - Non-normality, Transient Growth and Triggering Instability - 3
Lecture 29 - Bifurcations

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Lecture 30 - Premixed Flame Acoustic Interaction - 1
Lecture 31 - Premixed Flame Acoustic Interaction - 2
Lecture 32 - Combustion instability due to Equivalence Ratio Fluctuation
Lecture 33 - Role of Hydrodynamic Instabilities - 1
Lecture 34 - Role of Hydrodynamic Instabilities - 2
Lecture 35 - Role of Hydrodynamic Instabilities - 3
Lecture 36 - Active Control of Thermoacoustic Instability Revisited
Lecture 37 - Solid Propellant Combustion Instability - 1
Lecture 38 - Solid Propellant Combustion Instability - 2
Lecture 39 - Response of a Diffusion Flame to Acoustic Oscillations - 1
Lecture 40 - Response of a Diffusion Flame to Acoustic Oscillations - 2
Lecture 41 - Response of a Diffusion Flame to Acoustic Oscillations - 3
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NPTEL Video Course - Aerospace Engineering - Aerospace Propulsion

Subject Co-ordinator - Dr. P.A. Ramakrishna

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Air breathing Engines - Turbojet I
Lecture 3 - Air breathing Engines - Turbojet II
Lecture 4 - Air breathing Engines - Turboprop & Turbofan
Lecture 5 - Air breathing Engines - Ramjet & Scramjet
Lecture 6 - Non-air breathing Engines I
Lecture 7 - Non-air breathing Engines II
Lecture 8 - General Performance Parameters I
Lecture 9 - General Performance Parameters II
Lecture 10 - Cycle Analysis - Ramjet
Lecture 11 - Cycle Analysis - Turbojet I
Lecture 12 - Cycle Analysis - Turbojet II
Lecture 13 - Cycle Analysis - Turbojet III
Lecture 14 - Cycle Analysis - Turbojet IV
Lecture 15 - Cycle Analysis - Turbojet V
Lecture 16 - Cycle Analysis - Turbojet VI
Lecture 17 - Cycle Analysis - Turbofan
Lecture 18 - Rocket Nozzles - 1D Analysis I
Lecture 19 - Rocket Nozzles - 1D Analysis II
Lecture 20 - Rocket Nozzles - 1D Analysis III
Lecture 21 - Rocket Nozzles - Real Effects I
Lecture 22 - Rocket Nozzles - Real Effects II
Lecture 23 - Rocket Nozzles - Thrust Vectoring
Lecture 24 - Solid Rockets - Propellants
Lecture 25 - Solid Rockets - Burn rate
Lecture 26 - Solid Rockets - Performance
Lecture 27 - Solid Rockets - Grain
Lecture 28 - Solid Rockets - Ignition, Quenching
Lecture 29 - Solid Rockets - Igniter, Depressurization

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Lecture 30 - Propellant Combustion - Combustion Modelling
Lecture 31 - Liquid Rocket - Propellants
Lecture 32 - Liquid Rocket - Nozzle Cooling I
Lecture 33 - Liquid Rocket - Nozzle Cooling II
Lecture 34 - Liquid Rocket - Nozzle Cooling III
Lecture 35 - Liquid Rocket - Pressure fed system
Lecture 36 - Liquid Rocket - Pump fed system
Lecture 37 - Liquid Rocket - Pumps
Lecture 38 - Liquid Rocket - Fuel Injection
Lecture 39 - Hybrid Rocket - Basics
Lecture 40 - Hybrid Rocket Performance
Lecture 41 - Hybrid Rocket Combustion
Lecture 42 - Chemical Equilibrium Analyser - SP 273
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NPTEL Video Course - Aerospace Engineering - Combustion

Subject Co-ordinator - Prof. S.R. Chakravarthy

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Chemical Reactions, Heats of Reaction and Formation
Lecture 3 - Sensible Enthalpy and Adiabatic Flame Temperature
Lecture 4 - Dissociation of Products, Role of Pressure
Lecture 5 - Numerical Calculation of Adiabatic Flame Temperature, Chemical Kinetics 1
Lecture 6 - Chemical Kinetics 2
Lecture 7 - Equilibrium Reactions, Global Kinetics, Order of Reaction
Lecture 8 - Reduced Chemistry, Steady State Approximation
Lecture 9 - Steady State Approximation, Partial Equilibrium Approximation
Lecture 10 - Partial Equilibrium Approximation, Chemical Explosions
Lecture 11 - Combining Chemical and Thermal Processes 1
Lecture 12 - Combining Chemical and Thermal Processes 2
Lecture 13 - Combining Chemical and Thermal Processes 3
Lecture 14 - Combining Chemical and Thermal Processes 4
Lecture 15 - Mass and Molar Diffusion, Fick's Law
Lecture 16 - Conservation Equations for Multi-Component Mixtures
Lecture 17 - Multi-Component Diffusion Equation
Lecture 18 - Multi-Component Momentum Equation
Lecture 19 - Energy Equation
Lecture 20 - One Dimensional Steady Flow
Lecture 21 - Schvab-Zeldovich Formulation 1
Lecture 22 - Schvab-Zeldovich Formulation 2
Lecture 23 - Rankine-Hugoniot Relations 1
Lecture 24 - Rankine-Hugoniot Relations 2
Lecture 25 - Rankine-Hugoniot Relations 3
Lecture 26 - Velocity, Temperature and Entropy Variation along Hugoniot Curve
Lecture 27 - Laminar Premixed Flames
Lecture 28 - Laminar Premixed Flames - Corrections
Lecture 29 - Laminar Premixed Flames - Rigorous Analysis 1

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Lecture 30 - Laminar Premixed Flames - Rigorous Analysis 2
Lecture 31 - Flame Speed Dependencies, G-Equation
Lecture 32 - Bunsen Burner 1
Lecture 33 - Bunsen Burner 2
Lecture 34 - Flame Stabilisation 1
Lecture 35 - Flame Stabilisation 2
Lecture 36 - Ignition
Lecture 37 - Burke-Schumann Problem 1
Lecture 38 - Burke-Schumann Problem 2
Lecture 39 - Burke-Schumann Problem 3
Lecture 40 - Flame Structure
Lecture 41 - Mixture Fraction Formulation 1
Lecture 42 - Mixture Fraction Formulation 2
Lecture 43 - Droplet Burning 1
Lecture 44 - Droplet Burning 2
Lecture 45 - Spray Combustion 1
Lecture 46 - Spray Combustion 2
Lecture 47 - Turbulent Combustion 1
Lecture 48 - Turbulent Combustion 2
Lecture 49 - Combustion Instabilities
Lecture 50 - Detonations
Lecture 51 - Detonation Wave - ZND Structure
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NPTEL Video Course - Aerospace Engineering - Flight Dynamics II (Stability)

Subject Co-ordinator - Dr. Nandan Kumar Sinha

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Earth Atmosphere, Aircraft components, Aircraft nomenclature
Lecture 2 - Basic aerodynamics
Lecture 3 - Equilibrium and stability
Lecture 4 - Static vs dynamic stability
Lecture 5 - Criterion for stability, Wing contribution
Lecture 6 - Horizontal tail contribution
Lecture 7 - Wing plus tail contribution
Lecture 8 - Static margin and CG limits
Lecture 9 - Fuselage contribution
Lecture 10 - Powerplant contribution
Lecture 11 - Power effects on neutral point
Lecture 12 - Elevator
Lecture 13 - Stick free stability, Most fwd CG location
Lecture 14 - Longitudinal stick force per 'g', Ground effect
Lecture 15 - Control requirement, Pull-up maneuver, Maneuver point
Lecture 16 - Elevator per 'g', Maneuver point
Lecture 17 - Example problems
Lecture 18 - Lateral-Directional Stability Derivatives, Fuselage/Vertical fin contribution
Lecture 19 - Roll stability, Wing sweep effect, Rudder
Lecture 20 - Dihedral effect, Various contributions
Lecture 21 - Power effects, Roll control, Aileron
Lecture 22 - Example problems
Lecture 23 - Derivation of Translational Motion Equations
Lecture 24 - Derivation of Angular Motion Equations
Lecture 25 - Description of various forces and moments
Lecture 26 - Nonlinearities and Associated Aircraft Behavior
Lecture 27 - Small perturbation method, Linearization of equations
Lecture 28 - Aerodynamic force and Moment Derivatives
Lecture 29 - Contribution of Aircraft components to Aerodynamic Derivatives

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Lecture 30 - Linear Model and Aircraft Dynamics Modes
Lecture 31 - Short Period, Phugoid (Lanchester's formulation)
Lecture 32 - Short period mode approximation
Lecture 33 - Flying and Handling Qualities, Cooper Harper Scale
Lecture 34 - Pure rolling motion, Pure yawing motion,Spiral approximation
Lecture 35 - Spiral, Roll, Dutch roll Mode approximations
Lecture 36 - Lateral directional Flying Qualities, Routh's Stability criterion
Lecture 37 - Stability in Steady Roll Maneuver
Lecture 38 - Wind Effect on Aircraft Pure Plunging Motion
Lecture 39 - Wind Profiles, Longitudinal Mode Response to Wind Shear
Lecture 40 - Stability control/Augmentation
Lecture 41 - Autopilots, Automatic Landing System
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NPTEL Video Course - Aerospace Engineering - Gas Dynamics

Subject Co-ordinator - Dr. T.M. Muruganandam

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1
Lecture 2
Lecture 3
Lecture 4
Lecture 5
Lecture 6
Lecture 7
Lecture 8
Lecture 9
Lecture 10
Lecture 11
Lecture 12
Lecture 13
Lecture 14
Lecture 15
Lecture 16
Lecture 17
Lecture 18
Lecture 19
Lecture 20
Lecture 21
Lecture 22
Lecture 23
Lecture 24
Lecture 25
Lecture 26
Lecture 27
Lecture 28
Lecture 29

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Lecture 30
Lecture 31
Lecture 32
Lecture 33
Lecture 34
Lecture 35
Lecture 36
Lecture 37
Lecture 38
Lecture 39
Lecture 40
Lecture 41
Lecture 42
Lecture 43
Lecture 44
Lecture 45
Lecture 46
Lecture 47
Lecture 48
Lecture 49
Lecture 50
Lecture 51
Lecture 52
Lecture 53
Lecture 54
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NPTEL Video Course - Aerospace Engineering - Introduction to CFD

Subject Co-ordinator - Prof. M. Ramakrishna

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction, Why and how we need computers
Lecture 2 - Representing Arrays and functions on computers
Lecture 3 - Representing functions - Box functions
Lecture 4 - Representing functions - Polynomials and Hat functions
Lecture 5 - Hat functions, Quadratic and Cubic representations
Lecture 6 - Demo - Hat functions, Aliasing
Lecture 7 - Representing Derivatives - finite differences
Lecture 8 - Finite differences, Laplace equation
Lecture 9 - Laplace equation - Jacobi iterations
Lecture 10 - Laplace equation - Iteration matrices
Lecture 11 - Laplace equation - convergence rate
Lecture 12 - Laplace equation - convergence rate Continued
Lecture 13 - Demo - representation error, Laplace equation
Lecture 14 - Demo - Laplace equation, SOR
Lecture 15 - Laplace equation - final, Linear Wave equation
Lecture 16 - Linear wave equation - Closed form and numerical solution, stability analysis
Lecture 17 - Generating a stable scheme and Boundary conditions
Lecture 18 - Modified equation
Lecture 19 - Effect of higher derivative terms on Wave equation
Lecture 20 - Artificial dissipation, upwinding, generating schemes
Lecture 21 - Demo - Modified equation, Wave equation
Lecture 22 - Demo - Wave equation / Heat Equation
Lecture 23 - Quasi-linear One-Dimensional. wave equation
Lecture 24 - Shock speed, stability analysis, Derive Governing equations
Lecture 25 - One-Dimensional Euler equations - Attempts to decouple
Lecture 26 - Derive Eigenvectors, Writing Programs
Lecture 27 - Applying Boundary conditions
Lecture 28 - Implicit Boundary conditions
Lecture 29 - Flux Vector Splitting, setup froms averaging

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Lecture 30 - Roes averaging
Lecture 31 - Demo - One Dimensional flow
Lecture 32 - Accelerating convergence - Preconditioning, dual time stepping
Lecture 33 - Accelerating convergence - Intro to Multigrid method
Lecture 34 - Multigrid method
Lecture 35 - Multigrid method - final, Parallel Computing
Lecture 36 - Calculus of Variations - Three Lemmas and a Theorem
Lecture 37 - Calculus of Variations - Application to Laplace Equation
Lecture 38 - Calculus of Variations - Final and Random Walk
Lecture 39 - Overview and Recap of the course
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NPTEL Video Course - Aerospace Engineering - NOC:Rocket Propulsion

Subject Co-ordinator - Prof. K. Ramamurthi, Prof. S. Varunkumar

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Motion in Space
Lecture 3 - Rotational Frame of Reference and Orbital Velocities
Lecture 4 - Velocity Requirements
Lecture 5 - Theory of rocket propulsion
Lecture 6 - Rocket Equation and Staging of Rockets
Lecture 7 - Review of Rocket Principles
Lecture 8 - Examples Illustrating Theory of Rocket Propulsion and Introduction to Nozzles
Lecture 9 - Theory of Nozzles
Lecture 10 - Nozzle Shape
Lecture 11 - Area Ratio of Nozzles
Lecture 12 - Characteristic Velocity and Thrust Coefficient
Lecture 13 - Divergence Loss in Conical Nozzles and the Bell Nozzles
Lecture 14 - Unconventional Nozzles and Problems in Nozzles
Lecture 15 - Criterion for Choice of Chemical Propellants
Lecture 16 - Choice of Fuel-Rich Propellants
Lecture 17 - Performance Prediction Analysis
Lecture 18 - Factors Influencing Choice of Chemical Propellants
Lecture 19 - Low energy liquid propellants and Hybrid propellants Chapter 5
Lecture 20 - Introduction to Solid Propellant Rockets
Lecture 21 - Burn Rate of Solid Propellants and Equilibrium Pressure in Solid Propellant Rockets
Lecture 22 - Design Aspects of Solid Propellant Rockets
Lecture 23 - Burning Surface Area of Solid Propellant Grains
Lecture 24 - Ignition of Solid Propellant Rockets
Lecture 25 - Review of Solid Propellant Rockets
Lecture 26 - Feed Systems for Liquid Propellant Rockets
Lecture 27 - Feed System Cycles for Pump Fed Liquid Propellant Rockets
Lecture 28 - Analysis of Gas Generator and Staged combustion cycles and introduction to injectors
Lecture 29 - Injectors, Cooling of Chambers and Mixture Ratio Distribution

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Lecture 30 - Efficiencies due to mixture ratio distribution and incomplete vaporization
Lecture 31 - Pumps and Turbines
Lecture 32 - Review of Liquid Bi-propellant Rockets and Introduction to Mono-propellant Rockets
Lecture 33 - Introduction to Hybrid Rockets and a Simple Illustration of Combustion instability in Liquid Pro
Lecture 34 - Principles of Electrostatic and Electromagnetic Rockets
Lecture 35 - Electrical Thrusters
Lecture 36 - Electrical and Nuclear Rockets; Advanced Propulsion

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NPTEL Video Course - Aerospace Engineering - Advanced Control System Design for Aerospace Vehicles

Subject Co-ordinator - Dr. Radhakant Padhi

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction and Motivation for Advanced Control Design
Lecture 2 - Classical Control Overview - I
Lecture 3 - Classical Control Overview - II
Lecture 4 - Classical Control Overview - III
Lecture 5 - Classical Control Overview - IV
Lecture 6 - Basic Principles of Atmospheric Flight Mechanics
Lecture 7 - Overview of Flight Dynamics - I
Lecture 8 - Overview of Flight Dynamics - II
Lecture 9 - Representation of Dynamical Systems - I
Lecture 10 - Representation of Dynamical Systems - II
Lecture 11 - Representation of Dynamical Systems - III
Lecture 12 - Review of Matrix Theory - I
Lecture 13 - Review of Matrix Theory - II
Lecture 14 - Review of Matrix Theory - III
Lecture 15 - Review of Numerical Methods
Lecture 16 - Linearization of Nonlinear Systems
Lecture 17 - First and Second Order Linear Differential Equations
Lecture 18 - Time Response of Linear Dynamical Systems
Lecture 19 - Stability of Linear Time Invariant Systems
Lecture 20 - Controllability and Observability of linear Time Invariant Systems
Lecture 21 - Pole Placement Control Design
Lecture 22 - Pole Placement Observer Design
Lecture 23 - Static Optimization
Lecture 24 - Calculus of Variations
Lecture 25 - Optimal Control Formulation using Calculus of Variations
Lecture 26 - Classical Numerical Methods for Optimal Control
Lecture 27 - Linear Quadratic Regulator (LQR) Design - 1
Lecture 28 - Linear Quadratic Regulator (LQR) Design - 2
Lecture 29 - Linear Control Design Techniques in Aircraft Control - I

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Lecture 30 - Linear Control Design Techniques in Aircraft Control - II
Lecture 31 - Lyapunov Theory - I
Lecture 32 - Lyapunov Theory - II
Lecture 33 - Constructions of Lyapunov Functions
Lecture 34 - Dynamic Inversion - I
Lecture 35 - Dynamic Inversion - II
Lecture 36 - Neuro-Adaptive Design - I
Lecture 37 - Neuro-Adaptive Design - II
Lecture 38 - Neuro-Adaptive Design for Flight Control
Lecture 39 - Integrator Back-Stepping; Linear Quadratic (lQ) Observer
Lecture 40 - An Overview of Kalman Filter Theory
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NPTEL Video Course - Aerospace Engineering - Optimal Control, Guidance and Estimation

Subject Co-ordinator - Dr. Radhakant Padhi

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction, Motivation and Overview
Lecture 2 - Overview of SS Approach and Matrix Theory
Lecture 3 - Review of Numerical Methods
Lecture 4 - An Overview of Static Optimization - I
Lecture 5 - An Overview of Static Optimization - II
Lecture 6 - Review of Calculus of Variations - I
Lecture 7 - Review of Calculus of Variations - II
Lecture 8 - Optimal Control Formulation Using Calculus of Variations
Lecture 9 - Classical Numerical Methods to Solve Optimal Control Problems
Lecture 10 - Linear Quadratic Regulator (LQR) - I
Lecture 11 - Linear Quadratic Regulator (LQR) - II
Lecture 12 - Linear Quadratic Regulator (LQR) - III
Lecture 13 - Linear Quadratic Regulator (LQR) - III
Lecture 14 - Discrete-time Optimal Control
Lecture 15 - Overview of Flight Dynamics - I
Lecture 16 - Overview of Flight Dynamics - II
Lecture 17 - Overview of Flight Dynamics - III
Lecture 18 - Linear Optimal Missile Guidance using LQR
Lecture 19 - SDRE and θ - D Designs
Lecture 20 - Dynamic Programming
Lecture 21 - Approximate Dynamic Programming (ADP), Adaptive Critic (AC) and Single Network Adaptive Critic (
Lecture 22 - Transcription Method to Solve Optimal Control Problems
Lecture 23 - Model Predictive Static Programming (MPSP) and Optimal Guidance of Aerospace Vehicles
Lecture 24 - MPSP for Optimal Missile Guidance
Lecture 25 - Model Predictive Spread Control (MPSC) and Generalized MPSP (G-MPSP) Designs
Lecture 26 - Linear Quadratic Observer & An Overview of State Estimation
Lecture 27 - Review of Probability Theory and Random Variables
Lecture 28 - Kalman Filter Design - I
Lecture 29 - Kalman Filter Design - II

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Lecture 30 - Kalman Filter Design - III
Lecture 31 - Integrated Estimation, Guidance & Control - I
Lecture 32 - Integrated Estimation, Guidance & Control - II
Lecture 33 - LQG Design; Neighboring Optimal Control & Sufficiency Condition
Lecture 34 - Constrained Optimal Control - I
Lecture 35 - Constrained Optimal Control - II
Lecture 36 - Constrained Optimal Control - III
Lecture 37 - Optimal Control of Distributed Parameter Systems - I
Lecture 38 - Optimal Control of Distributed Parameter Systems - II
Lecture 39 - Take Home Material
Lecture 40 - Take Home Material
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NPTEL Video Course - Aerospace Engineering - NOC:Combustion in Air Breathing Aero Engines

Subject Co-ordinator - Prof. Swetaprovo Chaudhuri

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Chemical Equilibrium - I
Lecture 3 - Chemical Equilibrium - II
Lecture 4 - Chemical Kinetics - I
Lecture 5 - Chemical Kinetics - II
Lecture 6 - Chemical Kinetics - III
Lecture 7 - Chemical Kinetics - IV
Lecture 8 - Oxidation Mechanism of Fuels - I
Lecture 9 - Oxidation Mechanism of Fuels - II
Lecture 10 - Oxidation Mechanism of Fuels - III
Lecture 11 - Oxidation Mechanism of Fuels - IV
Lecture 12 - Transport Phenomena
Lecture 13 - Governing Equations - I
Lecture 14 - Governing Equations - II
Lecture 15 - Governing Equations - III
Lecture 16 - Governing Equations - IV
Lecture 17 - Governing Equations - V
Lecture 18 - Laminar Non-Premixed Flames - I
Lecture 19 - Laminar Non-Premixed Flames - II
Lecture 20 - Laminar Non-Premixed Flames - III
Lecture 21 - Laminar Non-Premixed Flames - IV
Lecture 22 - Laminar Premixed Flames - I
Lecture 23 - Laminar Premixed Flames - II
Lecture 24 - Laminar Premixed Flames - III
Lecture 25 - Laminar Premixed Flames - IV
Lecture 26 - Laminar Premixed Flames - V
Lecture 27 - Laminar Premixed Flames - VI
Lecture 28 - Laminar Premixed Flames - VII
Lecture 29 - Limit Phenomena - I

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Lecture 30 - Limit Phenomena - II
Lecture 31 - Introduction to turbulent flows
Lecture 32 - Non-reacting turbulent flows - I
Lecture 33 - Non-reacting turbulent flows - II
Lecture 34 - Reacting turbulent flows - III
Lecture 35 - Reacting turbulent flows - IV
Lecture 36 - Reacting turbulent flows - V
Lecture 37 - Reacting turbulent flows - VI
Lecture 38 - Reacting turbulent flows - VII
Lecture 39 - Turbulent Non-Premixed Flames - I
Lecture 40 - Turbulent Non-Premixed Flames - II
Lecture 41 - Turbulent Non-Premixed Flames - III
Lecture 42 - Turbulent Premixed Flames - I
Lecture 43 - Turbulent Premixed Flames - II
Lecture 44 - Turbulent Premixed Flames - III
Lecture 45 - Turbulent Premixed Flames - IV
Lecture 46 - Turbulent Premixed Flames - V
Lecture 47 - Turbulent Premixed Flames - VI
Lecture 48 - Aero Gas Turbine Combustors - I
Lecture 49 - Aero Gas Turbine Combustors - II
Lecture 50 - Aero Gas Turbine Combustors - III
Lecture 51 - Aero Gas Turbine Combustors - IV
Lecture 52 - Aero Gas Turbine Combustors - V
Lecture 53 - Flame Stabilization and Blow off - I
Lecture 54 - Flame Stabilization and Blow off - II
Lecture 55 - Flame Stabilization and Blow off - III
Lecture 56 - Flame Stabilization and Blow off - IV
Lecture 57 - Flame Stabilization and Blow off - V
Lecture 58 - Combustion in Scramjets - I
Lecture 59 - Combustion in Scramjets - II
Lecture 60 - Combustion in Scramjets - III
Lecture 61 - Combustion in Scramjets - IV
Lecture 62 - Review
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NPTEL Video Course - Aerospace Engineering - NOC:Gasdynamics: Fundamentals and Applications

Subject Co-ordinator - Prof. Srisha Rao M V

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Flow Regimes
Lecture 3 - Thermodynamics - 1
Lecture 4 - Thermodynamics - 2
Lecture 5 - Thermodynamics - Numerical
Lecture 6 - Flow equations - Integral Form
Lecture 7 - Flow equations - Differential Form
Lecture 8 - Quasi-1D Assumption
Lecture 9 - Speed of Sound
Lecture 10 - Speed of Sound - Numerical
Lecture 11 - Stagnation properties
Lecture 12 - Pitot tube
Lecture 13 - Sonic/Star properties
Lecture 14 - Numerical
Lecture 15 - Normal Shock - I
Lecture 16 - Normal Shock - II-a
Lecture 17 - Normal Shock - II-b
Lecture 18 - Normal Shock - III
Lecture 19 - Normal Shock - IV
Lecture 20 - Normal Shock - Numerical
Lecture 21 - The Shock Tube
Lecture 22 - Waves of infinitesimal Amplitude
Lecture 23 - Waves of finite amplitude
Lecture 24 - Shock Tube Relations
Lecture 25 - Unsteady Flows - Numerical
Lecture 26 - Oblique Shock Waves
Lecture 27 - Expansion waves
Lecture 28 - Shock Expansion Method
Lecture 29 - Shock Reflection

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Lecture 30 - Oblique Shock and Expansion waves - Numerical
Lecture 31 - Varying Area Duct Flows - I
Lecture 32 - Varying Area Duct Flows - II
Lecture 33 - Converging Nozzle and Chocking
Lecture 34 - Converging and Diverging Nozzle Operation
Lecture 35 - Varying area flow- Numericals - I
Lecture 36 - Diffusers Intakes/Inlets
Lecture 37 - Experimental facilities
Lecture 38 - Varying area flow - Numericals - II
Lecture 39 - Varying area flow - Numericals - III
Lecture 40 - Varying area flow - Numericals - IV
Lecture 41 - 1D flow with friction - Fanno flow - I
Lecture 42 - 1D flow with friction - Fanno flow - II
Lecture 43 - 1D flow with friction - Fanno flow - III
Lecture 44 - 1D flow with friction - Fanno flow - Numericals
Lecture 45 - 1D Flows with Heat Addition: Rayleigh Flows - I
Lecture 46 - 1D Flows with Heat Addition: Rayleigh Flows - II
Lecture 47 - 1D Flows with Heat Addition: Rayleigh Flows - Numericals
Lecture 48 - Generalized 1D Flows
Lecture 49 - Small perturbation theory - I
Lecture 50 - Small perturbation theory - II
Lecture 51 - Small perturbation theory - III
Lecture 52 - Method of Characteristics: 2D Supersonic Flow - I
Lecture 53 - Method of Characteristics: 2D Supersonic Flow - II
Lecture 54 - Method of Characteristics: Applications
Lecture 55 - Hypersonic Flows - I
Lecture 56 - Hypersonic Flows - II
Lecture 57 - Edney Shock Interaction
Lecture 58 - Shock Boundary Layer Interaction - I
Lecture 59 - Shock Boundary Layer Interaction - II
Lecture 60 - Concluding Remarks
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