

## **1-Advance Engineering Thermodynamics**

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1. Classification and Introduction of Thermodynamic Systems    Introduction of thermodynamic parameters
2. The First Law of Thermodynamics and Ideal Gas Equation    Energy Conversion Relations of Different Systems
3. Thermodynamic Process of Ideal Gas and Compression
4. The Second Law of Thermodynamics and Direction of Energy Transfer    Energy Conversion Efficiency
5. Variation of Thermodynamic Parameters in Gas Flow
6. Power Cycle and Practical Application
7. Application of Engineering Thermodynamics in Power Machinery and Combustion    Retrospect and Prospect of Engineering Thermodynamics
8. Application of Propulsion System

**2017**

## **2-Methods of Orbit Determination**

**30**

1. Fundamentals of Classical Mechanics
2. The Four Fields and Perturbations; Basics of Measurements; Fundamentals of Time
3. Observation Errors; Fitting a Model to Data; Orbit Determination and Prediction
4. Kalman Filter; Unscented Kalman Filter
5. OD Modeling and Simulation

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## **4-Mechanics and Physics of Porous Medium**

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1. Introduction to additive manufacturing and motivation
2. Macroscopic modelling
3. Mesoscopic modelling
4. Governing equations of heat transfer
5. Constitutive models of solid state

6. Project on modelling powder bed-based AM
7. Project presentation and evaluation

## **6- Resilience Engineering of Sociotechnical Systems**

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1. Introduction (reacting flows, model reduction)
2. Classical model reduction and its application
3. Skeletal mechanism and its application
4. Manifold-based model reduction and its application

## **8- Principles of the Aero-engine( ) 30**

1. Basics of the gas turbine engine, including cycles, operating principles
2. Principles and fundamentals of the components including compressors, turbine, combustor, bearing
3. Structure of the gas turbine and component, for examples, single shaft, dual-shaft, three-shaft system
4. Basics of gas dynamics of the aero-engine
5. State of art of the aero-engine and main challenges
6. Special topics (such as aeroacoustics, Aero-elastic, vibration, rotor-dynamics)

## **9- The Finite Element Method in Mechanical Engineering**

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1. Computational Modelling
2. Introduction to Mechanics for Solids and Structures
3. Fundamentals for Finite Element Methods
4. FEM for Trusses and Beams
5. FEM for Frames and Case study
6. FEM for Two-dimensional Solids and Case study
7. FEM for Plates and Shells and Case study
8. FEM for 3d Solids and Case study
9. Special Purpose Elements
10. Modelling Technique
11. FEM for Heat Transfer Problems and Case study

**2017**

**10- Mechanical Behaviour of Engineering Materials**

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1. Literature search about fracture mechanics and failure examples
2. Elasticity Stress/strain, invariants, constitutive laws and stress concentration
3. Plasticity, Yield criteria, Flow theories, Prandtl-Reuss equation
4. Guest lecture (UK), Rate dependent plasticity
5. Dislocations in metals, Single crystal slip
6. Fracture mechanisms
7. Linear elastic fracture mechanics

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**2017**

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### **14- Thin Film Science & Technology ( )**



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