Course Code: ME866

Course Title: Advanced Turbo-Machines

Credit Hours: 3

Course Description

This course is about Advanced Turbo-Machines. Topics include Introduction - Fluid Dynamics of turbo-machines - Turbine Gas-Path Heat Transfer - Selection of Gas Turbine Cooling Systems - Unsteady Flow and Aeroelasticity - Fundamental of Compressor Design - Fundamental of Turbine Design - Steam Turbine - Multidisciplinary Design Optimization for Turbomachinery - Rotordynamic Considerations - Turbomachines in Rocket Systems - Terbomachinery Propulsion Testing - Automatic Superchargers and Turbochargers - Tesla Turbomachinery - Hydraulic Turbines.

Course Objectives

- Guides for practising engineers looking to access information on the analysis, design, operation and testing of turbomachinery.
- Discusses advances in fluid mechanics of turbomachinery and cooling challenges for increasing gas temperatures.

Course Topics

Week No.1: Introduction.
Week No.2: Fluid Dynamics of turbo-machines.
Week No.3: Turbine Gas-Path Heat Transfer.
Week No.4: Rotordynamics Considerations
Week No.5: Selection of Gas Turbine Cooling Systems.
Week No.6: Unsteady Flow and Aeroelasticity.
Week No.7: Fundamental of Compressor Design.
Week No.8: Fundamental of Turbine Design
Week No.9: Steam Turbine.
Week No.10: Multidisciplinary Design Optimization for Turbomachinery.
Week No.11: Turbomachines in Rocket Systems.
Week No.12: Turbomachinery Propulsion Testing
Week No.13: Automatic Superchargers and Turbochargers.
Week No.14: Tesla Turbomachinery.
Week No.15: Hydraulic Turbines.

References

- Logan, E., Roy, J.R., “Handbook of turbomachinery”, ISBN: 0824709950, ISBN-13: 9780824709952, 2nd revised edition, CRC Press, Latest edition.
- Japikse, D., “Advanced Topics in Turbomachinery Technology: Principal lecture series, 1st Edition, ISBN-13: 978-0933283022, ISBN-10: 0933283024, Latest edition.
- Rath, H.J., Egbers, C., “Advances in Fluid Mechanics and Turbomachinery”, eBook ISBN: 978-3-642-72157-1, Springer-Verlag Berlin Heidelberg, Latest edition.