**Lesson Plan**

**Subject : Heat Transfer**

Lesson plan Duration : 15 Weeks

Work load (lecture/Practical) per week (in hours): Lectures: 3 hours, Practical: 2 hours

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| **Lecture No** | **Theory** | **Practical** | |
| **Practical Day** | **Topic** |
| 1 | Brief detail regarding syllabus and overview of subject, books required | 1. | To determine the thermal conductivity of a metalrod. |
| 2 | Introduction to heat transfer Definition of heat, modes of heat transfer |
| 3 | Basic laws of heat transfer, application of heat transfer |
| 4 | Simple numerical problems |
| 5 | Fourier equation, electrical analogy of heat conduction thermal conductivity | 2. | To determine the thermal conductivity of an insulatingslab. |
| 6 | Drive the general conduction equation in Cartesian coordinate. |
| 7 | Drive the general conduction equation in cylindrical coordinate. |
| 8 | Drive the general conduction equation in spherical coordinate. |
| 9 | Concept of conduction and film resistance  Drive the steady one dimensional heat conduction without internal heat generation | 3 | To determine the thermal conductivity of an insulatingpowder. |
| 10 | conduction through plane and composite wall, the cylindrical shell |
| 11 | Conduction through the spherical shell. |
| 12 | Derive the expression for critical thickness of insulation. |
| 13 | Concept of variable thermal conductivity. | 4 | To determine the thermal resistance of a compositewall. |
| 14 | Derive the steady one dimensional heat conduction with uniform internal heat generation: the plane slab |
| 15 | Derive the steady one dimensional heat conduction with uniform internal heat generation through cylindrical and spherical systems. |
| 16 | Heat transfer through fins of uniform cross section, governing equation, temperature distribution and heat dissipation rate |
| 17 | Lumped system approximation and Biot number, approximate solution to unsteady conduction heat transfer by the use of Heisler charts. | 5 | To plot the temperature distribution of a pin fin infree-convection. |
| 18 | Effectiveness and efficiency of fins |
| 19 | Heat convection, basic equation, boundary layers |
| 20 | Forced convection, external and internal flow |
| 21 | Natural convective heat transfer | To plot the temperature distribution of a pin fin inforced-convection |
| 22 | Dimensionless parameters for forced and free convective heat transfer | 6 |
| 23 | Boundary layer analogies correlations for forced and free convection |
| 24 | Approximate solution to laminar boundary layer equations for both internal and external flow |
| 25 | Estimate heat transfer rates in laminar and turbulent flow situations using appropriate correlations for free and forced convection. | 7 | To study the forced convection heat transfer from a cylindricalsurface. |
| 26 | Boiling and condensation heat transfer, pool boiling curve, Nusselt theory of laminar film condensation |
| 27 | Interaction of radiation with materials, definitions of radioactive properties, monochromatic and total emissive power |
| 28 | Plank’s distribution law, Stefan Boltzman’s law |
| 29 | Wien’s displacement law, Kirchhoff’s law, intensity of radiation | 8 | To determine the effectiveness of a concentric tube heat exchanger in a parallel flow arrangement |
| 30 | Lambert’s cosine law, heat transfer between black surfaces, radiation shape factor, heat transfer between non-black surfaces. |
| 31 | Infinite parallel planes, infinite long concentric cylinders, small gray bodies and small body in large enclosure, electrical network approach, radiation shields |
| 32 | Introduction to heat exchangers,Types of heat exchangers | To determine the Stefan-Boltzmanconstant. |
| 33 | Overall heat transfer coefficient, fouling factor | 9 |
| 34 | Analysis and design of heat exchanger using LMTD |
| 35 | NTU method | To determine the emissivity of a givenplate. |
| 36 | Effectiveness of heat exchangers |
| 37 | Multipaas heat exchangers, application of heat exchangers |