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| **Syllabus for Comprehensive Test**  |
| **Full Marks: 40 marks**  |

**ME 511: Conduction and Radiation**

**Governing Equations**

Basic modes of heat transfer, Heat transfer mechanisms, Governing laws, Reynolds Transport Theorem (RTT), Derivation of Energy Equation, Fourier’s Law

**Conductive Heat Transfer systems**

Heat conduction equations in isotropic and anisotropic materials, Initial and boundary conditions, 1-D conduction problems without and with heat generation, Plane wall, hollow cylinder, composite tube, hollow sphere, Steady 2-D heat conduction problem, Problems in cylindrical and spherical coordinate system, Bounded 1-D domain, Slab with heat generation, Principle of superposition, Thermal Resistance, Transient Response, Semi-infinite solid, Polar co-ordinate (2-D), Time dependent BCs

**Radiative Heat Transfer**

Mechanism of energy transport in thermal radiation Divergence of radiative heat flux, Laws of radiation, View factor and solid angle, Radiation in presence of participating medium, Radiation transport equations (RTE), Radiative equilibrium

**References**:

1. F. P. Incropera & D.P. Dewitt, “Fundamentals of Heat and Mass Transfer”, John Willey & Sons
2. A. Bejan,“Convective Heat Transfer”, John Wiley and Sons
3. K. Muralidhar and G. Biswas, “Advanced Engineering Fluid Mechanics”, Narosa