Heat Transfer

- Heat is the energy transferred from one system to another or from one part of the system to its other part, arising due to temperature difference.
- Heat can be transferred from one place to other by through three different modes conduction, convection and radiation.
- **Thermal Conduction** of heat takes place in a body when different parts of body are at different temperature.
- **Heat Conduction**

  $Q = -KA\left(\frac{dT}{dx}\right)$
- Convection is transfer of heat by actual motion of matter.
- Radiation process does not need any material medium for heat transfer.
- Term Radiation refers to the continuous emission of energy from surface of all bodies and this energy is called radiant energy.
- **Wein displacement law**

  $\lambda T=b$

  where $b=0.2896\times10^{-2}$ mK for black body and is known as Wien's constant.
- **Stefan Boltzmann law**

  $u=e\sigma T^4$

  u is positive if net energy is being absorbed via radiation and negative if it is being lost via radiation.
- **Newton law of Cooling**

  For small temperature difference between the body and surrounding rate of cooling is directly proportional to the temperature difference and surface area exposed i.e.,

  $\frac{dT}{dx} = b(T - T_s)$

  b depends on nature of surface involved and the surrounding conditions.

  Negative sign is to indicate that $T_1>T_2$, dT/dt is negative and temperature decreases with time

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