

Instructions to the Students:

1. Draw figures wherever possible.
2. Assume suitable data if required.

Q.	Answer the following questions	Level	Marks
Q.1	1. State different modes of heat transfer.	L-1	6
Q.2	2. Write equation of 'Newton's law of heating/cooling'.	L-1	
Q.3	3. Write an application of 'Extended Surfaces or Fins'.	L-2	
Q.4	4. Write equation/formula of Reynolds Number and Prandtl Number.	L-1	
Q.5	5. Define 'Critical Radius of Insulation'	L-1	
Q.6	6. State any two factors which affects thermal conductivity of material	L-2	
Q.7	Solve Any Two of the following.		3 X 2
Q.8	Write short note on 'Hydrodynamic Boundary Layer'.	L-2	
Q.9	A hollow cylinder of 50mm inner dia and 80mm outer diameter is 5m long. The thermal conductivity of cylinder material is $110 \text{ W/m}^\circ\text{C}$. If the inner and outer surfaces of cylinder are at 210°C and 30°C , determine the rate of heat loss from the cylinder.	L-3	
Q.10	A wall of furnace is made up of inside layer of silica brick 120 mm thick covered with a layer of magnesite brick 240 mm thick. The temperatures at the inside surface of silica brick wall and outside surface of magnesite brick wall are 730°C and 105°C resp. The contact thermal resistance between two wall at the interface is 0.0035°C/W per unit area. If thermal conductivities of Silica and magnesite brick are $1.7 \text{ W/m}^\circ\text{C}$ and $5.8 \text{ W/m}^\circ\text{C}$, calculate a) The rate of heat loss per unit wall area. b) Temperature drop at interface.	L-3	
Q.11	Solve Any One of the following.		8
Q.12	Derive generalized three dimensional conduction equation in Cartesian co-ordinates and reduce it to various forms.	L-3	
Q.13	Twelve thin brass fins ($K = 65 \text{ W/m}^\circ\text{C}$) of 0.8 mm thick are placed axially on a 5 cm dia cylinder which stands vertically and is surrounded by air at 40°C . The fins extend 3.5 cm from the cylinder surface. What is the rate of heat transfer to air per meter length of cylinder when its surface is at 150°C ? Take $h = 20 \text{ W/m}^2\text{C}$.	L-3	

*** End ***