USN | | | | | | | | | |

CBCS SCHEME - Make-Up Exam

BME601

Sixth Semester B.E/B.Tech. Degree Examination, June/July 2025
Heat Transfer

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. Use of thermodynamics and Heat transfer data hand book is permitted.
4. Any missing data can be suitably assumed.

		Module – 1	M	L	C
1	a.	Derive one dimensional time dependent heat conduction equation with internal heat generation and constant thermal conductivity in cortegion coordinate system.	10	L2	CO1
	b.	With neat sketch explain boundary conditions of first, second and third kinds.	10	L1	CO1
		OR			
2	a.	A wall is constructed of several layers. The first layer consists of brick ($k = 0.66$ w/m^k) 25 cm thick, the second layer 2.5 cm thick mortar (k = 0.7 W/m.k), the third layer 10 cm thick limestone (k = 0.66 w/m.k) and outer layer of 1.25 cm thick plaster (K = 0.7 w/m.k). The heat transfer co-efficients on interior and exterior of the wall fluid layers are 5.8 w/m^2 k and 11.6 w/m^2 k respectively. Find : i) Overall hear transfer co-efficient ii) Overall thermal resistance per m^2 iii) Rate of heat transfer per m^2, if the interior of the room is at 26°C while outer air is at - 7°C.	10	L3	CO1
	b.	Derive a critical thickness of insulation for a cylinder.	10	L2	CO1
		Module – 2			
3	a.	Obtain an expression for temperature distribution and heat flow through a uniform cross section Longfin.	10	L2	CO3
	b.	A very long 25 mm diameter copper (k = 380 W/m.k) rod extends from a surface at 120°C. The temperature of surrounding air is 25°C and the heat transfer co-efficient over the rod is 10 W/m^2 k. Calculate: i) Heat loss from the rod ii) How long the rod should be in order to be considered infinite?	10	L3	CO3
		OR			
4	a.	With usual notations derive an expression for temperature distribution through a body for lumped parameter analysis.	10	L3	CO3
	b.	A 50 mm thick iron plate is initially at 225°C. Its both surface are suddenly exposed to air at 25°C with convection co-efficient of 500 W/m^2 k. i) Calculate the center temperature at the depth of 10 mm from the surface after 2 minute of exposure. Take thermophysical properties of iron plate : K = 60 W/mk, ρ = 7850 kg/m^3, C_p = 460 J/kok $\alpha = 1.6 \times 10^{-5}$ m^2/s	10	L3	CO3