Exam.Code:0942
Sub. Code: 33875

2015
B.E. (Mechanical Engineering)
Sixth Semester
MEC-604: Heat Transfer

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part.

x-x-x

1	a	Why do metals conduct both heat and electricity well, while some non-metallic crystals conduct heat well but not electricity?	10
	b	Why does forced convection have a higher heat transfer coefficient compared to free convection?	
	c	What role does the thermal boundary layer play in convective heat transfer?	
	d	Define the concept of view factor and explain its significance in the calculation of radiation heat transfer.	
	e	What are the various types of condensation, and how do they differ in terms of their mechanisms, heat transfer rates?	

Part -A

2		Derive general heat conduction equation in Cylindrical coordinates.	10
3		It is required to reduce heat loss from a slab by doubling the thickness of brick work. The temperature of inner surface of brick work is 500°C and ambient air is at 30°C. The temperature of outer surface of initial brick work was 200°C. Calculate the percentage reduction in heat loss per m^2 because of doubling the thickness.	10
4		Derive expressions for temperature distribution and heat dissipation in a straight fin of rectangular profile for the case Infinitely long fin.	10

Part-B

5	a	How are heat exchangers classified?	3
	b	Derive an expression for logarithmic mean temperature difference (LMTD) in the case of parallel flow.	7
6	a	State and prove Kirchhoff's law of radiation.	4
	b	The filament of a 75 W light bulb may be considered a black body radiating into a black enclosure at 70° C. The filament diameter is 0.10 mm and length is 5 cm. Considering the radiation, determine the filament temperature.	6
7	a	What are the differences in condensation and boiling heat transfer?	3
	b	List the relevant dimensionless terms that govern forced convection and free convection. Give their physical significance.	7

x-x-x