COMPUTER AIDED RADIATION HEAT TRANSFER SETUP (EE-4180)

DESCRIPTION:

The present Set-up offers basic experiments for targeted teaching on the topic of heat transfer by radiation. At the heart of the experimental unit is a metallic specimen heated by a concentrated light beam. The light beam is generated by a continuously adjustable halogen lamp and a parabolic reflector. The reflector concentrates the radiation ta a focal length point. A specimen is measured by a thermopile. In order to be able to measure the radiation at different distances. Specimens with different surfaces are available to be selected. Perfectly matched components ensure rapid heating and trouble-free measurements.

EXPERIMENTATIONS:

➢ To measure the thermal radiation from various metallic surfaces and study Stefan-Boltzmann Law
➢ To study Lambert's Inverse-Square Law
➢ To study Kirchhoff's Law of Thermal radiation.
➢ To study transient behavior of thermal system.
➢ To study energy balance, etc.

TECHNICAL SPECIFICATION:

➢	Halogen Lamp	:	130 – 150 W
➢	Maxi. Temperature	:	approx. 450ºC
➢	Aluminium Specimens	:	Dia. 20 mm and Thickness of 3 mm approx.
			1 x Matt anodized on both sides
			1 x High-temperature painted on both sides
			1 x Matt anodized on one side and painted on the other
➢	Copper Specimens	:	Dia. 20 mm and Thickness of 3 mm approx.
			1 x Nickel-plated
			1 x Bright finish
➢	Stainless Steel Specimen	:	Dia. 20 mm and Thickness of 3 mm approx.
			1 x Bright finish
➢	Measuring Range of Temp.	:	20 – 750 ºC
➢	Radiation intensity	:	0 – 1200 W/m^2
➢	Power requirements	:	230V, 50Hz, 1 phase
➢	Data Acquisition	:	USB interfaced and required cables shall be provided
			Compatible with windows OS.
			Data acquisition system feature an integrated microprocessor based instrumentation, eliminating the need for

			external measuring devices or error-prone manual wiring
➢	Software for	:	-System/Setup operation
			-Data acquisition and recording
			-Conducting lab experiments and analysis like verifying Lambert's Inverse-Square Law, Stefan-Boltzmann Law, Kirchhoff's Law, transient behavior of thermal systems, power balance to evaluate energy exchange etc.
			Reporting of results and interpret the plots to provide quantitative analysis.
➢	Standard Desktop Computer System for setup	:	Computer system to aid the instructors/students in conducting experiments based on this apparatus having the system/setup software, educational software, etc.
			Ram: DDR5, 16 GB
			Storage: 1 TB SSD
			Processor: Intel Core i7
			Input devices: USB mouse and standard keyboard
			Number of USB ports: Minimum 4
			Monitor-LED monitor with 21" screen size
			Operating system: Windows 11