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MRW-002

MASTER OF SCIENCE (RENEWABLE ENERGY AND ENVIRONMENT) (MSCRWEE)

Term-End Examination

December, 2022

MRW–002 : HEAT TRANSFER

Time : 3 Hours *Maximum Marks : 70*

Note : *Answer any* ***seven*** *questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. (a) Explain the mechanism of heat transfer by conduction. 5

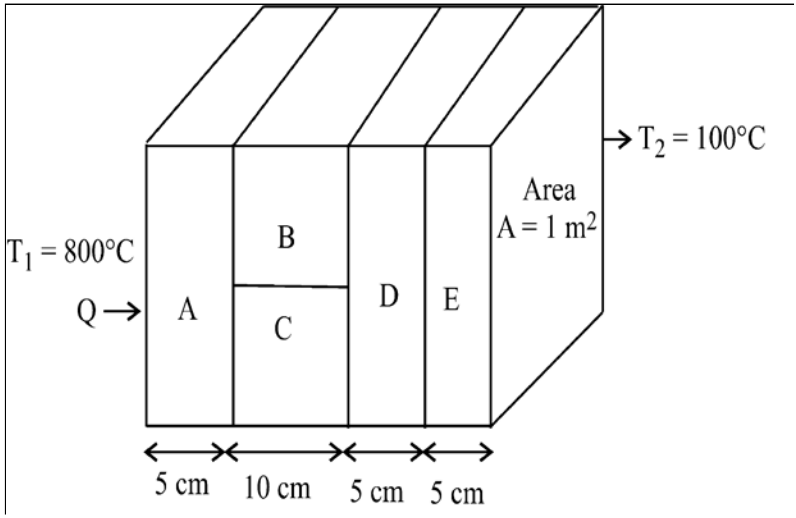
   (b) Write the mode of heat transfer in vacuum. State the Stefan-Boltzmann's law of radiation along with its assumptions. 5

2. (a) Describe the relationship between heat transfer and thermodynamics. 5

(b) What are the basic units ? How does one obtain force, pressure, energy and power from the basic units ? 5

3. Discuss, in detail, thermal contact resistance and the parameters on which it depends. Also, explain the effect of contact pressure on thermal contact resistance. 10

4. Determine the heat transfer through the composite wall shown in Fig. Take the conductivities of A, B, C, D and E as 50, 10, 6.67, 20 and 30 W/mK respectively and assume one-dimensional heat transfer. 10



5. Derive the continuity equation for laminar flow over a flat plate. 10

6. (a) What is surface property in radiation ? How does radiation vary with surface properties ? 6

   (b) Define the following : 4

   (i) Absorptivity

   (ii) Reflectivity

7. (a) State the following laws with their expression : 5

   (i) Wien's displacement law

   (ii) Kirchhoff's law

   (b) Discuss any *two* applications of Heat Transfer. 5

8. Discuss, in detail, the classification of heat exchangers by : 10

   (a) Flow arrangement

   (b) Heat transfer mechanism

9. Write short notes on any ***two*** of the following : 5+5

   (a) Critical radius of insulation

   (b) Fins

   (c) Thermal Boundary Layer

   (d) Water tube boilers