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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION- JAN 2023

Course Code: PET 2008

Course Name: Heat & Mass Transfer for Petroleum Engineering

Program: B. Tech (PET)

Date: 27-JAN-2023

Time: 09:30 Am-12:30 pm

Max Marks: 50

Weightage: 25%

Instructions:

- (i) Read the all questions carefully and answer accordingly.
- (ii) Question paper consist of three parts, PART A, B & C
- (iii) All questions are mandatory

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(5Qx 2M= 10M)

1. Define Newton's law of cooling. (C.O.No.1) [Application]
2. When the heat transfer takes in a metal pipe, identify which modes of heat transfer taking place and explain it? (C.O.No.1) [Application]
3. What do you understand by Forced Convection. (C.O.No.1) [Application]
4. Suppose three identical shape solid body of different material is given to you. You can find out any property of the body. How will you find out the body in which the rate of heat flow will be highest? (C.O.No.1) [Application]
5. What do you understand by Biot number? (C.O.No.1) [Application]

Part B [Thought Provoking Questions]

Answer the Questions. Question carries EIGHT marks.

(2Qx8M=16M)

6. Suppose a rectangular of size 6m x 4m solid body is given to you. Explain all the different possibilities by which you can increase the rate of heat transfer. Out of all the possibilities you have given select the possibility which is relevant and can be applied in real life. Explain the concept in detail.

(C.O.No.1) [Application]

7. Find out the rate of heat flow Q when we r heating a metal rod. The Thermal Conductivity of metal is given 1.5 W/mK and the heat transfer coefficient of the metal is $2.5 \text{ W/m}^2\text{K}$ the length is 8 m and the area is 4.5 m^2 . Hot surface temperature id 300 K and cold surface temperature is 80 K . Explain the law convection follows also explain the different types of convection.

(C.O.No.1) [Application]

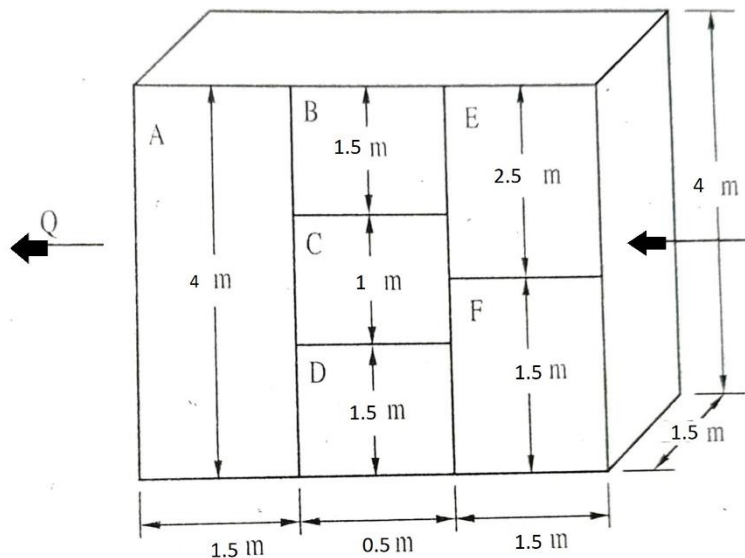
Part C [Problem Solving Questions]

Answer the Questions. Question carries TWELVE marks.

(2Qx12M=24M)

8. A composite wall is shown in the figure. Calculate the rate of heat flow through the solid only. $K_A=16.6$, $K_B=3.7$, $K_C=4.2$, $K_D=1.6$, $K_E=2.8$, $K_F=1.3$, $H_i=6500$, $H_o=2000$, $T_i=800 \text{ k}$, $T_o= 80 \text{ K}$.

(C.O.No.1) [Application]



9. A furnace wall consists of 45 cm of layer 1, 35 cm of layer 2 and a 25cm layer 3 on the outside. If the inside surface temperature of the furnace is 1900 K and outside surface temperature is to be 220 K . Calculate the temperatures between the layers and the heat flow by conduction of furnace wall. Take K for layer 1= 3.28 W/m-k , k for layer 2= 45.37 W/m-k , k for layer 3= 2.44 W/m-k , $H_i=5000$, $H_o=3000$.

(C.O.No.1) [Application]