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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

SUMMER TERM / MAKE UP END TERM EXAMINATION

Semester: Summer Term 2019

Date: 24 July 2019

Course Code: PET-206

Time: 2 Hours

Course Name: Heat and Mass Transfer

Max Marks: 80

Program & Sem: B.Tech IV Sem

Weightage: 40%

Instructions:

(i) **Answer all questions**

Part A

Answer **all** the Questions. **Each** question carries **two** marks.

(5Qx2M=10)

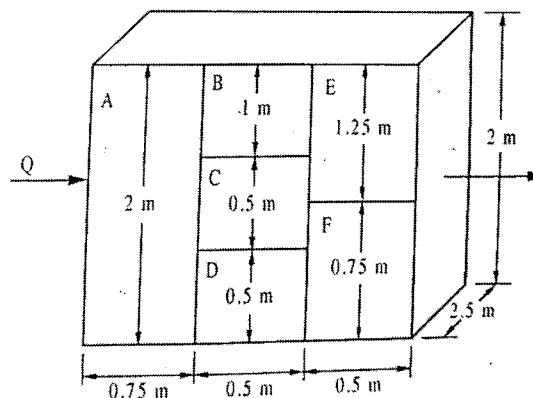
- 1) Explain convection? How it takes place and write down the law governing convection?
- 2) Define thermal conductivity?
- 3) Define emissivity?
- 4) What do you mean by scaling and fouling?
- 5) What do you mean by dropwise condensation?

Part B

Answer **all** of the Questions. **Each** question carries **ten** marks.

(5Qx10M=50)

- 6) Derive the Heat equation for
 - i) Slab/Plane wall
 - ii) Composite wall
- 7) Explain the phenomena of pool boiling with suitable diagram?
- 8) Write down the various non dimension-less number and explain?
- 9) Explain the different types of heat exchangers?
- 10) A composite wall is as shown in figure. Calculate the rate of heat loss from it.
 $k = 18.88 \text{ W/m-k}$; $k = 2.77 \text{ W/m-k}$; 232 W/m-k ; $k = 19 \text{ W/m-k}$; $k = 1.16 \text{ W/m-k}$; $k_F = 37 \text{ W/m-k}$; $h = 8500 \text{ W/m-k}$; $h_c = 2000 \text{ W/m-k}$. $T = 900^\circ\text{C}$, $T = 40^\circ\text{C}$



Part C

Answer **any one** Question. **Each** question carries **twenty** marks.

(1Qx20M=20)

11) A furnace wall is made up of three layers of thickness 250mm, 100mm 150mm with thermal conductivities of 1.65k, 9.2 w/m-k respectively The inside is exposed gases at 1250°C with convective coefficient of 25 w/m²-k and the inside surfaces at 1100 C Outside surface is exposed to air at 25°C with convection coefficient of 12 W/m²-k. (Take the unknown for the second layer)

Determine

- (i) The unknown thermal conductivity 'k.
- (ii) The overall heat transfer coefficient
- (ii) All surface temperatures.

12) Derive the general heat conduction equation in Cartesian coordinate?