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Roll No .....

CM-5004-CBGS

B.E. V Semester

Examination, June 2020

Choice Based Grading System (CBGS)

Heat Transfer

Time : Three Hours

Maximum Marks : 70

Note : i) Attempt any five questions.

ii) All questions carry equal marks.

1. Derive the generalized equation of heat transfer in spherical coordinate.

2. a) Classify different type of heat exchanger?
   b) Discuss the design consideration of heat exchanger?

3. Derive the Von-Karman momentum integral equation, for

   a) $\frac{u}{u_\infty}=2\left(\frac{y}{\delta}\right)-\left(\frac{y}{\delta}\right)^2$

   b) $\frac{u}{u_\infty}=1.5\left(\frac{y}{\delta}\right)-0.5\left(\frac{y}{\delta}\right)^3$

4. Saturated steam at T_{sat} = 90ºC condense on the surface of a 1.5m long 2.5m outer diameter vertical tube maintained at a uniform temperature T_{ou} = 70°C. Assume film condensation. Find:
   i) Local heat transfer coefficient at the bottom of the tube
   ii) Average heat transfer coefficient

5. Explain schematic temperature distribution diagrams for counter-flow and parallel -flow heat exchangers.

6. Calculate the critical radius of insulation for asbestos (k = 0.17 W/m°C) surrounding a pipe and exposed to room air at 20°C with h = 3.0 W/m^2 °C. Calculate the heat loss from a 200°C, 5.0cm diameter pipe when covered with critical radius of insulation and without insulation.

7. Derive the approximate solution for laminar boundary layer over a flat plate.

8. Write short notes on any two of the following
   a) Natural and Forced convection
   b) Extended surface equipments
   c) Nucleate boiling

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