Roll No

ME-6003 (CBGS)

B.E. VI Semester

Examination, November 2018

Choice Based Grading System (CBGS)

Heat and Mass Transfer

Time : Three Hours *Maximum Marks : 70*

Note: i) Attempt any five questions.
ii) All questions carry equal marks.
iii) HMT data book permitted.

1. a) Define thermal conductivity, thermal diffusivity and overall heat transfer coefficient. 6
   b) Derive an expression of general heat conduction equation in rectangular coordinates. 8

2. Derive an expression of heat transfer through rectangular finite length fin. https://www.rgpvonline.com 14

3. Explain the application of Buckingham "pie" theorem in free and force convection heat transfer analysis. 14

4. a) What is Lamp capacity analysis? 5
   b) Derive an expression of critical thickness of insulation for pipe. 5
   c) What are the difference between Free and Force convection heat transfer? 4

5. a) What is LMTD? Draw temperature profile of condenser and find the LMTD value for it. 7
   b) In a counter flow heat exchanger 10,000kg/h of oil having a specific heat of 2095 J/kg K is cooled from 80°C to 50°C by 8000kg/hr of water entering at 25°C. Determine the heat exchanger area for an overall heat transfer coefficient of 300w/m²K. Take Cp for water as 4180 J/kg K. https://www.rgpvonline.com 7

6. a) What is the Molar diffusion velocity? Define mass transfer fluxes. 6
   b) What is Shape factor? 4
   c) What is Nucleate boiling? 4

7. A Gray diffuse opaque surface (α=0.8) is at 100°C and receives an irradiation 1000W/m². If the surface area is 0.1m² Calculate : 14
   a) Radiosity of the surface
   b) Net radiative heat transfer rate from the surface.

8. a) Discuss the various regimes of pool boiling. 7
   b) Vertical door of hot oven is 0.5m high and is maintained at 200°C. It is exposed to atmosphere air at 20°C Find the Local heat transfer coefficient half way of the door. 7

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