

DIPLOMA VIEP MECHANICAL ENGINEERING (DMEVI)

Term-End Examination

December, 2013

BIME-026: HEAT TRANSFER

Time : 2 hours

Maximum Marks : 70

Note : Attempt any five questions. Assume suitable missing data if any. Use of scientific calculator is permitted.

1. (a) What are the different modes of heat transfer ? Define over all heat transfer coefficient 7
 - (b) What is convection heat transfer ? Why it is regarded as a mode of heat transfer ? 7
 2. (a) Define efficiency and effectiveness of a fin. 7
 - (b) What is the logarithmic mean area for a hollow cylinder and sphere ? 7
 3. (a) Explain the concept of natural convection heat transfer coefficient. 7
 - (b) A slab made up of carbon steel is initially at a temperature of 500°C and it is exposed to air at 30°C. The thickness of the slab is 1cm. What will be the temperature of the slab after one minute ? Assume convective heat transfer coefficient on the surface of the slab is 40 W/m²K. 7
- The properties of carbon steel are given as :
 $\rho = 7833 \text{ kg/m}^3$, $K = 38.5 \text{ W/mK}$
 $C = 0.465 \text{ kJ/kgK}$, $\alpha = 1.474 \times 10^{-5} \text{ m}^2/\text{s}$

4. Discuss the various concepts in boiling heat transfer with the help of the boiling curve. 14
5. (a) Differentiate between film wise and drop wise condensation. 7
(b) What is the radiation shape factor ? 7
6. (a) Calculate the monochromatic emissive power of a black body emitting radiation at a temperature of 2500K and wavelength of $1.4\mu\text{m}$. Also determine the total emissive power of the body. 7
(b) Tungsten filament is used in a 100 watt light bulb. The filament temperature is 3000K and emissivity is 0.3. Calculate the minimum surface area of the tungsten filament if the bulb is completely evacuated and is at a steady state condition. 7
7. Write short note on the following : 3.5x4=14
(a) Wien's displacement law.
(b) Nusselt Number
(c) Black body and Gray body
(d) Prandtl number
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