

Name: \_\_\_\_\_ Hall Ticket No. 

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**Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 10.**

**I Choose the correct alternative:**

1. Fouling factor [      ]  
 a. is a dimensionless quantity      b. does not provide a safety factor for design  
 c. accounts for additional resistances to heat flow      d. None of these
2. Nusselt number is defined as (Nu)= [      ]  
 a.  $k/dh$       b.  $hk/d$       c.  $h/dk$       d.  $hd/k$
3. Hot water ( $0.01 \text{ m}^3/\text{min}$ ) enters the tube side of a counter current shell and tube heat exchanger at  $80^\circ\text{C}$  and leaves at  $50^\circ\text{C}$ . Cold oil ( $0.05 \text{ m}^3/\text{min}$ ) of density  $800 \text{ kg/m}^3$  and specific heat of  $2 \text{ kJ/kg.K}$  enters at  $20^\circ\text{C}$ . The log mean temperature difference in  $^\circ\text{C}$  is approximately [      ]  
 a. 32      b. 37      c. 45      d. 50
4. Stanton number in terms of  $h$ ,  $c_p$  and  $G$  is given by [      ]  
 a.  $h c_p / G$       b.  $h / c_p G$       c.  $G c_p / h$       d.  $h c_p / G^2$
5. Thermal layer is thinner than hydrodynamic layer when  $N_{Pr}$  [      ]  
 a.  $<1$       b.  $=1$       c.  $>1$       d. all
6. Grashoff number is given by [      ]  
 a.  $\beta g \Delta T_0 D_0^3 \rho_f^2 / \mu_f^2$       b.  $\beta g \Delta T_0 D_0 \rho_f^2 / \mu_f^2$   
 c.  $\beta g \Delta T_0 D_0^3 \rho_f / \mu_f^2$       d.  $\beta g \Delta T_0 D_0^3 \rho_f^2 / \mu_f$
7. Natural convection is due to \_\_\_\_\_ force [      ]  
 a. Magnetic      b. Electrostatic      c. Frictional      d. buoyancy
8. The mode of heat transfer in which motion of matter is absent [      ]  
 a. Convection      b. Radiation      c. Conduction      d. all
9. In the equation  $Q = UA \Delta t$ ;  $\Delta t$  is [      ]  
 a. Geometric mean temperature difference.      b. Arithmetic mean temperature differ  
 c. Logarithmic mean temperature difference.  
 d. The difference of average temperatures of hot and cold fluids
10. Fourier's law applies to the heat transfer by [      ]  
 a. Convection      b. Radiation      c. Conduction      d. all

**Cont.....2**

**II Fill in the blanks:**

11. The temperature that would be attained if the entire fluid stream flowing in a heat transfer section were withdrawn and mixed adiabatically to a uniform temperature called \_\_\_\_\_
12. Rate of heat per unit area per unit time is called \_\_\_\_\_
13. The driving force for mass transfer is \_\_\_\_\_
14. The buoyancy of heated liquid layers near a hot surface generate convection currents just as in \_\_\_\_\_
15. The fractional increase in volume at constant pressure of the fluid per degree of temperature change is known as \_\_\_\_\_
16. Graetz number is given  $m, t, C_p, k$  and  $L$  is given by \_\_\_\_\_
17. Nusslet number is the product of  $NR_e, NP_r$  and \_\_\_\_\_
18. The units of heat transfer coefficient are \_\_\_\_\_
19. In metallic solids thermal conduction results due to \_\_\_\_\_
20. The flow of air across a heated radiator is an example of \_\_\_\_\_ convection.

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**II Fill in the blanks:**

11. The buoyancy of heated liquid layers near a hot surface generate convection currents just as in \_\_\_\_\_
12. The fractional increase in volume at constant pressure of the fluid per degree of temperature change is known as \_\_\_\_\_
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Code No: 54598

Set No. 4

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

II B.Tech. II Sem., II Mid-Term Examinations, April – 2014

HEAT AND MASS TRANSFER

Objective Exam

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