Assignment 4

The due date for submitting this assignment has passed. Due on 2019-08-28, 23:59 IST. As per our records you have not submitted this assignment.

1) Which of the following are correct regarding fins
   a. Fins are extended surface which are used to increase the heat transfer rate
   b. Fins are extended surface which are used to decrease the heat transfer rate
   c. Fins are passive devices, no auxiliary power is required
   d. In general, fins should be made thin and more number of fins to be used.

   □ a
   □ b
   □ c
   □ d

No, the answer is incorrect.
Score: 0
Accepted Answers:
a
c
d
2) Which of the following fin is known as pin fin
   a. Longitudinal rectangular fin
   b. Circular or radial fin
   c. Longitudinal cylindrical fin
   d. Triangular fin

   No, the answer is incorrect.
   Score: 0
   Accepted Answers: c

3) Which of the following are design are adopted in plate fin heat exchangers
   a. Plain inline
   b. Wavy inline
   c. Wavy staggered
   d. All of the above

   No, the answer is incorrect.
   Score: 0
   Accepted Answers: d

4) Effectiveness of the fin is defined as the ratio of
   a. Heat transfer from the fin to heat transfer through the fin base without the fin
   b. Heat transfer from the fin to heat transfer through the fin base with the fin
   c. Heat transfer through the fin base without the fin to heat transfer from the fin
   d. All the above

   No, the answer is incorrect.
   Score: 0
   Accepted Answers: a

5) Which of the following are correct regarding the analysis of fin plate heat exchanger
   a. Fin plates are basically two dimensional fins
   b. Tubes in a fin tube heat exchanger are arranged in an inline array or in staggered array
   c. Fin plates are arranged parallel to each other
   d. All of these
Match the following

<table>
<thead>
<tr>
<th>List A</th>
<th>List B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(p). Efficiency of fin insulated at the tip</td>
<td>(w). $\sqrt{hPAc} \tanh(mL)(T_o - T_\infty)$</td>
</tr>
<tr>
<td>(q). Heat transfer through insulated fin</td>
<td>(x). $\sqrt{hPAc}(T_o - T_\infty)$</td>
</tr>
<tr>
<td>(r). Efficiency of the infinitely long fin</td>
<td>(y). $\tanh(mL)/mL$</td>
</tr>
<tr>
<td>(s). Heat transfer through infinitely long fin</td>
<td>(z). $1/mL$</td>
</tr>
<tr>
<td>(a). p-z, q-w, r-y, s-x</td>
<td>(b). p-y, q-w, r-z, s-x</td>
</tr>
<tr>
<td>(c). p-y, q-x, r-z, s-w</td>
<td>(d). p-y, q-w, r-x, s-z</td>
</tr>
</tbody>
</table>

No, the answer is incorrect.
Score: 0
Accepted Answers:

7)

What is the relationship between effectiveness($\epsilon_{fin}$) and efficiency($\eta_{fin}$) of infinitely long fin

a. $\frac{\epsilon_{fin}}{\eta_{fin}} = \frac{\text{surface area of fin}}{\text{cross sectional area of fin}}$

b. $\frac{\epsilon_{fin}}{\eta_{fin}} = \frac{\text{cross sectional area of fin}}{\text{surface area of fin}}$

c. $\frac{\epsilon_{fin}}{\eta_{fin}} = \frac{\text{Thermal conductivity} \times \text{surface area of fin}}{\text{cross sectional area of fin}}$

d. $\epsilon_{fin} \times \eta_{fin} = \text{surface area of fin} \times \text{cross sectional area}$
8) The overall surface efficiency of the finned surface is given by the expression of

- a. \( \eta_0 = 1 - \frac{A_f}{NA_f} (1 - \eta_f) \)
- b. \( \eta_0 = 1 - \frac{NA_f}{A_f} (1 - \eta_f) \)
- c. \( \eta_0 = \frac{NA_f}{A_f} (1 - \eta_f) \)
- d. \( \eta_0 = 1 - \frac{NA_f}{A_f} (\eta_f) \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
- a

9) Which of the following configuration has the highest fin effectiveness

- a. Thin, low thermal conductivity and closely spaced fin
- b. Thin, high thermal conductivity and closely spaced fin
- c. Thick, low thermal conductivity and closely spaced fin
- d. Thick, high thermal conductivity and closely spaced fin

No, the answer is incorrect.
Score: 0
Accepted Answers:
- b

10) Fin tube heat exchangers are primarily

- a. Gas-liquid heat exchangers
- b. Gas-gas heat exchangers
- c. Liquid-vapour
- d. All of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
- c
11) The effectiveness and efficiency of infinitely long fin is 5 and 0.60 respectively. The heat transfer from the fin is 10W. Determine the heat transfer (in W) through the fin base also find the surface area of the fin (in mm²) if cross section area of the fin is 3mm².

a. 2W, 22mm²
b. 50W, 25mm²
c. 50W, 22mm²
d. 2W, 25mm²

No, the answer is incorrect.
Score: 0
Accepted Answers: d

2 points

12) Determine the heat transfer rate (in W) from the rectangular fin of length 10cm, width 20cm and thickness 2cm. The tip of the fin is not insulated and the fin has a thermal conductivity of 100W/mK. The base temperature is 100°C and the fluid is at 20°C. The heat transfer coefficient between the fin and the fluid is 30W/m²K.

a. 50.035
b. 110.55
c. 98.656
d. 102.089

No, the answer is incorrect.
Score: 0
Accepted Answers: d

2 points

13) An infinitely long copper fin (k = 396W/mK) having 0.25cm in diameter protrudes from a wall at 95°C into ambient air at 25°C. Determine heat loss (in W) from the fin. The heat transfer coefficient by free convection is equal to 10W/m²K.

a. 10W
b. 7W
c. 5.67W
d. 3.37

No, the answer is incorrect.
Score: 0
Accepted Answers: d

0 points
Determine the ratio of heat loss from the infinitely long fin to the fin having negligible heat loss from the tip, consider the length of the fins is 10 mm and value of fin parameter is equal to 4.56/meter.

14)

- a. 22.56
- b. 26.78
- c. 21.94
- d. 20.34

No, the answer is incorrect.
Score: 0
Accepted Answers: d

Two long circular rods of same diameter, one is made of aluminium and another is made of copper is attached with a wall at temperature 130°C. If the diameter and length of each rod is 15 mm and 130 mm respectively. The thermal conductivity of aluminium and copper is 401 W/(m-K) and 237 W/(m-K) respectively. The convective heat transfer coefficient is 50 W/(m²-K) for both. The density of aluminium and copper is 2702 kg/m³ and 8933 kg/m³ respectively. What is the value of \( \frac{(\text{Heat transfer per unit mass})_{\text{copper}}}{(\text{Heat transfer per unit mass})_{\text{Aluminium}}} \) to the ambient. Assume both the rods are insulated at the tip.

15)

- a. 0.35
- b. 0.25
- c. 0.31
- d. 0.40

No, the answer is incorrect.
Score: 0
Accepted Answers: c