Module 7: Short questions

1. What are the heat transfer mechanisms involved during heat transfer from the hot fluid to the cold fluid?
2. In heat exchange between air and water across a tube wall, it is proposed to use fins to enhance the overall heat transfer coefficient. Would you put the fins on the air side or on the water side?
3. When is a heat exchanger classified as compact?
4. How does a cross flow heat exchanger differ from a counter flow one?
5. What is the role of baffles in a shell-and-tube heat exchanger? What is the implication about pressure drop?
6. Under what conditions is the effectiveness NTU method preferred over LMTD method as a method of analysis of a heat exchanger?
7. Can temperature of the hot fluid drop below the inlet temperature of the cold fluid at any location in a heat exchanger?
8. Can temperature of the cold fluid rise above the inlet temperature of the hot fluid at any location in a heat exchanger?
9. Consider two double pipe counterflow heat exchangers that are identical except that one is twice as long as the other one. Which of the exchangers is more likely to have a higher effectiveness?
10. Can effectiveness be greater than one?
11. Under what conditions can a counter flow heat exchanger have an effectiveness of one? What would be your answer for a parallel flow heat exchanger?

Multiple choice questions:

1) In a thin walled heat exchanger with no fouling, the overall heat transfer coefficient is

a) $A\left(h_i^{-1}+h_o^{-1}\right)^{-1}$

b) $\left(h_i^{-1}+h_o^{-1}\right)^{-1}$

c) $A\left(h_i^{-1}+h_o^{-1}\right)$

d) $\left(h_i^{-1}+h_o^{-1}\right)$

e) None of the above

2) In a liquid to gas heat exchanger, it is best to put extended surfaces on the gas side because

a) This reduces fouling

b) The gas side heat transfer coefficient is highest

c) It reduces drag in high speed flows

d) All of the first three

e) None of the above

3) When applying the ε - NTU method for heat exchangers, when one fluid is condensing steam, the heat capacity ratio C_r is effectively

a) 0
b) 1
c) π
d) ∞
e) None of the above

4) On one side of a heat exchanger, air enters at 72.82ºC and leaves at 90ºC. On the other side of the heat exchanger is condensing steam at one atmosphere. The value for ΔT_{lmtd} is
a) 10 K
b) 17.18 K
c) 27ºC
d) 100ºC
e) None of the above

5) Select the FALSE statement concerning the ε-NTU method for heat exchangers
a) $qmax = Cmin\ (T_{h,i} - T^{c,i})$
b) ε = q/qmax
c) NTU = UA/Cmin
d) q = ε Cmin ($T_{h,i} - T_{c,i}$)
e) None of the above