Module 2: Short questions

1. How does transient heat transfer differ from steady state heat transfer?

2. What is meant by the term “one-dimensional” in the context of conduction heat transfer?

3. What is meant by thermal resistance? Under what assumptions can the concept of thermal resistance be applied in a straightforward manner?

4. For heat transfer through a single cylindrical shell with convection on the outside, there is a value for the shell radius for a nonzero shell thickness at which the heat flux is maximized. This value is
   (A) k/h
   (B) h/k
   (C) h/r
   (D) r/h

5. The steady temperature profile in a one-dimensional heat transfer across a plane slab of thickness \( L \) and with uniform heat generation, \( q \), has one maximum. If the slab is cooled by convection at \( x = 0 \) and insulated at \( x = L \), the maximum occurs at a value of \( x \) given by

   \[
   x = \begin{cases} 
   0 & \text{(A)} \\
   \frac{L}{2} & \text{(B)} \\
   \frac{q}{k} & \text{(C)} \\
   L & \text{(D)} 
   \end{cases}
   \]

6. Consider a cold canned (typically cylindrical in shape) drink left on a table. Would the heat transfer be steady or transient? Would you model the heat transfer as one-, two-, or three-dimensional? Also, which coordinate system would you use to analyse this heat transfer problem?