# Introduction to Transport Phenomena: <u>Recap Quiz Modules 1-3</u>

Module 1

| Q# | Question | True | False |
|---|---|---|---|
| Q01 | In fluid mechanics, the basic conservation laws are those of volume, energy and momentum. | ☐ | ☐ |
| Q02 | Can you make a drawing which represents Bernoulli equation as the conservation of energy along a streamline? | | |
| Q03 | The Bernoulli equation assumes the fluid to be incompressible. | ☐ | ☐ |
| Q04 | Can you write the Bernoulli equation? | | |
| Q05 | In a pipe with changing diameter, the velocity is always constant | ☐ | ☐ |
| Q06 | You want to extinguish a little fire on the roof of your house (h =10m). In the garden, you find a water hose which sprays water at $15\frac{m}{s}$ from its nozzle. Are you able to extinguish the fire? | ☐ | ☐ |
| Q07 | Assuming friction, is the velocity of a fluid in a pipe always zero at the walls? | ☐ | ☐ |
| Q08 | Draw the velocity profile in a straight pipe in laminar flow regime assuming friction. | | |
| Q09 | The Reynolds number has the dimension of $kg * \frac{m}{s}$. Is this true? | ☐ | ☐ |
| Q10 | The Reynolds number is a measure of the ratio of inertial force to viscous forces | ☐ | ☐ |
| Q11 | For laminar flow in a horizontal pipeline under a constant pressure gradient, a doubling of the diameter results in a doubling of the flow rate | ☐ | ☐ |
| Q12 | The Fanning friction factor is twice the Darcy friction factor | ☐ | ☐ |
| Q13 | The Fanning friction factor is directly proportional to the Reynolds number | ☐ | ☐ |
| Q14 | For pipe flow, the friction factor varies gradually as the Reynolds number increase from laminar flow to turbulent flow | ☐ | ☐ |
| Q15 | Friction is always the only loss to consider in a pipe system | ☐ | ☐ |

Module 2

| Q# | Question | True | False |
|---|---|---|---|
| Q01 | Transport by advection is the transport occurring by the bulk movement of a fluid | ☐ | ☐ |
| Q02 | Can you draw the convention regarding the direction of normal unit vector with respect to inlet and outlet surface of the fluid flow? | | |
| Q03 | The units of the mass flow rate are kg/min $\cdot m^2$ | ☐ | ☐ |
| Q04 | The control volume is a real component of a pipe system | ☐ | ☐ |
| Q05 | The only force acting on the surface of the control volume is the pressure force | ☐ | ☐ |
| Q06 | The only volume force is gravity | | |
| Q07 | The force exerted by the control volume on the fluid is a reaction force | ☐ | ☐ |
| Q08 | You can ignore the coordinate system in solving problems of advective transport | ☐ | ☐ |

Module 3

| Q# | Question | True | False |
|---|---|---|---|
| Q01 | The Fourier's Law describes convective heat transfer. | ☐ | ☐ |
| Q02 | In liquids and gases heat conduction occurs through molecular collisions | ☐ | ☐ |
| Q03 | Heat conduction in solids occurs only through lattice vibrations | ☐ | ☐ |
| Q04 | The thermal conductivity of a liquid increases with increasing temperature and the thermal conductivity of a gas decreases with increasing temperature. | ☐ | ☐ |
| Q05 | The temperature profile at steady state between a hot and cold surface is parabolic if heat is transferred by conduction. | ☐ | ☐ |
| Q06 | A ventilator cooling a hot surface is an example of forced convection | ☐ | ☐ |
| Q07 | The heat transfer coefficient is essential to describe heat transfer by conduction | ☐ | ☐ |
| Q08 | The temperature remains constant within the boundary layers | ☐ | ☐ |
| Q09 | Circuits of thermal resistances resembles those of electrical resistances. | ☐ | ☐ |
| Q10 | When heat is transferred by conduction across a series of walls perpendicular to the flux, at | ☐ | ☐ |

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|---|---|---|---|
| | steady state and in the absence of losses, the heat flux changes at each interface. | | |
| Q11 | When heat is transferred by conduction across a series of walls parallel to the flux, the same heat flux passes through each wall. | ☐ | ☐ |
| Q12 | Radiative heat transfer does not require a medium between the objects that exchange heat. | ☐ | ☐ |
| Q13 | Draw the temperature profile in a counter flow and in a parallel flow heat exchanger and identify $T_{c,i}$, $T_{c,o}$, $T_{o,i}$ and $T_{h,o}$ | | |
| Q14 | A counter flow heat exchanger is more efficient than a parallel flow heat exchanger keeping all the parameters the same | ☐ | ☐ |