Assignment 5

The due date for submitting this assignment has passed. **Due on 2018-03-15, 12:29 IST.**

Submitted assignment

1) Which of the following assumptions are used to derive the expression for velocity profile in ideal gas-liquid annular flow?  
   - Flow in steady
   - Flow is laminar
   - Fully developed flow
   - All of the above

   **No, the answer is incorrect.**  
   **Score: 0**  
   **Accepted Answers:**  
   All of the above

2) Nusselt number is the ratio of
   - Conduction / Convection
   - Radiation / Convection
   - Convection / Conduction
   - All of the above

   **No, the answer is incorrect.**  
   **Score: 0**  
   **Accepted Answers:**  
   Convection / Conduction

3) In axisymmetric flow, the ____________ velocity component is zero.
   - Radial
   - Tangential
   - Angular
   - None of these

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

4) The boundary conditions at the gas-liquid interface in ideal annular flow are:
   - Velocity components tangential to the interface in the two phases are equal
   - Velocity components normal to the interface in the two phase are equal
   - Continuity of shear stress at the interface
5) Heat transfer coefficient in a stagnant liquid film of thickness $d$ is $\frac{k}{d}$. The thermal conductivity of the liquid is $k$ and heat capacity is $C_p$.  
- $kC_p$  
- $\frac{d}{k}$  
- $k/d$  
- $\frac{k}{C_p}$  
No, the answer is incorrect.  
Score: 0  
Accepted Answers: $\frac{k}{d}$

6) Which of these is are the phase change processes?  
- Boiling  
- Evaporation  
- Condensation  
- All of the above  
No, the answer is incorrect.  
Score: 0  
Accepted Answers: All of the above

7) The specific heat capacity is an intensive property.  
- True  
- False  
No, the answer is incorrect.  
Score: 0  
Accepted Answers: True

8) Prandtl number is the ratio of  
- Momentum diffusivity and mass diffusivity  
- Momentum diffusivity and thermal diffusivity  
- Mass diffusivity and thermal diffusivity  
- None of the above  
No, the answer is incorrect.  
Score: 0  
Accepted Answers: Momentum diffusivity and thermal diffusivity

9) Prandtl number of air is (choose the nearest value)  
- 0.01  
- 10  
- 5  
- 1  
No, the answer is incorrect.  
Score: 0
10. Heat transfer coefficient in single phase, laminar, fully-developed flow in a channel ________ with increase in flow rate.

- Increases
- Decreases
- Remains unchanged
- None of the above

No, the answer is incorrect. Score: 0

Accepted Answers: Increases

11. Heat transfer in slug flow regime in gas-liquid flow in microchannels is expected to be better than that in single phase flow in microchannels for low and moderate void fractions because of

- Internal recirculations in the liquid slugs
- Internal recirculation in the gas bubbles
- Developing flow in the liquid slugs
- Internal recirculations in the liquid slugs and developing flow in the liquid slugs

No, the answer is incorrect. Score: 0

Accepted Answers: Internal recirculations in the liquid slugs and developing flow in the liquid slugs

12. Heat transfer in developing single phase does not depend on the following

- Reynolds number
- Prandtl number
- Flow length
- Depends on all the above factors

No, the answer is incorrect. Score: 0

Accepted Answers: Depends on all the above factors

13. Consider gas-liquid flow in a channel. The specific heat capacities of water and air to be 4180 and 1000 J/kg-K, respectively. The densities of water and air are 1000 and 1.3 kg/m$^3$, respectively. If the superficial velocities and the volume fractions of the two phases are equal, what percent of heat entering from the wall goes into the gas phase?

- 10%
- 50%
- 100%
- less than 0.1%

No, the answer is incorrect. Score: 0

Accepted Answers: less than 0.1%

14. Consider gas-liquid flow in a channel. The specific heat capacities of water and air to be 4180 and 1000 J/kg-K, respectively. The densities of water and air are 1000 and 1.3 kg/m$^3$, respectively. If the volumetric flow rate of the gas phase is 100 times that of the liquid phase, what percent of heat entering from the wall goes into the gas phase?
Consider gas-liquid flow in a channel. The specific heat capacities of water and air to be 4180 and 1000 J/kg-K, respectively. The densities of water and air are 1000 and 1.3 kg/m³, respectively. If the volumetric flow rate of the gas phase is 1000 times than that of the liquid phase, what percent of heat entering from the wall goes into the gas phase?

- 100%
- 0.3%
- 50%
- 3%

No, the answer is incorrect.
Score: 0
Accepted Answers:
3%

Route of heat transfer in Taylor flow regime are

- Wall to bubble film
- Bubble film to liquid slug
- Wall to recirculating slug
- All of the above

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

Calculate the inverse Graetz number $L_s^*$ for flow Reynolds number of 300, Prandtl number of 7, and nondimensional slug length of 5.

- 0.24
- 420
- 42
- 0.0024

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.0024

What would be the Nusselt number in a slug for the parameters given in Q. 17 for constant wall heat flux boundary condition?

- 15
- 19
- 4.363
- 10

No, the answer is incorrect.
Score: 0
Accepted Answers:
19
19. For a non-dimensional film thickness of 20 microns, what is the film Nusselt number? Use length scale as the film thickness.

- 100
- 1
- 10
- None

No, the answer is incorrect.
Score: 0
Accepted Answers:
1

20. Refer to Q. 19, what is the Nusselt number if the length scale used is the channel diameter (1 mm)?

- 100
- 1
- 50
- 10

No, the answer is incorrect.
Score: 0
Accepted Answers:
50