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Unit 3 - Module 1

Course outline

New Unit

assignment zero

Module 1

- Lesson 1: An Introduction
- Lesson 2: Interface and Surface Tension
- Lesson 3: Flow Regimes 1
- Quiz : Assignment one

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Assignment one

The due date for submitting this assignment has passed. **Due on 2018-02-22, 13:29 IST.**

Submitted assignment

1) The slip length in the Navier slip model would be _____ when no slip boundary condition is **1 point** valid on the wall

- one
- zero
- infinite
- none of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
zero

2) What is no slip condition **1 point**

- $V_{\text{tangential, wall}} = 0$
-

$V_{\text{tangential, wall}} = V_{\text{wall}}$

-
- $V_{\text{tangential, wall}} = -V_{\text{wall}}$
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:

$V_{\text{tangential, wall}} = V_{\text{wall}}$

3) What is Bond number **1 point**

- Ratio of buoyancy and surface tension effects
- Ratio of mean free path or the characteristic length scale
- Ratio of inertial effects to viscous effects
- Ratio of viscous to inertial effects

No, the answer is incorrect.
Score: 0

Accepted Answers:
Ratio of buoyancy and surface tension effects

1.4) Surface tension **1 point**

- increases with increase in temperature

- decreases with increase in temperature
- decreases with increase in pressure
- remain constant with temperature change

No, the answer is incorrect.

Score: 0

Accepted Answers:

decreases with increase in temperature

5) With increase in surfactant concentration, surface tension

1 point

- increases
- decreases
- remain constant
- increases then decreases

No, the answer is incorrect.

Score: 0

Accepted Answers:

decreases

6) At low concentration, surface tension

1 point

- decreases linearly
- decreases exponentially
- increases linearly
- remain constant

No, the answer is incorrect.

Score: 0

Accepted Answers:

decreases linearly

7) This flow regime is not observed in vertical channels:

1 point

- Bubbly flow
- Stratified flow
- Slug flow
- Annular flow

No, the answer is incorrect.

Score: 0

Accepted Answers:

Stratified flow

8) What is Suratman number ?

1 point

- Re/Ca
- $Re Ca$
- $Re + Ca$
- None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Re/Ca

9) Capillary number for flow of a bubble moving with a velocity of 0.1 m/s in a 1 mm channel is 10 times to that in a 1 cm channel. **1 point**

- True
- False

No, the answer is incorrect.

Score: 0

Accepted Answers:*False*

10) When the channel size changes from 1 m to 1 mm, the surface area to volume ratio becomes

1 point

- 0.001 times
- 1000 times
- 10^6 times
- 10^{-6}

No, the answer is incorrect.**Score: 0****Accepted Answers:***1000 times*

11) The pressure jump between the inside and outside of an air bubble of 1 mm diameter in water is ____ Pa.

1 point

- 14
- 144
- 0.14
- 1440

No, the answer is incorrect.**Score: 0****Accepted Answers:***144*

12) Superficial velocity of gas (in m/s) in a channel having cross sectional area of 1 mm² having gas flow rate of 0.01 g/s would be (assume gas density to be 2 kg/m³):

1 point

- 10
- 5
- 1
- 0.5

No, the answer is incorrect.**Score: 0****Accepted Answers:***5*

13) Which amongst these should be considered and evaluated while analysing flow in microchannels

1 point

- Surface effects
- Non-continuum effects
- Low Reynolds number effects
- All of the above

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

14) What is Reynolds number

1 point

- Ratio of characteristic length scale to the mean free path
- Ratio of mean free path or the characteristic length scale
- Ratio of inertial effects to viscous effects
- Ratio of viscous to inertial effects

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

Ratio of inertial effects to viscous effects

1.15) Knudsen number is

1 point

- Ratio of characteristic length scale to the mean free path
- Ratio of mean free path or the characteristic length scale
- Ratio of inertial effects to viscous effects
- Ratio of viscous to inertial effects

No, the answer is incorrect.**Score: 0****Accepted Answers:***Ratio of mean free path or the characteristic length scale*

1.16) Fluid can be considered continuum if

1 point

- $Kn \geq 10$
- $Kn \leq 10^{-2}$
- $10^{-2} < Kn < 0.1$
- $0.1 < Kn < 10$

No, the answer is incorrect.**Score: 0****Accepted Answers:** *$Kn \leq 10^{-2}$*

17) What is Electrophoresis

1 point

- Movement of a charged surface relative to a stationary liquid due to an external electric field
- Movement of a charged surface relative to a moving liquid due to an external electric field
- Movement of a charged surface relative to a stationary liquid due to an internal electric field
- Movement of a charged surface relative to a stationary surface due to an external electric field

No, the answer is incorrect.**Score: 0****Accepted Answers:***Movement of a charged surface relative to a stationary liquid due to an external electric field*

18) At the molecular level, separation between two immiscible fluids depends upon

1 point

- Molecular interactions between them
- Brownian diffusion
- Both a and b
- none of the above

No, the answer is incorrect.**Score: 0****Accepted Answers:***Both a and b*

19) Surface tension becomes zero at

1 point

- Critical temperature
- Saturation temperature
- Critical pressure
- Saturation pressure

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

1.20) What is a capillary number

1 point

- Ratio of buoyancy and surface tension effects

- Ratio of viscous and capillary stresses
- Ratio of mean free path or the characteristic length scale
- Ratio of viscous to inertial effects

No, the answer is incorrect.

Score: 0

Accepted Answers:

Ratio of viscous and capillary stresses

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