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reviewer1@nptel.iitm.ac.in ▼

Courses » Multiphase Microfluidics Announcements Course Ask a Question Progress Mentor

Unit 10 - Module 8

Course outline

New Unit

assignment zero

Module 1

Module 2

Module 3

Module 4

Module 5

Module 6

Module 7

Module 8

[Week 08 Lec 01] Inertial Microfluidics

[Week 08 lec 02] Microfluidic Applications

[Week 08 Lec 03] Microfluidic applications contd.

[Week 08 Lec 04] Concluding Remarks

Quiz : Assignment 8

Assignment 8

The due date for submitting this assignment has passed. **Due on 2018-04-06, 23:59 IST.**

Submitted assignment

1) Which of the following term causes non-linearity in the Navier –Stokes equation for a **1 point** compressible, Newtonian fluid having constant viscosity

- Unsteady term
- Convection or inertial term
- Viscous term
- Pressure gradient term

No, the answer is incorrect.

Score: 0

Accepted Answers:

Convection or inertial term

2) An implication of “the mirror symmetry time reversal theorem” is: **1 point**

- There is always a lift forces acting on a rigid symmetrical spherical particle in a channel for low Reynolds number ($Re < 1$)
- There cannot be any lift force on a rigid symmetrical spherical particle in a channel for low Reynolds number ($Re < 1$)
- There is always a drag force acting on a rigid symmetrical spherical particle in a channel for low Reynolds number ($Re < 1$)
- No drag force acts on a rigid symmetrical spherical particle in a channel for low Reynolds number ($Re < 1$)

No, the answer is incorrect.

Score: 0

Accepted Answers:

There cannot be any lift force on a rigid symmetrical spherical particle in a channel for low Reynold number ($Re < 1$)

3) Tubular pinch effect **1 point**

- Randomly distributed particle introduced at different location in channel attain particular focusing position between axis and wall at low Reynolds number
- Randomly distributed particle introduced at different location in channel attain particular focusing position between axis and wall at high Reynolds number

Randomly distributed particles introduced at different location in channel focused at the centre of the channel

None of these

No, the answer is incorrect.

Score: 0

Accepted Answers:

Randomly distributed particle introduced at different location in channel attain particular focusing position between axis and wall at high Reynolds number

4) The flow of particle in a channel can become non-linear because of **1 point**

- Non-Newtonian behaviour e.g. power law fluids
- Non-symmetric or flexible particles
- Non-negligible inertial effect
- All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Non-Newtonian behaviour e.g. power law fluids

5) Lift force on the particles flowing in a channel can be caused by **1 point**

- Shear gradient induced lift force
- Shear-induced lift force
- Particle rotation lift force
- All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

6) Which among the following is the primary cause of inertial focusing along with the lift force caused by wall lubrication **1 point**

- Particle rotation lift force
- Shear gradient induced lift force
- Shear-induced lift force
- All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Shear gradient induced lift force

7) In a square channel, generally _____ focusing positions are obtained **1 point**

- 2
- 4
- 6
- 8

No, the answer is incorrect.

Score: 0

Accepted Answers:

4

8) In a rectangular channel with aspect ratio far from one, the number of focusing positions are **1 point**

- Four
- Two, near the wider faces

- Two, near the narrow faces
- None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Two, near the wider faces

9) An increase in the Reynolds number

1 point

- Does not affect the equilibrium position of the particle
- Shifts the equilibrium position away from the wall
- Shifts the equilibrium position near the wall
- None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Shifts the equilibrium position near the wall

10) For which of the following, the application of inertial focusing is being explored?

1 point

- Flow cytometry
- Cell separation
- Exchange of fluids around cells
- All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

11) For which of the following, the application of inkjet printing is prominent/being explored?

1 point

- Living cell printing
- Textile printing
-
- Printed circuit boards (PCBs)
- All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

12) The ink is transferred as liquid drops by physical contact between print head and surface on which printing is to be done in ink jet printing technique

1 point

- False
- True

No, the answer is incorrect.

Score: 0

Accepted Answers:

False

13) In drop on demand (DOD) printing technology for inkjet printer

1 point

- Continuous jet of ink is disintegrated into drops and printed on the substrate
-
- The droplet which are not required are to be printed on substrate deflected and collected for reuse
- Only those droplets of ink which are required for printing are discharged from the ink reservoir

All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Only those droplets of ink which are required for printing are discharged from the ink reservoir

14) Which of the following criteria should a printable liquid fulfil: 1 point

- Splashing on the substrate should be avoided
- Formation of satellite droplet should be avoided
- The jet of the fluid must have sufficient energy for drop formation
- All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

15) Which of the following is an application of microfluidics in oil and gas industries 1 point

- Measurement of oil and gas properties
- Assessment of reservoir processes at the pore scale
- Both a and b
- None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Measurement of oil and gas properties

16) Which of the following gas-liquid reactions are good candidates to be performed in microreactors 1 point

- Fast reaction rate
- Highly exothermic reactions
- Mass transfer limited reactions
- All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

17) According to Fahreus-Lindquist effect 1 point

- The relative viscosity of blood increases with increase in temperature
- The relative viscosity of blood decreases with increase in temperature
- The relative viscosity of blood increases as channel size decreases below 300 μm
- The relative viscosity of blood decreases as channel size decreases below 300 μm

No, the answer is incorrect.

Score: 0

Accepted Answers:

The relative viscosity of blood decreases as channel size decreases below 300 mm

18) Which among the following in an application of microfluidics in biology? 1 point

- Hemorheology
- Integrated analysis system
- Cell encapsulation
- All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

Previous Page

End

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