Unit 4 - Week 2

Course outline

How to access the portal

Week 0 Assignment 0

Week 1

Week 2

Lecture 6 : Surface tension driven flows

Lecture 7 : Modulating surface tension

Lecture 8 : Lab on a CD

Lecture 9 : Introduction to Electrokinetics

Lecture 10 : Introduction to Electrokinetics-part II

Lecture Material

Quiz : Assignment 2

Feedback for Week 2

Week 3

Week 4

Download Videos

Solution

Text Transcripts

Assignment 2

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-09-11, 23:59 IST.

1) *1 point*

If 's' is the wicking length and 't' is the wicking time of liquid in a capillary, then which of the following options depicts the correct nature of the solution of the 1-D Lucas Washburn equation?

a) $s \propto t$
b) $s \propto t^2$
c) $s \propto e^{-t}$
d) $s \propto \sqrt{t}$

a.
b.
c.
d.

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

2) Which of the flowing components of blood directly affects its flow dynamics? *1 point*

a) Red blood cells
b) White blood cells
c) Both (a) and (b)
d) None of the above

a.
b.
c.
d.

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

3) *1 point*

For a capillary dipped vertically in a liquid, the capillary equilibrium height can be obtained by

a) Balance between viscous and gravity forces
b) Balance between viscous and surface tension forces
c) Balance between surface tension and gravity forces
d) By considering cumulative effect of gravity, surface tension and viscous forces.

a.
b.
c.
d.

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

4) *1 point*

Contact angle at the three-phase contact line can be defined from which of the below mentioned equations

(a) Young-Laplace equation
(b) Young-Lipmann equation
(c) Lucas-Washburn equation
(d) Young's equation

a.
b.
c.
d.

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

5) The part of an electrical double layer consisting of stationary charges is called *1 point*

(a) Stern Layer
(b) Diffuse Layer
(c) Shear Plane
(d) Helmholtz layer

a.
b.
c.
d.

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

6) *1 point*

The Young-Laplace equation for a planar membrane is given by

(a) $\Delta p = 2\sigma/R$
(b) $\Delta p = 0$
(c) $\Delta p = 2\sigma$.
(d) none of these
where σ = interfacial tension, R = radius of curvature and Δp = pressure difference accross the membrane

a.
b.
c.
d.

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

7) *1 point*

In a Lab-on-a-CD setup, Burst Frequency is defined as the

(a) frequency of rotation of a CD above which a sample starts moving by overcoming the viscous force
(b) frequency of rotation of a CD above which a sample starts moving by overcoming the Euler forces
(c) frequency of rotation of a CD above which a sample starts moving by overcoming the surface tension force
(d) all of these

a.
b.
c.
d.

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

8) *1 point*

Which of the following velocity profile is obtained in a purely electro-osmotic flow outside the electrical double layer?

(a) parabolic
(b) hyperbolic
(c) uniform
(d) none of these

a.
b.
c.
d.

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

9) *1 point*

For a Lab-on-a-CD setup, if the CD is made of a polycarbonate material with contact angle equal to 120°, then the surface tension force

a) acts as the driving force
b) acts as a resistive force
c) does not exist in this case
d) none of the above.

a.
b.
c.
d.

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

10) Which of the below factors may affect the plug-like profile in an electro-osmotic flow? *1 point*

a) Non-uniformity in zeta potential
b) Flow velocity
c) Both of the above
d) None of the above.

a.
b.
c.
d.

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

11) *1 point*

Separation of particles can be an important application of a Lab-on-a-CD setup. Which of the below forces is responsible for this phenomenon?

a) Euler Force
b) Centrifugal force
c) Surface tension force
d) Coriolis force

a.
b.
c.
d.

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

12) *1 point*

Consider a droplet present on a glass slide. If an electric potential is applied across the droplet, the contact angle will

(a) always increase
(b) always remain constant
(c) always decrease
(d) may increase or decrease

a.
b.
c.
d.

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