Unit 3 - Week 1

Assignment 1

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

For steady, fully developed flow inside a straight pipe of diameter D, neglecting gravity effects, the pressure drop Δp over a length L and the wall shear stress τ_w are related by

a) $\tau_w = \frac{\Delta p D}{4L}$

b) $\tau_w = \frac{\Delta p D^2}{4L}$

c) $\tau_w = \frac{\Delta p D}{2L}$

d) $\tau_w = \frac{\Delta p D}{L}$

a.
b.
c.
d.

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

2) 1 point

Transcription takes place in the _____ while Translation occurs in the _____ and is mediated by _____. Choose the correct set of answers.

a) Cytoplasm, Ribosome, Lysosome
b) Nucleus, Cytoplasm, Lysosome
c) Nucleus, Cytoplasm , Ribosome
d) Cytoplasm, Nucleus, Ribosome

a.
b.
c.
d.

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

3) 1 point

The property of cells referred to as "robustness" means:

a) performing chemical reactions to convert food energy into utilisable sugars
b) movement of some components of the cell
c) ability to produce two identical replicas of DNA
d) ability to maintain performance in the face of perturbations and uncertainty

a.
b.
c.
d.

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

4) 1 point

Lipid rafts are nanodomains of the plasma membrane, rich in :

a) Glycerol and phospholipid
b) Cholesterol and phospholipid
c) Cholesterol and sphingolipid
d) Glycerol and sphingolipid

a.
b.
c.
d.

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

5) 1 point

Which of the below options is true regarding the transport of single stranded DNA in microchannels during DNA hybridization?

a) Single stranded DNA is electrically neutral, hence cannot be influenced by electric field
b) In micro channels, diffusion of single stranded DNA takes place at a significantly high speed.
c) Use of electric field for DNA transport may lead to Joule heating in the sample and hybridized DNA may again get broken into single strands.
d) None of the above.

a.
b.
c.
d.

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

6) 1 point

While metastasis, cancer cells are able to withstand huge stress even while travelling through micro capillaries. Which of the following options state a possible reason for the above phenomenon.

a) As the cells sense the presence of the stress, the cell membrane becomes extremely rigid, so that the cell structure remains intact.
b) As the cells sense the presence of the stress, the cells shrink further in size so that they can pass easily through the micro capillaries.
c) As the cells sense the presence of the stress, the cell membrane becomes highly malleable and fluidic for subsequent shape adaptation.
d) None of the above.

a.
b.
c.
d.

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

7) 1 point

Microfluidic platform may be efficiently used to study cellular polarization for which type of cells:

a) Neuronal cells
b) Liver cells
c) Kidney cells
d) Bone cells

a.
b.
c.
d.

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

8) 1 point

A cylindrical channel A has cross sectional area double that of another cylindrical channel B. Length of both the channels are same. Moreover, volume flow rate of water through both the channels is identical. Assuming laminar and fully developed flow, Ratio of head loss in channel A to that in channel B is

a) 1/4
b) 16
c) 4
d) None of the above

a.
b.
c.
d.

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

9) 1 point

If we confine rough surfaces made of hydrophobic materials,

I) the liquid particles get trapped on the rough surfaces of the channel
II) Roughness and hydrophobicity together lead to the formation of a layer of tiny bubbles on the surface of the channels
III) The flow velocity is greatly reduced due to the hydrophobicity of the channel surface.
IV) Liquid appears to effectively slip on the surface.

Choose the correct combination from the below options:

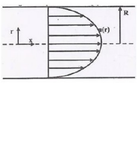
a) I and II
b) I and IV
c) II and IV
d) III and I

a.
b.
c.
d.

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

10) 1 point

The velocity profile of a fully developed laminar flow in a straight circular pipe, as shown in the figure, is given by the expression $u_r = -\frac{R^2}{4\mu}\left(\frac{dp}{dx}\right)\left(1-\frac{r^2}{R^2}\right)$, where $\left(\frac{dp}{dx}\right)$ is constant. The average velocity of fluid in the pipe is



a) $-\frac{R^2}{8\mu}\left(\frac{dp}{dx}\right)$

b) $-\frac{R^2}{4\mu}\left(\frac{dp}{dx}\right)$

c) $-\frac{R^2}{2\mu}\left(\frac{dp}{dx}\right)$

d) $-\frac{R^2}{\mu}\left(\frac{dp}{dx}\right)$

a.
b.
c.
d.

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