Unit 7 - Week 5

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Assignment 5

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

Due on 2019-09-04, 23:59 IST.

1) Kozeny Carman equation applies to a flow at *1 point*

a) Large Reynold's number
b) Small Reynold's number
c) Any Reynold's number
d) None of the above

- a.
- b.
- c.
- d.

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

2) Blake Plummer equation applies to a flow at *1 point*

a) Large Reynold's number
b) Small Reynold's number
c) Any Reynold's number
d) None of the above

- a.
- b.
- c.
- d.

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

3) For flow of water through a capillary of diameter 0.01 mm, length 0.1 m, at a velocity of 1 cm/s, calculate the friction factor. Water density of 1000 kg/m^3 and viscosity of 10^{-3} Pa.s are to be considered.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 600,700

1 point

4) For the same problem, as in Question 3 above, calculate the pressure drop (kPa).

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 300,360

1 point

5) Follow Ergun equation to calculate the pressure gradient (in MPa/m) for flow of water through packed bed of spherical particles (diameter 1 mm, overall porosity 0.3). The overall diameter of the packed bed is 0.5 m, and the flow rate is 10^{-5} m^3/s. The density and viscosity of water to be taken as 1000 kg/m^3 and 10^{-3} Pa.s respectively.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 7000,7500

1 point

6) If the bed referred in Question 5 is comprising of particles of density 2000 kg/m^3, what would be the pressure gradient (Pa/m) at incipient fluidization?

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 6500,7000

1 point

7) When a particle settles at terminal velocity, which of the following is true? *1 point*

a) Gravity force equals buoyancy force
b) Gravity force equals drag force
c) Buoyancy-corrected gravity force equals drag force
d) Drag force diminishes to zero

- a.
- b.
- c.
- d.

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

8) When the difference between terminal velocity of particles and the incipient fluidization velocity is not significant, then *1 point*

a) small particles get carried over on slightest change in fluid velocity above the minimum fluidization velocity
b) pressure drop across the bed decreases with further increase in superficial velocity
c) porosity decreases with further increase in superficial velocity
d) bed height decreases with further increase in superficial velocity

- a.
- b.
- c.
- d.

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

9) When the superficial velocity is less than the minimum fluidization velocity, the bed height *1 point*

a) is a function of superficial velocity
b) is same as the initial bed height
c) depends on the permeability of the bed
d) none of the above

- a.
- b.
- c.
- d.

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

10) The two terms in Ergun equation represents *1 point*

a) Shear and friction
b) Friction and vorticity
c) Shear and inertia
d) Shear and vorticity

- a.
- b.
- c.
- d.

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

11) For the same system, as elaborated in Question 5 and Question 6, calculate the minimum fluidization velocity (cm/s) when laminar flow term involving very small particles dominate. Assume porosity to be same as initial porosity.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.2,0.3

1 point

12) For the same system, as elaborated in Question 5 and Question 6, calculate the minimum fluidization velocity (cm/s) when laminar flow term becomes negligible due to very large size of particles.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 1,1.5

1 point

13) For one dimensional diffusion of a spot of solute, the total mass/moles of solute at any time is given by *1 point*

(a) $\int_{-\alpha}^{+\alpha} CAdZ$
(b) $\int_{-\alpha}^{+\alpha} CdZ$
(c) $\int_{0}^{+\alpha} CAdZ$
(d) None of the above

In the above problem *C* is the concentration of solute, and *A* is the area perpendicular to the axis of diffusion, over which the initial spot is stretched.

- a.
- b.
- c.
- d.

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

14) For the same system as in Question 13, calculate concentration (mg/L) at distance 1 cm from the origin after 1 minute. Assume total solute of 1 mg, and A = 1 cm^2, and D = 10^{-7} m^2/s

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 15,20

1 point

15) For the same system as in Question 13, calculate concentration (mg/L) at distance 1 cm from the origin at a time t = 5 minutes.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 200,250

1 point