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NPTEL

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Courses » Transport Phenomena of Non-Newtonian Fluids

Announcements **Course** Ask a Question Progress FAQ

Unit 8 - Week 6: Flow of Non-Newtonian Fluids though Porous Media

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Course outline

Week 06 Assignment 01

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment. **Due on 2019-03-13, 23:59 IST.**

Week 06 Assignment 01

1) Which of the following properties are important in order to define a porous media at macroscopic level: ***4 points***

- Voidage and tortuosity
- Specific surface
- Permeability
- All above a), b), and c) points are required

No, the answer is incorrect.
Score: 0

Accepted Answers:
All above a), b), and c) points are required

2) Specific surface for a bed of particles is defined as ***4 points***

- Surface area per unit volume of the bed
- Cross sectional area of particle per unit volume of particle
- Surface area of particle per unit volume of particle
- None of the above a), b) and c) points are true

No, the answer is incorrect.
Score: 0

Accepted Answers:
Surface area per unit volume of the bed

3) Hydraulic mean diameter for a packed bed is defined as? ***4 points***

- 4 × (flow area) × (wetted perimeter)

Accepted Answers:
4 × (flow area) / (wetted perimeter)

4) For flow of a fluid through a bed of spherical particles packing in a tubular column, what is the relation between superficial velocity (V_o) and interstitial velocity (V_i)? ***4 points***

- $V_i = V_o \times \varepsilon$
- $V_i = V_o / \varepsilon$
- $V_o = V_i / \varepsilon$
- None of the above a), b) and c) points are true

No, the answer is incorrect.
Score: 0

Accepted Answers:
$V_i = V_o / \varepsilon$

5) For a fluid flowing through a bed of particles, the friction factor is defined as: ***4 points***

- None of the above a), b) and c) points are true

No, the answer is incorrect.
Score: 0

Accepted Answers:

6) For the case of flow through beds of particles under fixed bed conditions: ***4 points***

- None of the below b), c), and d) points are true
- Pressure drop independent of superficial velocity
- Pressure drop inversely proportional to superficial velocity
- Pressure drop linearly increases with superficial velocity

No, the answer is incorrect.
Score: 0

Accepted Answers:
Pressure drop linearly increases with superficial velocity

7) For the case of flow through beds of particles under fluidized conditions: ***4 points***

- None of the below b), c), and d) points are true
- Pressure drop independent of superficial velocity
- Pressure drop inversely proportional to superficial velocity
- Pressure drop linearly increases with superficial velocity

No, the answer is incorrect.
Score: 0

Accepted Answers:
Pressure drop independent of superficial velocity

8) For a fluidized bed conditions, what is the relation between Galileo number and superficial velocity of the fluid: ***4 points***

- Galileo number increases with superficial velocity
- Galileo number decreases with superficial velocity
- Galileo number is independent of superficial velocity

None of the above a), b) and c) points are true

No, the answer is incorrect.
Score: 0

Accepted Answers:
Galileo number is independent of superficial velocity

9) What is the specific area of spherical particles of diameter d? ***4 points***

6/d
d/6
6d
None of the above a), b) and c) points are true

No, the answer is incorrect.
Score: 0

Accepted Answers:
6/d

10) For a packed bed of spherical particles, what is hydraulic mean diameter in terms of packing characteristics? ***4 points***

None of the above a), b) and c) points are true

No, the answer is incorrect.
Score: 0

Accepted Answers:

11) What is the minimum fluidizing velocity for a bed consisting of 3.57 mm glass spheres (density 2500 kg/m^3) in a 101 mm diameter column using a power-law polymer solution (m = 0.35Pa s^n, n = 0.6 and density 1000 kg/m^3) if the bed voidage at the incipient fluidized condition is 37.5%. Reynolds number is defined as: ***15 points***

25.2 mm/s
1.02 mm/s
100 mm/s
0.01 mm/s

No, the answer is incorrect.
Score: 0

Accepted Answers:
1.02 mm/s

12) In a laboratory size treatment plant, it is required to pump the sewage sludge through a bed of porcelain spheres packed in a 50 mm diameter column. The rheological behaviour of the sludge (density 1008 kg/m^3) can be approximated by a power-law model with m = 3.8 Pa s^n and n = 0.4. What is the diameter of the spherical packing (voidage 0.4) which will be required to obtain a pressure gradient of 8 MPa/m at a flow rate of 3.6 m^3/h? Reynolds number is defined as: ***15 points***

950µm
650µm
350µm

150µm

No, the answer is incorrect.
Score: 0

Accepted Answers:
950µm

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