

## Unit 5 - Week 3

### Course outline

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- Lecture 11 : Fluid - particle mechanics (Contd.)
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## Assignment 3

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

**Due on 2019-08-21, 23:59 IST.**

- 1) How is the terminal velocity for Newton's law region related to the particle size,  $x$ ? 1 point
- a.  $x^2$   
b.  $x$   
c.  $x^{1/2}$   
d.  $x^{-1/2}$
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
c.
- 2) The dependence of drag coefficient on Reynolds number for Stokes' law region is: 1 point
- a. Inversely proportional  
b. Proportional  
c. Independent  
d. None of the above
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
a.
- 3) Which of these hold true for the boundary layer separation region? 1 point
- a.  $0.3 < Re_p < 500$   
b.  $500 < Re_p < 2 \times 10^5$   
c.  $Re_p > 2 \times 10^5$   
d.  $Re_p < 0.3$
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
c.
- 4) Which of these forces is not a contributing factor to the total drag force, as given by Stokes' law? 1 point
- a. Pressure drag force  
b. Shear stress drag force  
c. Wave drag force  
d. None of the above
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
c.
- 5) In which settling region, the drag coefficient is observed to be independent of Reynolds number? 1 point
- a. Intermediate law region  
b. Stokes' law region  
c. Newton's law region  
d. None of the above
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
c.
- 6) Which of these hold true for intermediate law region? 1 point
- a.  $0.3 < Re_p < 500$   
b.  $500 < Re_p < 2 \times 10^5$   
c.  $Re_p > 2 \times 10^5$   
d.  $Re_p < 0.3$
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
a.
- 7) In Stokes' flow regime, a particle is: 1 point
- a. always accelerating  
b. always decelerating  
c. stagnant  
d. of zero acceleration
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
d.
- 8) Which of the following dimensionless expressions is required for calculating the particle size,  $x$ , for a given terminal velocity? 1 point
- a.  $C_D Re_p$   
b.  $C_D Re_p^2$   
c.  $C_D / Re_p$   
d.  $C_D / Re_p^2$
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
c.
- 9) In the intermediate settling region, the settling velocity is not directly proportional with which of the following? 1 point
- a.  $(\rho_p - \rho_f)^{0.7}$   
b.  $\mu^{-0.43}$   
c.  $x^2$   
d. None of the above
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
c.
- 10) Which of the following parameters account for the presence of a solid boundary during terminal velocity calculation? 1 point
- a.  $f_w$   
b.  $x$   
c.  $\rho_p$   
d. None of the above
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
a.
- 11) A sphere ( $x = 14$  mm and  $\rho_p = 6500$  kg/m<sup>3</sup>) falls under gravity at terminal conditions through a liquid ( $\rho_f = 980$  kg/m<sup>3</sup>) in a tube of diameter 18 mm. The measured terminal velocity of the particle is 2.0 mm/s. Calculate the viscosity of the fluid. 2 points
- a. 9.76 Pa.s  
b. 7.65 Pa.s  
c. 4.11 Pa.s  
d. 8.82 Pa.s
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
a.
- 12) A sphere ( $x = 8$   $\mu$ m and  $\rho_p = 2600$  kg/m<sup>3</sup>) falls under gravity at terminal conditions through a liquid ( $\rho_f = 1080$  kg/m<sup>3</sup>). The particle Reynold number is 0.286. Calculate the terminal velocity. 2 points
- a. 1.02 mm/s  
b. 1.33 mm/s  
c. 2.28 mm/s  
d. 2.55 mm/s
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
b.
- 13) What is the drag coefficient for a particle of 10 mm in diameter and density 2500 kg/m<sup>3</sup>, settling in a stagnant fluid whose density is 850 kg/m<sup>3</sup> and viscosity is 0.01 Pa.s, at a velocity of 35 mm/s? 2 points
- a. 2.05  
b. 1.76  
c. 1.26  
d. 1.35
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
a.
- 14) What is the drag coefficient for a particle of 5 mm in diameter and density 2000 kg/m<sup>3</sup>, settling in a stagnant fluid whose density is 1120 kg/m<sup>3</sup> and viscosity is 0.0089 Pa.s, at a velocity of 1 m/s? 2 points
- a. 1.85  
b. 1.65  
c. 0.86  
d. 0.44
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
d.
- 15) For a particular case of a particle (density = 2890 kg/m<sup>3</sup>) settling in a fluid (density = 825 kg/m<sup>3</sup> and viscosity = 0.2 Pa.s), the values of constants  $C_D Re_p^2$  and  $C_D / Re_p$  are given as 8704.46 and  $9.921 \times 10^{-4}$  respectively. What is the particle Reynolds number? 2 points
- a. 312.56  
b. 598.64  
c. 267.24  
d. 206.25
- a.  
 b.  
 c.  
 d.
- No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
d.