1. An oil is flowing down a vertical wall as a film 1.7 mm thick . The oil density is 820 kg/m^3 and the viscosity is 0.2 Pa.s. calculate the mass flow rate per unit width of wall.

a) 0.54 Kg m^{-1}. s^{-1}
b) 0.054 Kg m^{-1}. s^{-1}
c) 0.27 Kg m^{-1}. s^{-1}
d) 0.014 Kg m^{-1}. s^{-1}

Ans. B

2. In question 1 calculate Reynolds number?

a) 1.08
b) 10.80
c) 5.4
d) 1.28

Ans. A

3. In question 1 calculate average velocity of flow in m/s?

a) 0.0037

b) 0.037

c) 0.028

d) 0.0028

Ans. b

4. The sphericity of cylinder with diameter 1 cm and height 1 cm is

a) 0.834
b) 0.874
c) 0.912
d) 0.956

Ans. b

5. If an object has the volume V_p, Diameter D_p and surface area S_p, then the sphericity of that object can be given as

a) $\frac{6*Vp}{Dp*Sp}$

b) $\frac{6*Dp}{Vp*Sp}$

c) $\frac{6*Sp}{Vp*Dp}$

d) None of the above

Ans. a

6. If ε_{mf} is the porosity of the bed at minimum fluidization then the height of the bed at minimum fluidization when there is no porosity can be find out as

a) $L*(1- \varepsilon_{mf})$

b) $L/(1- \varepsilon_{mf})$

c) $L* \varepsilon_{mf}$

d) L/ ε_{mf}

Ans. B

7. A plate heat exchanger is used to sterilize apple juice. The gap between the plates is 10 mm and of 3 m long. Assume density and viscosity of apple juice to be 1060 kg m^{-3} and 1 x 10^{-3} respectively. What is the average velocity in cm/s if the Reynolds Number is 1200?

a) 5.6

b) 11.2

c) 0.056

d) 0.112

Ans. a

8. Calculate the pressure drop in question 7.

a) 0.20 Pa

b) 20.16 Pa

c) 3.7 Pa

d) 0.37 Pa

Ans. B