Assignment 2

Due on 2020-08-13, 23:59 IST.

1. Dispersed flow models are applicable to:
   - Void fraction less than 0.3
   - Dynamic ratio less than 0.3
   - Negligible relative velocity
   - All of the above
   
   No, the answer is incorrect.

   Answer:
   Void fraction less than 0.3

   Marks: 1 point

2. For fully developed slug flow in vertical tube, bubble velocity can be written as:
   - \( \frac{dV}{dt} = \frac{1}{1 + \frac{1}{2} \left( \frac{dV}{dt} \right)^2} \)
   - \( \frac{dV}{dt} = \frac{1}{1 - \frac{1}{2} \left( \frac{dV}{dt} \right)^2} \)
   - \( \frac{dV}{dt} = \frac{1}{1 + \frac{1}{2} \left( \frac{dV}{dt} \right)^2} \)
   - \( \frac{dV}{dt} = \frac{1}{1 - \frac{1}{2} \left( \frac{dV}{dt} \right)^2} \)
   - \( \frac{dV}{dt} = \frac{1}{1 - \frac{1}{2} \left( \frac{dV}{dt} \right)^2} \)

   No, the answer is incorrect.

   Answer:
   \( \frac{dV}{dt} = \frac{1}{1 + \frac{1}{2} \left( \frac{dV}{dt} \right)^2} \)

   Marks: 1 point

3. For determination of film thickness in annular flow \( \delta = \frac{\pi d_t d_w}{4} \).

   Value of \( \delta \) is:
   - 0
   - 1
   - 0.5
   - 2
   - 3

   No, the answer is incorrect.

   Answer:
   0.5

   Marks: 1 point

4. In case of emulsified flow with negligible surface tension, wave is generated due to:
   - Taylor-Cullis instability
   - Kelvin-Helmholtz instability
   - Rayleigh-Taylor instability
   - Kelvin-Helmholtz instability
   - Rayleigh-Taylor instability

   No, the answer is incorrect.

   Answer:
   Rayleigh-Taylor instability

   Marks: 1 point

5. Which one is not a part of signal processing circuit of Conductivity probe for gas-liquid flow?
   - Probe
   - Amplifier
   - Filter
   - Diode
   - None of the above

   No, the answer is incorrect.

   Answer:
   None of the above

   Marks: 1 point

6. Consider the flow of air and water inside a vertical tube of 2.5 cm diameter. For this flow investigation, film flows are also to be investigated. Using falling-film approximation, film thickness can be written as, \( \delta = \frac{\pi d_t d_w}{4} \). All students are having their exam seminar. Assume the film flow as Newtonian for which inertial flow rate per unit width can be expressed as \( \dot{m} = \frac{\pi d_t \delta \rho \mu}{2} \). Find the following quantities for the average flow rate of 0.8 \( \times 10^{-3} \) m/s. Take liquid and gas densities as 1000 kg/m³ and 1.2 kg/m³, respectively. Viscosity of liquid is 0.01 kg/ms. More flow rate of the film is
   - 0.4
   - 0.5
   - 0.6
   - 0.7
   - None of the above

   No, the answer is incorrect.

   Answer:
   0.6

   Marks: 1 point

7. Consider the same problem in Q6. Film thickness is in m.

   - 1.737
   - 2.164
   - 2.852
   - 1.249
   - 1.59

   No, the answer is incorrect.

   Answer:
   2.164

   Marks: 1 point

8. Consider the same problem in Q6. The film velocity at \( y = 1 \) mm.

   - 5.42 m/s
   - 7.53 m/s
   - 3.96 m/s
   - 6.25 m/s
   - 4.73 m/s

   No, the answer is incorrect.

   Answer:
   6.25 m/s

   Marks: 1 point


   - 12.137
   - 15.961
   - 15.975
   - 21.142
   - 11.12

   No, the answer is incorrect.

   Answer:
   15.961

   Marks: 1 point


    - 28.45
    - 23.47
    - 26.412
    - 34.26
    - 28.933

    No, the answer is incorrect.

    Answer:
    26.412

    Marks: 1 point