

Unit 4 - Week 2: Process Variables and Rate

Course outline
How does an NPTEL online course work?
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<ul style="list-style-type: none"> Lecture 2.1: Variables and Properties of Material in System Lecture 2.2: Pressure and Temperature of Flow Process Lecture 2.3: Rate of Process Quiz : Assignment 2 Solution: Assignment 2 Feedback form
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Assignment 2

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

Due on 2020-02-12, 23:59 IST.

Module 2: Process variables and rates

All questions are compulsory
The assignment consists of 15 questions
Each question carries equal marks (1 mark)
There is no any negative marking for selecting the wrong choice.
Assume the value of constants, if data is not provided in the problem

1) Which of the following is an extensive property? 1 point

- Pressure
- Temperature
- Density
- Mass

No, the answer is incorrect. Score: 0

Accepted Answers: Mass

2) Which of the following expression is used to obtain API gravity of petroleum products from specific gravity (SG) of fluid? 1 point

- $API = 131.5/SG$
- $API = 141.5/SG$
- $API = (141.5/SG) - 131.5$
- $API = (131.5/SG) - 141.5$

No, the answer is incorrect. Score: 0

Accepted Answers: $API = (141.5/SG) - 131.5$

3) The density of mixture for three phase system (Gas, Liquid and Solid) is expressed as - 1 point
Given: ρ_m, ρ_g, ρ_l , and ρ_s are the density of mixture, gas, liquid and solid respectively

α_g, α_l , and α_s , are the volume fraction of gas, liquid and solid respectively

- $\rho_m = \rho_g + \rho_l + \rho_s$
- $\rho_m = (1 - \alpha_g) \rho_g + (1 - \alpha_l) \rho_l + (1 - \alpha_s) \rho_s$
- $\rho_m = (\alpha_g - 1) \rho_g + (\alpha_l - 1) \rho_l + (\alpha_s - 1) \rho_s$
- $\rho_m = \alpha_g \rho_g + \alpha_l \rho_l + \alpha_s \rho_s$

No, the answer is incorrect. Score: 0

Accepted Answers: $\rho_m = \alpha_g \rho_g + \alpha_l \rho_l + \alpha_s \rho_s$

4) Dielectric material has 1 point

- High thermal conductivity
- Poor electrical conductivity (or high polarizability)
- A ratio of permittivity of free space to permittivity of substance equal to 1
- All of the above

No, the answer is incorrect. Score: 0

Accepted Answers: Poor electrical conductivity (or high polarizability)

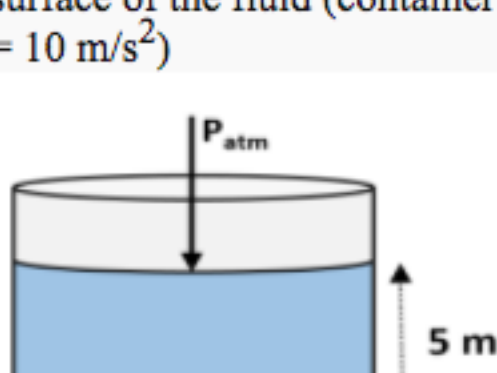
5) Which of the following is NOT a unit of pressure? 1 point

- bar
- Pascal
- atm
- Stokes

No, the answer is incorrect. Score: 0

Accepted Answers: Stokes

6) A fluid having density 1000 kg/m^3 is filled in a cylindrical container up to 5 m height. Atmospheric pressure is acting at top surface of the fluid (container is open from top as shown in figure). Calculate the absolute pressure (kN/m^2) at bottom of the container. (Take $g = 10 \text{ m/s}^2$) 1 point



- 5
- 50
- 15
- 150

No, the answer is incorrect. Score: 0

Accepted Answers: 150

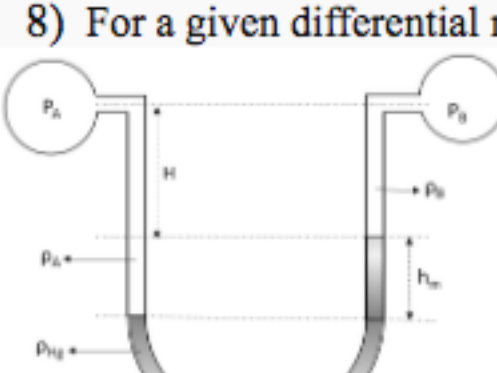
7) Gauge pressure of ZERO indicates 1 point

- Absolute pressure = Atmospheric pressure
- Absolute pressure = 0
- Atmospheric pressure = 0
- Absolute pressure = infinity (∞)

No, the answer is incorrect. Score: 0

Accepted Answers: Absolute pressure = Atmospheric pressure

8) For a given differential manometer, pressure difference $P_A - P_B$ expressed as 1 point



- $P_A - P_B = (\rho_{Hg} - \rho_A) g h_m$
- $P_A - P_B = (\rho_B - \rho_A) g h_m$
- $P_A - P_B = (\rho_B - \rho_A) g h_m + (\rho_{Hg} - \rho_A) g H$
- $P_A - P_B = (\rho_{Hg} - \rho_A) g H$

No, the answer is incorrect. Score: 0

Accepted Answers: $P_A - P_B = (\rho_B - \rho_A) g h_m + (\rho_{Hg} - \rho_A) g H$

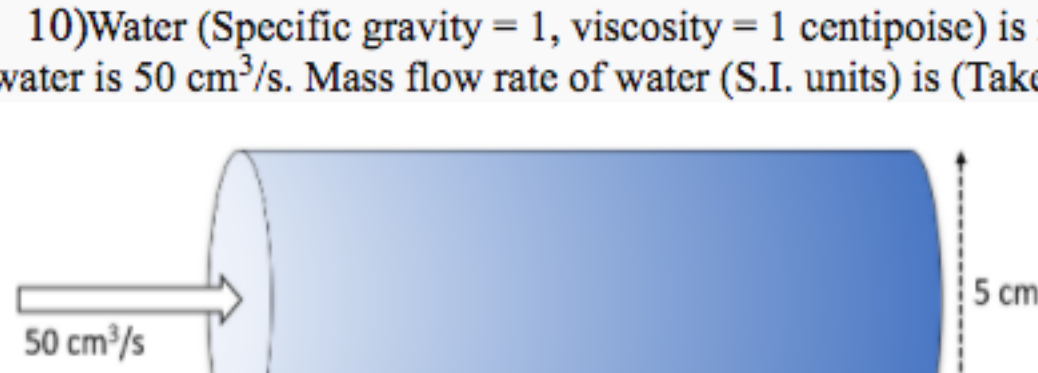
9) Pyrometer device is used to measure 1 point

- Flowrate
- Resistance of a metal
- Temperature
- Viscosity

No, the answer is incorrect. Score: 0

Accepted Answers: Temperature

10) Water (Specific gravity = 1, viscosity = 1 centipoise) is flowing inside the pipe having diameter 5 cm. Volumetric flowrate of water is $50 \text{ cm}^3/\text{s}$. Mass flow rate of water (S.I. units) is (Take $g = 10 \text{ m/s}^2$) 1 point



- 0.05
- 1
- 0.5
- 50

No, the answer is incorrect. Score: 0

Accepted Answers: 0.05

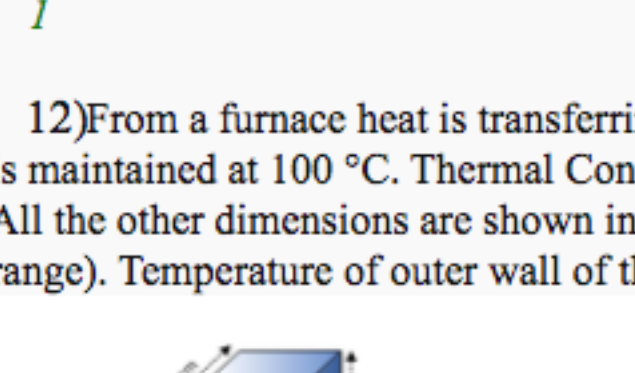
11) Emissivity coefficient for ideal black body is 1 point

- 0
- 1
- ∞
- None of the above

No, the answer is incorrect. Score: 0

Accepted Answers: 1

12) From a furnace heat is transferring from a thin wall (thickness = 10 cm) to atmosphere ($T = 25 \text{ }^\circ\text{C}$). The inside wall temperature is maintained at $100 \text{ }^\circ\text{C}$. Thermal Conductivity of wall is 0.2 W/m.k and heat transfer coefficient from outer wall to atmosphere is $2 \text{ W/m}^2\text{.k}$. All the other dimensions are shown in figure. (Steady state heat transfer and thermal conductivity is independent of temperature in a given range). Temperature of outer wall of the furnace is 1 point



- 125
- 250
- 31.25
- 62.5

No, the answer is incorrect. Score: 0

Accepted Answers: 62.5

13) Unit of Diffusivity is (m = meters, and s = seconds) 1 point

- m/s
- m
- m^2/s
- s

No, the answer is incorrect. Score: 0

Accepted Answers: m^2/s

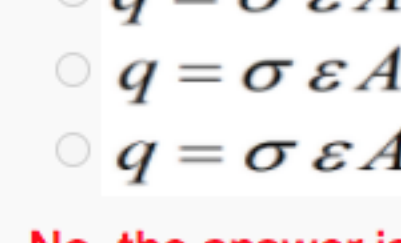
14) The Stefan-Boltzmann law expressed as (σ = Stefan-Boltzmann constant, ϵ = emissivity, A = area, T = Temperature) 1 point

- $q = \sigma \epsilon AT^4$
- $q = \sigma \epsilon AT^3$
- $q = \sigma \epsilon AT^2$
- $q = \sigma \epsilon AT^1$

No, the answer is incorrect. Score: 0

Accepted Answers: $q = \sigma \epsilon AT^4$

15) Find the order and molecularity of an elementary reaction given as 1 point



- 2, 2
- 3, 2
- 3, 3
- 2, 5

No, the answer is incorrect. Score: 0

Accepted Answers: 3, 3