

Possible questions for the final exam – CEE 3500 – Fall 2005
Part 1 – Fluid properties, Statics

- [1]. What is the basic unit of force in the British Gravitational (BG) system of units?
- [2]. What is the basic unit of mass in the British Gravitational (BG) system of units?
- [3]. What is the basic unit of force in the International System (SI) of units?
- [4]. What is the basic unit of mass in the International System (SI) of units?
- [5]. If m is the mass of a fluid and V is its volume, the density ρ of this fluid is calculated as:
(a) V/m (b) m/g (c) m/V (d) mg
- [6]. If ρ is the density of a fluid, the specific volume is defined as:
(a) $1/\rho$ (b) ρg (c) g/ρ (d) ρ/g
- [7]. If W is the weight of a volume V of a liquid, then, the specific weight of a liquid, γ , is given by:
(a) V/W (b) W/g (c) W/V (d) Wg
- [8]. If a force F acts on a surface A , then the pressure p on the surface is defined as:
(a) F/A (b) A/F (c) AF (d) F/A^2
- [9]. The bulk modulus of elasticity of a liquid has units of:
(a) volume (b) pressure (c) force (d) viscosity
- [9]. An ideal fluid is one with zero viscosity. Thus, an ideal fluid is also known as a(n):
(a) incompressible fluid (b) viscous fluid (c) inviscid fluid (d) compressible fluid
- [10]. If μ is the absolute (or dynamic) viscosity of a fluid and ρ is its density, its kinematic viscosity is defined as:
(a) $\rho VD/\mu$ (b) ρg (c) $\mu\rho$ (d) μ/ρ
- [11]. Which one of the following is a unit of absolute viscosity?
(a) centipoise (b) newton (c) pascal (d) watt
- [12]. Which one of the following is a unit of kinematic viscosity?
(a) poise (b) newton (c) centistoke (d) watt
- [13]. Which one of the following is a unit of pressure?
(a) centipoise (b) newton (c) pascal (d) watt
- [14]. Which one of the following is a unit of power?
(a) centipoise (b) newton (c) pascal (d) watt

- [15]. The *horsepower (hp)* is a BG unit of:
 (a) energy (b) force (c) pressure (d) power
- [16]. ___ True or ___ False: Kinematic viscosity has dimensions of *length²/time* (L^2/T).
- [17]. ___ True or ___ False: Surface tension has dimensions of *Force/length* (F/L).
- [18]. $N \cdot s/m^2$ are units of _____ in the SI.
 (a) pressure (b) absolute viscosity (c) kinematic viscosity (d) kinetic energy
- [19]. ___ True or ___ False. The effect of water rising in small-diameter tubes due to surface tension is referred to as capillarity.
- [20]. ___ True or ___ False. Water is a wetting liquid.
- [21]. ___ True or ___ False. Mercury is a non-wetting liquid.
- [22]. Let p_{abs} be the absolute pressure at a point, p_{gag} be the gage pressure, and p_{atm} be the atmospheric pressure at the same point. The absolute pressure is calculated as:
 (a) $p_{abs} = p_{gag} + p_{atm}$ (b) $p_{abs} = p_{gag} - p_{atm}$ (c) $p_{abs} = p_{atm} - p_{gag}$ (d) $p_{abs} = p_{atm} / p_{gag}$
- [23]. To convert from *psi* (*pounds per square inch, or lb/in²*) to *psf* (*pounds per square foot, or lb/ft²*) multiply by:
 (a) 12 (b) 32.2 (c) 9.806 (d) 144
- [24]. Which of the following is not a typical value of the atmospheric pressure at sea level:
 (a) 14.69 psi (b) 300 mmHg (c) 101.3 kPa (d) 10.34 mH₂O
- [24]. Atmospheric pressure can be measured using an instrument called:
 (a) rotameter (b) pitot tube (c) barometer (d) hot-wire anemometer
- [25]. Pressure differences in a pipeline can be measured using an instrument called:
 (a) rotameter (b) manometer (c) barometer (d) hot-wire anemometer
- [26]. The Bourdon Gage is an instrument used to measure:
 (a) horsepower (b) velocity (c) pressure (d) discharge
- [27]. Let z represent the elevation of the centerline of a pipe and p be the pressure at the pipe section, the sum $z + p/\gamma$, where γ is the specific weight of the fluid in the pipe, is referred to as the:
 (a) manometric pressure (b) elevation (c) velocity head (d) piezometric head
- [28]. If we are working with gage pressures only in analyzing a manometer, any free surface open to the atmosphere has a pressure equal to:
 (a) 14.69 psi (b) zero (c) 760 mmHg (d) 101.3 kPa

[29]. ___ True or ___ False. The equation $p = \gamma h$ represents the gage pressure at a depth h below the free surface of a liquid of specific weight γ open to the atmosphere.

[30]. If a horizontal plane surface of area A is submerged at a depth h in a liquid of specific weight γ the force due to the liquid pressure on the area is calculated as:

- (a) $\gamma h A$ (b) $\gamma h / A$ (c) $A / \gamma h$ (d) $\gamma h + A$

[31]. If a vertical plane surface of area A is submerged in a liquid of specific weight γ , and h_c is the depth of the surface's centroid below the free surface, then, the force due to the liquid pressure on the area is calculated as:

- (a) $A / \gamma h_c$ (b) $\gamma h_c A$ (c) $A / \gamma h_c$ (d) $\gamma h_c + A$

[32]. The point on a plane surface where the hydrostatic force acts is referred to as:

- (a) the center of gravity (b) the centroid (c) the center of mass (d) the center of pressure

[33]. ___ True or ___ False: The buoyancy force on a solid submerged in a fluid is equal to the weight of the volume of liquid displaced by the solid.

[34]. ___ True or ___ False: Archimedes' principle is used to calculate the buoyancy force on a solid submerged in a liquid.

[35]. ___ True or ___ False: If a nonporous solid has a specific weight (or density) larger than that of the liquid where it is submerged the solid body will sink in the liquid.

[36]. ___ True or ___ False: If a nonporous solid has a specific weight (or density) smaller than that of the liquid where it is submerged the solid body will float to the surface of the liquid.

[37]. A hydrometer can be used to measure the _____ of a liquid.

- (a) viscosity (b) specific gravity (c) surface tension (d) bulk modulus of elasticity