

Possible questions for the final exam – CEE 3500 – Fall 2005  
Part 2 – Fluid dynamics, similitude, pipe flow (1)

[38]. An ideal fluid is one where no friction (viscous) effects are present. Another term for ideal fluid is \_\_\_\_\_ fluid.

- (a) turbulent (b) unsteady (c) inviscid (d) compressible

[39]. For most practical applications liquids are considered \_\_\_\_\_ fluids.

- (a) compressible (b) incompressible (c) inviscid (d) turbulent

[40]. If a real flow shows the fluid particles moving in layers in an orderly manner, the flow is most likely:

- (a) laminar (b) turbulent (c) unsteady (d) boiling

[41]. Eddies are characteristic of \_\_\_\_\_ flows.

- (a) laminar (b) turbulent (c) ideal (d) uniform

[42]. If all conditions at any point in a stream remain constant with respect to time, the flow is said to be:

- (a) uniform (b) inviscid (c) unsteady (d) steady

[43]. The line traced by a single fluid particle moving through a flow is referred to as a \_\_\_\_\_.

- (a) streamline (b) pathline (c) streakline (d) boundary

[44]. The velocity  $V$  in a pipe of diameter  $D$  carrying a discharge  $Q$  is given by

- (a)  $\frac{4 \cdot Q}{\pi \cdot D^4}$  (b)  $\frac{\pi \cdot Q}{4 \cdot D^4}$  (c)  $\frac{4 \cdot Q}{\pi \cdot D^2}$  (d)  $\frac{4 \cdot Q}{\pi \cdot D^5}$

[45]. A diagram representing streamlines and equipotential lines in a two-dimensional flow is referred to the \_\_\_\_\_ of the flow.

- (a) pressure distribution (b) flow net (c) flow chart (d) free-body diagram

[46]. A point in a flow where the velocity suddenly becomes zero (e.g., at the tip of a streamlined body set against a stream) is referred to as a \_\_\_\_\_ point.

- (a) pressure (b) stagnation (c) turning (d) hinge

[47]. Whereas a flow net is based on the assumption of ideal flow, in a real flow with diverging boundaries flow particles will tend to detach from the boundaries and create recirculating zones known as \_\_\_\_\_ zones.

- (a) pressure (b) converging (c) separation (d) nozzle

[48]. For a one-dimensional, unsteady flow the velocity is a function of position  $s$  and time  $t$ , i.e.,  $V = V(s,t)$ . For this case, the acceleration of the flow is given by  $\mathbf{a} = V \cdot \frac{\partial V}{\partial s} + \frac{\partial V}{\partial t}$ . The term  $\frac{\partial V}{\partial t}$  is

referred to as the \_\_\_\_\_ acceleration.

- (a) local (b) convective (c) variable (d) centrifugal

[49]. For a one-dimensional, unsteady flow the velocity is a function of position  $s$  and time  $t$ , i.e.,  $\mathbf{V} = \mathbf{V}(s,t)$ . For this case, the acceleration of the flow is given by  $\mathbf{a} = V \cdot \frac{\partial V}{\partial s} + \frac{\partial V}{\partial t}$ . The term  $V \cdot \frac{\partial V}{\partial s}$  is referred to as the \_\_\_\_\_ acceleration.

- (a) local (b) convective (c) variable (d) centrifugal

[50]. In a flow, lines drawn parallel to the velocity vectors throughout the flow at a given instant of time are called \_\_\_\_\_.

- (a) pathline (b) streakline (c) streamline (d) boundary line

[51]. At a given point in a pipeline flow the term  $p/\gamma$  is referred to as the \_\_\_\_\_ head.

- (a) elevation (b) pressure (c) velocity (d) total

[52]. At a given point in a pipeline flow the term  $z$  is referred to as the \_\_\_\_\_ head.

- (a) elevation (b) pressure (c) velocity (d) total

[53]. At a given point in a pipeline flow the term  $V^2/2g$  is referred to as the \_\_\_\_\_ head.

- (a) elevation (b) pressure (c) velocity (d) total

[54]. In Bernoulli's theorem or the energy equation for pipelines the term  $z$  also represents the \_\_\_\_\_ energy per unit weight of the flowing fluid.

- (a) kinetic (b) chemical (c) nuclear (d) potential

[54]. In Bernoulli's theorem or the energy equation for pipelines the term  $V^2/2g$  also represents the \_\_\_\_\_ energy per unit weight of the flowing fluid.

- (a) kinetic (b) chemical (c) nuclear (d) potential

[55]. In Bernoulli's theorem or the energy equation for pipelines the term  $V^2/2g$  has dimensions of \_\_\_\_\_.

- (a) velocity (b) kinetic energy (c) surface tension (d) length

[56]. In Bernoulli's theorem or the energy equation for pipelines the term  $p/\gamma$  has dimensions of \_\_\_\_\_.

- (a) velocity (b) kinetic energy (c) surface tension (d) length

[57]. The pressure at a stagnation point is referred to as the stagnation pressure or \_\_\_\_\_ pressure.

- (a) dynamic (b) elevation (c) boundary (d) turbulent

[58]. In developing the general energy equation for steady flow, the external work performed by pressure forces on the cross-sections of the flow tube is referred to as \_\_\_\_\_.

- (a) centrifugal work (b) kinetic work (c) flow work (d) shaft work

[59]. In developing the general energy equation for steady flow, the external work performed by a machine (pump, turbine) on the flow is referred to as \_\_\_\_\_.

- (a) centrifugal work (b) kinetic work (c) flow work (d) shaft work

[60]. The piezometric head at a point in a pipeline is given by:

- (a)  $z+p/\gamma$  (b)  $z+V^2/2g$  (c)  $p/\gamma+V^2/2g$  (d)  $z+p/\gamma+V^2/2g$

[61]. The total energy head at a point in a pipeline is given by:

- (a)  $z+p/\gamma$  (b)  $z+V^2/2g$  (c)  $p/\gamma+V^2/2g$  (d)  $z+p/\gamma+V^2/2g$

[62]. The specific energy (head) at a cross-section of an open-channel flow is given by:

- (a)  $z+y$  (b)  $z+V^2/2g$  (c)  $y + V^2/2g$  (d)  $z+y+V^2/2g$

[61]. The total energy head at a cross-section of an open-channel flow is given by:

- (a)  $z+y$  (b)  $z+V^2/2g$  (c)  $y + V^2/2g$  (d)  $z+y+V^2/2g$

[62]. If a pump introduces a head  $h_p$  to a pipe flow carrying a discharge  $Q$ , the power developed by the pump is given by:

- (a)  $\gamma Qh$  (b)  $\gamma Q^2 h$  (c)  $\gamma/Qh$  (d)  $\gamma Q/h$

[63]. Using  $\gamma(pcf)$ ,  $Q(cfs)$ , and  $h(ft)$ , the power in *horsepower* is calculated as:

- (a)  $\gamma Qh/144$  (b)  $\gamma Q^2 h/550$  (c)  $\gamma Qh/550$  (d)  $\gamma Qh/1000$

[64]. Using  $\gamma(N/m^3)$ ,  $Q(m^3/s)$ , and  $h(m)$ , the power in *kilowatts (kW)* is calculated as:

- (a)  $\gamma Qh/144$  (b)  $\gamma Q^2 h/550$  (c)  $\gamma Qh/550$  (d)  $\gamma Qh/1000$

[65]. Let  $P_o$  represent the power output from a process or machine, and  $P_i$  represent the power input from a process or machine, then the *efficiency ( $\eta$ )* of the process or machine is defined as

- (a)  $P_i/P_o$  (b)  $P_o/P_i$  (c)  $P_o P_i$  (d)  $P_o+P_i$

[66]. \_\_\_ True or \_\_\_ False. A pump is a device that introduces energy into a pipe flow.

[67]. \_\_\_ True or \_\_\_ False. A turbine is a device that introduces energy into a pipe flow.

[68]. When the local absolute pressure falls below the vapor pressure of a liquid flowing in a pipeline or other enclosed device, then vapor bubbles form that can implode when carried to points of higher pressure. This phenomenon is referred to as \_\_\_\_\_.

- (a) turbulence (b) capillarity (c) cavitation (d) fracturing

[69]. The Hydraulic Grade Line (HGL) connects all the \_\_\_\_\_ heads in a pipeline flow.

- (a) elevation (b) pressure (c) piezometric (d) total

[70]. The Energy Line (EL) connects all the \_\_\_\_\_ heads in a pipeline or open-channel flow.

- (a) elevation (b) pressure (c) piezometric (d) total

[71]. The location of the free surface in an open channel flow represents the \_\_\_\_\_ line for that flow.

- (a) Hydraulic Grade (b) Energy (c) Boundary (d) Channel Bed

[72]. The difference between total energy head between two sections of a real fluid flow in a pipeline or open channel is referred to as the \_\_\_\_\_ loss.

- (a) head (b) velocity (c) discharge (e) power