

## CIH Exam Equation Sheet Practice Questions

1. A slot hood is used to exhaust an open surface tank. The slot is 4 ft long and 2 in. wide, and the air velocity through the hood is 2,000 fpm. The duct connected to the hood has a diameter of 11 in. What is the hood static pressure?
  - A. 0.51 in. H<sub>2</sub>O
  - B. 0.25 in. H<sub>2</sub>O
  - C. 0.76 in. H<sub>2</sub>O
  - D. 0.70 in. H<sub>2</sub>O
  
2. What is the actual volume of air flowing through a system when the measured static pressure at a given point is -1.5"wg, while the design volume and static pressure at that point is 2,500 cfm and 2.0"wg respectively?
  - A. 3,333 cfm
  - B. 2,887 cfm
  - C. 2,165 cfm
  - D. 1,875 cfm
  
3. When estimating the average velocity using a pitot tube traverse across a duct, the best method is to:
  - A. average the velocity pressures measured across the traverse, and calculate the average velocity.
  - B. calculate the velocity from each velocity pressure reading across the traverse, and average the calculated velocities.
  - C. average the velocity measured across the traverse.
  - D. measure the centerline velocity pressure, calculate the velocity and divide it by 2.

4. When a vacuum cleaner is used as part of a LEV engineering control for respirable crystalline silica exposure in concrete cutting operations, it must have \_\_\_\_\_ exhaust ports.

- A. Well maintained
- B. Pressure demand
- C. HEPA filtered
- D. Demand only

5. A fan is exhausting air from a furnace. The air density at the fan is  $0.050 \text{ lbm/ft}^3$ . The fan rating table indicates that, at the actual air flow and equivalent fan static pressure, the power requirement is 8.75 brake horsepower. What is the actual power requirement for this fan?

- A. 13.13 hp
- B. 8.75 hp
- C. 5.83 hp
- D. 3.89 hp

6. What type of centrifugal fan is most commonly used in local exhaust ventilation systems where contaminants go through the fan?

- A. Backward curve blades
- B. Propeller type
- C. Radial blades
- D. Forward curve blades

7. What is the normal range of the mixing factor used in general exhaust ventilation calculations?

- A. 3 to 10
- B. 1 to 5
- C. 1 to 100
- D. 0 to 1

8. What conclusions are appropriate for control ventilation provided by a flanged circular hood, with a face area of  $1 \text{ ft}^2$ , to control welding fumes generated 5 ft away?
- A. 5,100 cfm is required
  - B. 18,750 cfm is required
  - C. It would be better to use a hood with a wide flange
  - D. This is an impractical control
9. Which of the following describes a hood aspect ratio for a slot?
- A.  $W/L = 0.2$  or less
  - B.  $L/W = 0.2$  or less
  - C.  $W/L = 3:1$  or more
  - D.  $L/W = 3:1$  or less
10. A hot wire anemometer with only standard density settings gives a velocity reading of 300 ft/min, at 0 ft asl and 70 F, for a gas stream consisting of 21% Helium, 58% Nitrogen, and 21% Oxygen. What is the corrected velocity of the gas stream?
- A. 240 ft/min
  - B. 375 ft/min
  - C. 268 ft/min
  - D. 300 ft/min
11. Using a hot wire anemometer a consultant estimated the average face velocity of a hood to be 240 fpm. The air exhausted through that hood is hot and humid with a density of  $0.06 \text{ lbm/ft}^3$ . Local regulations required employers to comply with average face velocities in standard conditions. What is the corrected average face velocity of the hood?
- A. 240 ft/min
  - B. 300 ft/min
  - C. 192 ft/min
  - D. 375 ft/min

12. Smoke tubes can be utilized in the following situation when assessing (measuring) ventilation systems:

- A. In hot, dry air
- B. At velocities below 150 fpm
- C. When exact measurements are required
- D. At velocities above 150 fpm

13. When used to ventilate a hot-temperature process, a canopy hood is classified as a:

- A. Booth
- B. Enclosing hood
- C. Exterior hood
- D. Receiving hood

14. When used to ventilate a room-temperature process, a canopy hood is classified as a:

- A. Booth
- B. Enclosing hood
- C. Exterior hood
- D. Receiving hood

15. Why are slot hoods inherently superior in contaminant control performance to round, square, or rectangular hoods?

- A. Capture velocity falls off more slowly with distance from the hood.
- B. The slot geometry ensures a better distribution of air flow across the hood face.
- C. They offer less interference to the process being exhausted.
- D. They are easier to construct.

16. In designing a rectangular canopy hood to place over a 3 ft x 2 ft degreasing process tank that uses tetrachloroethylene as degreaser, you must design enough flow rate to ensure adequate

capture of the solvent vapors. If the high canopy hood is to be placed 3.0 feet above the tank, what is the minimum design flow rate to ensure adequate capture velocity in the surface of the tank.

- A.** 2,100 cfm
- B.** 1,050 cfm
- C.** 12,600 cfm
- D.** 4,200 cfm

17. In designing a stack, what minimum stack velocity should be used to prevent downwash and keep raindrops out of the stack?

- A.** 500 fpm
- B.** 1000 fpm
- C.** 2500 fpm
- D.** 5000 fpm

18. When accurate measurements are needed, you may need to account for deviations from standard, dry air while doing pitot measurements for velocity pressure. For example, a change in the air density factor due to altitude while converting from velocity pressure to velocity at 5,500 foot elevation would cause a variation in velocity result of:

- A.** 4% higher with the correction.
- B.** 4% lower with the correction.
- C.** 10% higher with the correction.
- D.** 10% lower with the correction.

19. All of the following actions would increase the collection efficiency of a single-stage electrostatic precipitator, EXCEPT:

- A.** Lowering the gas velocity through the electrostatic precipitator
- B.** Decreasing the specific collecting area

**C.** Decreasing the plate spacing

**D.** Increasing the length of the electrostatic precipitator

20. Which of the following factors is not important when choosing the proper capture velocity for an exterior hood?

**A.** Magnitude of cross-drafts

**B.** Contaminant generation velocity

**C.** Distance from hood face to point of capture

**D.** Contaminant toxicity

21. Low volume-high velocity exhaust systems utilize hood slot velocities in what range?

**A.** 40 - 100 ft/min

**B.** 800 - 3000 ft/min

**C.** 5,000 - 9000 ft/min

**D.** 24,000 - 39,000 ft/min

22. A multiple-hood exhaust system can be balanced by the "balance by design" method or the "blast-gate" method. Which of the following is NOT an advantage of the balance by design method?

**A.** Air flows through various branches can be changed relatively easily

**B.** Less likelihood of tampering by workers

**C.** Less likelihood of ductwork plugging due to inadequate transport velocities

**D.** Air flows less likely to change over time due to erosion

23. A HEPA filter is designed to operate at an air flow of 500 cfm with a pressure drop of 0.8 in. H<sub>2</sub>O. If the air flow is increased to 800 cfm, what will be the pressure drop across the filter?

**A.** 0.8 in. H<sub>2</sub>O

**B.** 1.0 in. H<sub>2</sub>O

- C. 1.3 in. H<sub>2</sub>O
- D. 2.0 in. H<sub>2</sub>O

24. A HEPA filter is designed to operate at an air flow of 600 cfm with a pressure drop of 1.0"wg. . If the air flow is increased to 900 cfm, what will be the pressure drop across the filter?

- A. 1.0 "wg
- B. 1.5 "wg
- C. 1.22 "wg
- D. 2.25 "wg

25. Air is flowing into an unflanged 3 in. diameter circular duct at a rate of 200 cfm. At what distance in front of the duct face is the capture velocity equal to 150 ft/min?

- A. 0.7 in
- B. 4.3 in
- C. 3.0 in
- D. 5.0 in

Air is flowing at a rate of 2500 cfm through a 14 in. diameter duct. At this air flow, the frictional loss factor is 0.017 VP per foot of duct. What is the static pressure loss when the air flows through 80 feet of this duct?

- A. 0.34 in. H<sub>2</sub>O
- B. 0.46 in. H<sub>2</sub>O
- C. 1.02 in. H<sub>2</sub>O
- D. 1.36 in. H<sub>2</sub>O

26. In determining the volume of dilution air needed in a room, you need to know which of the following?

- A.** The TLV of the contaminant
- B.** The rate of generation of the contaminant
- C.** The size of the room
- D.** Both A and B

27. With reference to the fans used in local exhaust systems "system effect" refers to the:

- A.** total static pressure developed by the system.
- B.** fan static pressure developed by the system.
- C.** effect of changing the ductwork configuration on the shape of the system static pressure curve.
- D.** estimated loss in fan performance due to non-uniform air flow at the fan inlet and outlet.

28. The inlet duct of a fan has VP = 3 inches water gauge (in. w.g.) and a SP = -7.5 in. w.g. The discharge duct has a VP = 6 in. w.g. and a total pressure of 15 in. w.g. Calculate the fan static pressure.

- A.** +13.5 in w.g
- B.** -1.5 in w.g
- C.** +19.5 in w.g
- D.** -13.5 in w.g

29. Air is flowing into an exhaust hood. The average velocity of the air in the duct connected to the hood is 3660 ft/min. If the hood entry loss factor is 0.70, what is the hood static pressure?

- **A.** 0.59 in. H<sub>2</sub>O
- **B.** 0.64 in. H<sub>2</sub>O
- **C.** 1.42 in. H<sub>2</sub>O
- **D.** 1.55 in. H<sub>2</sub>O