

Multiple Choice Section. Circle the letter prefix of the best answer. Credit is given for the best answer only. Each question is worth 3 points.

1. The symbol below on a fire extinguisher means the extinguisher is suitable for use on fires in classes



a. A	c. C	e. AB	g. all of the above
b. B	d. BC	<u>f. ABC</u>	h. none of the above

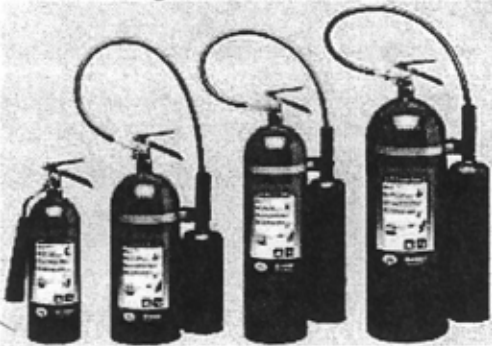
2. Which of the following is of greatest concern with a superficial respirator program?

a. the respirators may have a short shelf life	c. most organic vapors do not have warning properties	e. all of the above
<u>b. employees may be lulled into a false sense of security</u>	d. cartridges are not interchangeable	f. none of the above

3. Which of the following is associated with the most fatalities with confined space entry?

<u>a. oxygen deficiency</u>	c. entrapment	e. all of the above
b. engulfment	d. explosion	f. none of the above

4. The extinguishers shown below are appropriate for which classes of fire?



<u>a. A</u>	c. C	e. AB	g. all of the above
<u>b. B</u>	d. BC	f. ABC	h. none of the above

5. Which of the following is required if the respirator is to be used for protection against a substance that has no warning properties?

a. the atmosphere must not be IDLH	c. the respirator must not be used in confined spaces	e. all of the above
<u>b. the respirator must have an end-of-service-life indicator.</u>	d. the flow mode must be demand flow.	f. none of the above

6. Which of the following safeguarding strategies is prohibited for a full-revolution press?

a. die enclosure guard	<input checked="" type="radio"/> c. presence-sensing device	e. all of the above
b. Type B gate	d. Type A gate	f. none of the above

7. Which of the following fire hazards is not properly addressed by the four classes of fire extinguishers?

<input checked="" type="radio"/> a. LPG	c. energized electrical equipment	e. all of the above
b. gasoline	d. paper	f. none of the above

8. Which of the following alternatives is suggested for an interlocked barrier guard when hand feeding is to be used for feeding a punch press?

a. fixed barrier guard	c. brake monitor and control system	e. all of the above
b. die enclosure guard	<input checked="" type="radio"/> d. gate device	f. none of the above

9. A five thousand pound (5000) load attached to a block weighing 100 pounds is to be picked up by a wire rope hoist in which the wire rope has a nominal breaking strength of 4,000 pounds. The minimum number of sheaves needed on the upper and lower blocks to meet standards is

a. 3	<input checked="" type="radio"/> c. 7	e. all of the above
b. 5	d. 9	f. none of the above

10. The most important problems with forklift trucks occur in the area of

a. improper selection of the type of truck for hazardous atmospheres	c. illegal modifications from one type of truck to another classification	e. all of the above
b. use of trucks that do not have Underwriters Laboratories approval	<input checked="" type="radio"/> d. improper operations and maintenance of the trucks	f. none of the above

Short Answer Section. Complete each question in the space provided. Confine your answer to the topic of the question. Plan your answer so that it is readable, easily interpreted, and easily understood. Each question answer is worth 7 points.

1. Identify and briefly describe 3 different fire detector technologies (the way a sensor detects the presence of a fire) used in fire detectors available for use in buildings and plants.

heat detectors

1. a low-melting-point metal is used to disengage the detector. The heat from a fire will melt this metal, setting off the alarm. ✓
2. smoke detectors - will detect the smoke that a fire is producing
3. flame detectors - looks for specific types of light emitted by flames during combustion ✓

2. Identify the device pictured below and briefly describe its use in machine safeguarding.



Laser Light Safety Scanner

this device can be connected to the controls on a machine so that when something or someone 'breaks' the laser beams, the machine can be put into a safe mode.

3. Describe the required color(s) and shape(s) for an E-Stop push button.

must be red palm or mushroom head with yellow background

4. A machine that has two independently controlled components has been identified for safety purposes to require guarding. The proposal from the production department has been to use a common shared guard for both components. Discuss the safety aspects of this proposal and whether it should be approved in your role as the safety manager for the firm.

I do not think it should be approved. If the components are independently controlled, then 2 different operators can operate this machine at the same time. If one operator is loading the machine (guard down) then the other operator could very well choose to run his component without waiting for the guard to be put back in place. This causes a hazard.

5. A welder required to use electric arc welding to repair a tank inlet seam is sent into a 15 foot diameter by 10 foot deep tank via a 4 foot diameter top access port using a ladder inserted into the tank. A test of the air quality in the tank shows no concerns about flammable vapors and the oxygen content is measured at 20.5%. The welder and the spotter provided have been trained in confined space entry, the welder is harnessed and a permit for entry was issued. The welder is sent in with a respirator to wear underneath the welding hood and a CO2 fire extinguisher. Discuss the safety measures followed as it relates to the overall safety of the entry.

since welding uses oxygen in the air, check to make sure the oxygen content doesn't go below 19.5%. Before welding should take place, the employees should test for flammable gases. If flammable gases are present, welding should not be done. If the oxygen level increases, the possibility of fires being generated with welding is high.

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Oxygen depletion especially if CO2 extinguisher used for any reason

6. Identify and briefly describe two technologies available to implement a "minimum safe distance" safeguarding strategy for a standing worker where no physically restraining system is employed.

two-hand controls - these ensure a minimum safe distance because the worker has to be holding down both buttons and can't be near the danger zone.

two-hand trips - these are the same as two-hand controls except that once the machine is tripped the worker can let go - and enter the danger zone again. In order to ensure a minimum safe distance, these are placed at a farther distance from the machine than two-hand controls.

7. What 4 characteristics must a machine guard have to be considered effective?

1. The safeguard must prevent any part of the worker's body from coming in contact with dangerous moving parts.
2. Safeguards must not be easily removable or tamperable
3. The safeguard should ensure that no objects can fall into moving parts
4. The safeguard must not interfere with the worker doing his/her job.

okay

8. In a machine shop a machinist is spraying metal chips off a machine using a compressed air hose connected to the shop's piped system from the shop air compressor. What safety precautions are recommended for this procedure? (Identify 3 or more that apply directly to this situation).

- check to make sure the pressure is less than 30psi.
- utilize chip guarding to protect other workers ✓
- wear PPE to protect yourself
- use a reducer if the pressure is > 30psi. ✓

9. A mechanical power press, having a flywheel speed of 75 rpm and equipped with a brake and clutch, has a stopping time of .4 seconds.

- part →
- a. Calculate the minimum distance for placement of a presence sensing device. Show calculations.
 - b. Calculate the minimum distance for placement of a two-hand control device. Show calculations.

a. safety distance = .4 sec × 63 in/sec = 25.2 in ✓

b. same as a 25.2 in ✓

10. A particular wire rope has a "nominal breaking strength" of 15000 pounds. How much mechanical advantage in the reeving arrangement is necessary to safely and legally (per OSHA standards) pick up a payload of 15,500 pounds using a load block weighing 100 pounds. Show calculations and briefly sketch the reeving combination showing the block, tackle, rope path, and rope fastening.

$$\frac{15,500 + 100}{\# \text{ parts}} \leq 20\% (15,000)$$

parts of rope ≥ 5.2 ⇒ 6

