

C36 BUILDING CONSTRUCTION, FIRE PROTECTION AND BASIC HAZARDS

IMPORTANT

The time allowed for this exam is 3 hours.

Total marks: 200

You must hand in this paper and any paper used for rough work to the supervisor when you leave the examination room. Failure to do so may result in disqualification.

Section A: Multiple-Choice Questions

Question 1. For the following multiple-choice questions, fill in the circle of the letter that identifies the most correct answer.

Example: (A) (B) ● (D)

DO NOT MARK THE ANSWERS ON THESE PAGES.

USE THE FIRST PAGE OF YOUR ANSWER BOOK.

1. Something that will NOT ignite or burn is
 - (A) combustible.
 - (B) fireproof.
 - (C) fire-resistant.
 - (D) non-combustible.

2. Given the same thickness, and assuming they are not plastered,
 - (A) walls of clay brick have a higher fire resistance than those of concrete blocks.
 - (B) walls of clay brick have a lower fire resistance than those of concrete blocks.
 - (C) walls of reinforced concrete have a lower fire resistance than those of concrete blocks.
 - (D) (B) and (C)

3. Which of the following is a true statement?
 - (A) A rule of thumb is that a building is "fire-resistive" if supported entirely by bare steel.
 - (B) An inspector cannot determine the class of building simply by examining the building drawings.
 - (C) Fire resistance may be required in non-bearing walls by such conditions as fire exposure or location with respect to lot lines.
 - (D) (B) and (C)

4. Which of the following is true of polyurethane?
 - (A) It comes in two different forms—rigid and flexible.
 - (B) It generates great amounts of smoke when it burns.
 - (C) It is never used in insulation applications.
 - (D) It is often referred to as "styrofoam".

5. Which of the following is NOT one of the surface burning characteristics of a given material?
 - (A) The amount of fuel contributed
 - (B) The amount of smoke produced
 - (C) The cross-sectional area of the material
 - (D) The flame spread over the surface of the material

6. Class B roof coverings are
 - (A) effective against all types of fire exposure.
 - (B) effective against moderate fire exposures.
 - (C) effective against severe fire exposures.
 - (D) only available in the "built-up" type.

7. Which of the following is or are used to restrict the heat flow and designed for use in air-conditioning and ventilation ducts?
 - (A) An electro-thermal link
 - (B) Fire dampers
 - (C) Fire glass
 - (D) A fusible link

8. Most types of coal are subject to spontaneous ignition. The one major exception is
- (A) anthracite.
 - (B) bitumen.
 - (C) hematite.
 - (D) peat.
9. Bimetallic strips found in thermostats
- (A) consist of two metal strips that expand until they make contact for activation.
 - (B) uncurl to their original position when they cool down.
 - (C) are activated by external light sources.
 - (D) consist of an aluminium alloy and tin.
10. This combustion control device may be used on dip tanks containing flammable liquids as well as in furnaces:
- (A) mercury bulb thermostat
 - (B) bimetallic strip thermostat
 - (C) oscillating electrical switch
 - (D) excess temperature limit switch
11. Which of the following is a FALSE statement?
- (A) Both propane and natural gas are easily carried about by air movement.
 - (B) Both propane and natural gas can form ignitable concentrations in basements.
 - (C) Natural gas is slightly lighter than air.
 - (D) Propane is slightly lighter than air.
12. A thermocouple
- (A) consists of wires encased in a large-bore aluminum tube.
 - (B) is an arrangement of similar wires.
 - (C) operates with the flow of electrons from one conductor to another when a change of temperature occurs.
 - (D) is a primary safety control often used with wood-burning devices.
13. With respect to oil-fired heating appliances, a primary safety control
- (A) controls the fan motor at a pre-set temperature.
 - (B) is responsive directly to smoke properties.
 - (C) may not shut down the combustion system.
 - (D) senses the presence or absence of flame.
14. A photocell is
- (A) located close to an oil burner assembly to detect the presence of combustion.
 - (B) used in the production of a combustion-extinguishing agent.
 - (C) used to increase the flow of air to the fire and thereby accelerate the flame.
 - (D) used to short-circuit an electrical current.

15. Which of the following is a true statement?
- (A) A photocell is used with either a gas-fired or an oil-fired heating appliance.
 - (B) A safety shut-off valve is used primarily with an oil-fired heating appliance.
 - (C) A stack relay switch is used primarily with a gas-fired heating appliance.
 - (D) A thermocouple controls the flow of electricity in a bimetallic strip.
16. Smokestacks
- (A) consist of a cement chimney within a metal chimney.
 - (B) require zero clearances to combustible materials.
 - (C) are coated with a fire-resistive substance.
 - (D) may allow heat to pass through and ignite nearby combustibles.
17. The most common type of wire used to conduct electricity is made of
- (A) aluminum.
 - (B) copper.
 - (C) lead.
 - (D) zinc.
18. The main function of fuses is to
- (A) break the circuit if there is a high surge of current through the wires.
 - (B) prevent fire that may be caused when you place a piece of metal behind the fuse.
 - (C) provide a continuous flow of electricity.
 - (D) provide a maximum flow of electricity to appliances that require additional electricity.
19. According to Ohm's law, where a dryer runs on a 220-volt electrical supply and has a resistance of 22 ohms, what is its current?
- (A) 10 amps
 - (B) 0.10 amps
 - (C) 2,220 amps
 - (D) 22.20 amps
20. With respect to electrical equipment, a Class II location is hazardous because of the presence of
- (A) combustible or electrically conductive dusts.
 - (B) easily ignitable fibres or flyings.
 - (C) flammable gases.
 - (D) flammable vapours.

21. Which of the following is a FALSE statement?
- (A) A flash fire is one that travels with a rapidity approaching that of an explosion, particularly in an atmosphere of easily ignitable fibres or flyings.
 - (B) Explosion-proof equipment must be cool operating.
 - (C) Organic material that is extremely dry will not ignite spontaneously.
 - (D) Pressure piling refers to the build-up of pressure created by an explosion travelling within a conduit system.
22. Which of the following is a FALSE statement?
- (A) Combustible liquids have a flash point that is higher than that of flammable liquids.
 - (B) The flash point is a distinctive characteristic of each flammable or combustible liquid.
 - (C) The flash point is one of the least important properties of flammable and combustible gases.
 - (D) The lower the flash point, the easier the ignition and the greater the fire hazard.
23. Electrical equipment referred to as "dust ignition-proof" is designed particularly for
- (A) Class I atmospheres.
 - (B) Class II atmospheres.
 - (C) Class III atmospheres.
 - (D) all of the above.
24. Which of the following is a FALSE statement?
- (A) A vapour with a density higher than one will tend to rise.
 - (B) In the traditional "fire triangle", only one of the three components needs to be removed to extinguish the fire.
 - (C) The ratio of the weight of a liquid to the weight of an equal volume of water at the same temperature and pressure is called the specific gravity of that liquid.
 - (D) The weight of a volume of pure vapour compared to the weight of an equal volume of air at the same temperature and pressure is called the density of that vapour.
25. With respect to the storage of flammable and combustible liquids, a cutoff room
- (A) is ideally constructed in the corner of a building.
 - (B) is one that has no exterior walls.
 - (C) is the equivalent of an inside storage room.
 - (D) should never have two of its walls in common with two of the exterior building walls.
26. With respect to gas cylinders used in connection with flame cutting,
- (A) "empties" should be intermixed with other empty containers.
 - (B) fuel and oxygen gas should always be used in a vertical position.
 - (C) vertical use of fuel or oxygen gas may cause liquid gas to issue from the nozzle.
 - (D) oxygen cylinders should be stored horizontally.

27. With respect to the construction of the hood covering the cooking area in a restaurant,
- (A) aluminum is most common owing to the ease of cleaning and consequent higher level of hygiene attainable.
 - (B) stainless steel is not allowed due to its low melting point.
 - (C) the hood should be sized so as to completely cover the equipment it is designed to ventilate.
 - (D) the hood should be supported by aluminum of a certain minimum thickness.
28. Automatic sprinkler fire extinguishing equipment located over cooking surfaces should
- (A) be controlled by a separate indicating shut-off valve sealed in the closed position.
 - (B) concentrate coverage on the centre of the cooking surface.
 - (C) be designed so that a cooking surface fire will operate sprinklers protecting the cooking surface five minutes after sprinklers protecting the plenum chamber and ventilation ducts are activated.
 - (D) be installed in the plenum chamber and ducts at least two temperature ratings higher than those protecting the cooking surfaces and not less than 163 ° C.
29. Karbaloy liquid is used in
- (A) automatic sprinkler systems.
 - (B) CO₂ extinguishing systems.
 - (C) dry chemical extinguishing systems.
 - (D) wet chemical extinguishing systems.
30. Portable fire extinguishers
- (A) are not effective if the fire is still relatively small.
 - (B) are only effective if used in the latter stages of a fire, when most of the oxygen in the area has already been consumed.
 - (C) need to be available even if automatic sprinklers have been installed.
 - (D) are equally effective on all four classes of fire.
31. Which of the following extinguishing media is self-expelled (with a nitrogen booster) and has a chain-breaking effect?
- (A) Carbon dioxide
 - (B) Dry powder
 - (C) Halon
 - (D) Ordinary dry chemical
32. Which of the following do NOT use numerical ratings?
- (A) Extinguishers for Class A and Class C fires
 - (B) Extinguishers for Class B and Class D fires
 - (C) Extinguishers for Class C and Class D fires
 - (D) Extinguishers for Class A and Class D fires

33. Which of the following is a true statement?
- (A) Class A fires use combustible liquids as fuel.
 - (B) Class B fires tend to produce burning embers or coals.
 - (C) Class C fires involve energized electrical equipment.
 - (D) Class D fires involve flammable or combustible liquids.
34. Which of the following types of water extinguisher can be discharged intermittently and has its water usually expelled by compressed air?
- (A) Water-cartridge operated
 - (B) Water-loaded stream
 - (C) Water-pump tank
 - (D) Water-stored pressure
35. Extinguishers using dry powder are intended only for
- (A) Class A fires.
 - (B) Class B fires.
 - (C) Class C fires.
 - (D) Class D fires.
36. Which of the following types of extinguisher is NOT considered obsolete?
- (A) Carbon dioxide
 - (B) Carbon tetrachloride
 - (C) Foam
 - (D) Soda-acid
37. Which of the following is NOT a main purpose of a sprinkler system?
- (A) Fire detection
 - (B) Sounding an alarm
 - (C) Controlling or extinguishing a fire by an even distribution of water
 - (D) Smoke detection
38. The SSP sprinkler is designed to be installed in such a way that the water is
- (A) directed upward against the deflector which evenly distributes the water over the protected area.
 - (B) directed downward against the deflector which evenly distributes the water over the protected area.
 - (C) discharged away from the nearby wall with only a small portion of the discharge directed at the wall behind the sprinkler.
 - (D) discharged toward the nearby wall with a high portion of the discharge directed at the wall behind the sprinkler.

39. The one advantage dry pipe sprinklers have over wet pipe systems is that they
- (A) they can be used in unheated areas.
 - (B) they require less maintenance.
 - (C) they are less expensive to install.
 - (D) the corrosion of the interior of steel piping is less than with a wet system.
40. A guard should
- (A) have a key with which to open the punch-clock.
 - (B) change the discs on the punch-clock at the end of his rounds.
 - (C) have a telephone available at all times to call for assistance.
 - (D) have continuous uninterrupted rounds during his shift.

(2 marks each = 80 marks)

Section B: Narrative Questions

- Question 2. (a) Identify FIVE (5) different ways in which structural steel may be protected against the adverse effects of heat from a fire. (5 marks)
- (b) What is meant by **heavy timber construction**? Identify its essential construction members and describe its other essential features or dimensions. (15 marks)
- Question 3. Describe the specific maintenance requirements for fire doors. (20 marks)
- Question 4. Fuel oil supply tanks installed on a property must comply with the requirements of CSA Standard B139 (Installation Code for Oil Burning Equipment).
- (a) Identify FIVE (5) installation requirements for outside supply tanks (buried). (10 marks)
- (b) Identify FIVE (5) installation requirements for inside supply tanks (unenclosed). (10 marks)
- Question 5. Describe in full the operation of the TWO (2) types of listed grease extractors. (20 marks)
- Question 6. A sprinkler system consists of a number of important components. Identify FIVE (5) of these components, and discuss their individual roles and importance. (20 marks)

continued on next page

Section C: Application Question

Question 7. You are a loss prevention expert.

The insured is unaware of the problems associated with the storage of solid fuels: coal and wood. How would you explain the problems of storing and using coal and wood as heating fuels? What safety precautions would you suggest?

(20 marks)

