**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_Instructor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**1) OSHA is the** Shall. **NFPA 70E is the** How.

**2) What does the 70E cover?**

Describes how to perform installation and maintenance work safety.

It covers safe electrical work practices such as lockout-tagout, and when worker should use insulated tools and wear AR clothing

It is a Guideline for employees and employers on equipment maintenance

**3) What is the purpose of the NFPA 70E?**

To provide a practical safe working area for employees relative to the hazards arising from the use of electricity

**4) OSHA Section: 1910.333(a)(1) states that every employer shall furnish a place of employment free of any recognized hazards that might cause death or serious physical harm to the employees.**

**5) Section 6425 of the California Labor Code requires any employer and any employee to be to be OSHA and 70E compliant.**

**6) There are three basic causes of electrical incidents**

**1) Unsafe conditions**

**2) Unsafe equipment**

**3) Unsafe Acts**

**7) Electrical hazard 70E Article 100 defines a dangerous condition such that contact or equipment failure can result in**

**1) Electric Shock**

**2) Arc Flash burn**

**3) Thermal burn**

**4) Arc blast**

**8) What are the four protective strategies of the 70E?**

**1) Turn off the power**

**2) Use an energized work permit (when turning off the power is infeasible)**

**3) Plan the Work**

**4) Use PPE**

**9) 2015 NFPA 70E Article 100 definition of a Qualified Person is one who has demonstrated the** skills **and** knowledge **related to the construction and operation of** electrical **equipment and installations and has received safety training to** identify **and avoid the hazards** involved.

**10) OSHA 1910.399-Qualified person one who has received** training **in and has** demonstrated **skills and knowledge in the** construction **and operation of electric equipment and installations and the** hazards **involved.[ remember: OSHA is the enforcer]**

**11) What are the six steps to establishing an electrically safe work condition?**

**1) Identify the power source(s)**

**2) Disconnect the power source(s)**

**3) Verify that the power is disconnected**

**4) Use Lockout-tagout procedures**

**5) Verify that the power is off with test instruments**

**6) Discharge stored electrical energy (and install safety grounds under certain conditions)**

**12) Appropriate devices must be applied to** lockout or tagout **equipment to properly isolate all energy sources.**

**13) What category tester would you use for feeders and branch circuits?** Category III

**14) There are two techniques for controlling hazardous energy are: Section: 120.2(D)**

**1**) Simple  **2)** Complex

**15) Section 120.2(B)(3)(4) states the employee is required to have documented training in**

**LOTO every 3 years.**

**16) When it is Infeasible to De-energize? (there are only three reasons)**

**1)** If deenergizing is infeasible due to equipment design or operational limitations

2) If deenergizing is infeasible due to testing and troubleshooting work that can be done only while the circuits are energized

3) If deenergizing introduces additional or increased hazards

**17)** **Section:** **130.2(B)(1) The Energized Electrical Work Permit [EEWP] is required under the following conditions:**

**a) When work is performed within the** restricted approach boundary.

**Or**

**b) When the employee interacts with the equipment when conductors or circuit parts are not exposed but an increased** likelihood of injury **from an exposure to an arc flash exists**

**18) Section: 130.2(B)(3) There are four Exemptions to when an EEWP is not required.**

**a) Testing, toubleshooting and** voltage measuring

**b)Thermography and** visual **inspection if the restricted approach boundary (RAB) is not crossed**

**c)** Access/egress **from an area with energized electrical equipment with no electrical work and the RAB is not crossed**

**d) General** housekeeping **and miscellaneous nonelectrical task if the RAB is not crossed**

**19)** Section 130.1(B)(2) **of the 70E details the minimum information that must be documented in the energized electrical work permit.**

**20) What are the two Shock Approach boundaries called and what is the distance limitation of each for equipment rated at 50 volts to 750 volts? Understand that you will see on older electrical warning labels with the “prohibited approach boundary”.[ Section 130.4 and Table 130.4(D)(a)]**

1) Limited Approach Boundary

2) Restricted Approach Boundary

**21) Which Shock Approach boundary requires insulating gloves and at what voltage? RAB 50V or more**

**22) Electrical injuries can be caused by what three things?**

**1) Shock Hazard 3) Arc Blast**

**2) Arc Flash**

**23) [2015 NFPA 70E Article 100 Definitions] Incident Energy is the amount of thermal energy impressed on a surface, a certain distance from the source, generated during an electrical arc event. Incident energy is typically expressed in calories per square centimeter. Cal/cm2**

**24) 2015 NFPA 70E Section 130.5 (B) Arc Flash Boundary[AFB] shall be the distance at which the incident energy equals 50volts. What degree burn is that? 2nd degree burn**

**25) [2015 NFPA 70E Section 130.5]**

**An Arc Flash Risk Assessment shall determine three things:**

1. **Arc flash boundary**
2. **The incident energy at the working distance (18”)**
3. **The PPE that employees within the arc flash boundary shall use**

**26) Arc Flash Label are required to display five things list them: The new 2015 70E has two more requirements [labels older than 2012 may have only 5]**

**1) Approach Boundary Information 5) Equipment ID**

**2) Flash Hazard Category 6) Max available fault current**

**3) Minimum Arc Rating 7) The date of the fault current calculations**

**4) Required PPE**

**27) 2015 NFPA 70E Article 130.5(2) states that arc flash risk assessment be updated when a major modification or renovation takes place. It shall be reviewed periodically, at intervals not to exceed five years to account for changes in the electrical distribution system that could affect the results of the arc flash risk assessment.**

**28) Label placement should be on or near to the appropriate system or equipment. Label placement should be visible from the point of normal approach.**

**29) Electrical Equipment that are in other than dwelling units that are likely to require adjustment, servicing or maintenance while energized, shall be field marked to warn qualified person of potential electrical arc flash hazard**

**30) List the five specific types of electrical equipment requiring arc flash labeling [Section 130.5(D)]**

**1) switchboards**

**2) panelboard**

**3) Industrial control panels**

**4) meter socket enclosures**

**5) motor control centers**

**31) In Section 130.5 Informational Note No. 5 it states to see IEEE 1584 for more information regarding arc flash hazards for three-phase systems rated less than 240 volts.**

**32) For energized circuit over 50 volts or more safety tools and PPE must be used.)**

**33) Table 130.7(C)(16) has 4 categories for Arc Flash Clothing**

**34) What is the calorie rating for Category 2 clothing? 8cal/cm2**

**35) Using Table 130.7(C)(16) what PPE would you be required to wear for Category 2?**

**Note: Rubber Gloves are for shock protection only and rated by the voltage of the equipment**

1. **AR Jack & pant; Shirt & Pants; Coveralls**
2. **AR Face Shield or Arc Flash Suit Hood**
3. **Sock Hood [Balaclava]**
4. **Safety glasses or goggles**
5. **Hard Hat**
6. **Hearing Protections (Inserts)**
7. **Leather Gloves**
8. **All leather work shoes**

**36) Section 130.7(C)(7)(a) Rubber Insulating Equipment**

**Rubber insulating gloves shall be rated for the voltage for which the gloves will be exposed**

**37) NFPA 70E requires employees to have first aid and emergency training but does not provide the details.**

**38) OSHA regulations require that at least one person on each job site be trained in CPR and First Aid.**

**39) What is the leading cause of deaths due to electricity? Electric Shock**

**What are the other two causes?**

**1)Arc Flash and**

**2) Arc Blast**

**40) Under Section 110.2(D)(3) requires employees to be retrained at intervals not to exceed 3 years. Under Section 110.2(E) training must be documented.**