

Circle all the letters of all that apply.

75 questions @ 2 point each = 150 points possible

Energy Industry

1. Static electricity is the result of:

- a) the attraction of negative charges to other negative charges
- b) the attraction of positive and negative charges
- c) electrons being discharged
- d) electrons moving along a conductor

2. Alternating current was a better choice for public utilities because:

- a) it could be stepped down
- b) it was safer than direct current to the end user
- c) Edison designed underground conduits for it
- d) it could be distributed to a wider geographic area

3. Natural monopolies are characterized by:

- a) being unregulated
- b) having public control of their pricing structure
- c) serving a specific geographic area
- d) having no competition in their service area

4. The obligation to serve is:

- a) the requirement to provide a reliable power supply
- b) established by law
- c) the same thing as a smart grid
- d) the result of natural monopolies

5. What type of utility is a non-profit entity that is publicly-owned and controlled by local government agencies?

- a) Investor owned
- b) Municipal
- c) Independent Power Producer
- d) Cooperative

6. The most predominant type of utility in the United States is what type of business structure?

- a) Investor owned
- b) Non-profit
- c) Independent Power Producer
- d) Cooperative

7. Common residential customer voltage is:

- a) 480 volts (three-phase delta)
- b) 277/480 volts (three-phase wye)
- c) 120/208 volts (three-phase wye)
- d) 120 volts

8. Who uses the co-production of power and useful heat from an energy source such as a steam turbine, gas turbine, or internal combustion engine?

- a) Small power producers
- b) Cogenerators
- c) Merchant generators
- d) All of the above

9. Early electric power transmission systems encountered problems primarily due to:

- a) incompatible voltages
- b) the need to locate the generation station close to the transmission lines
- c) thermal limits
- d) lack of lightning arresters

Regulatory topics

10. The Clean Air Act of 1970 was designed to:

- a) prevent blackouts
- b) phase out the use of ozone-depleting chemicals
- c) require power plants to install wet scrubbers, cyclones, and electrostatic precipitators
- d) regulate the release of carbon dioxide into the air

11. Why was the Federal Trade Commission organized?

- a) to coordinate hydroelectric projects
- b) to investigate the practices of utility holding companies
- c) to ensure the reliability of the power system
- d) to gauge how much pollution is in the air

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14. Safety and Health conditions in most private industries are regulated by:

- a) Occupational Safety and Health Administration
- b) Department of Transportation
- c) Department of Homeland Security
- d) Federal Emergency Management Agency

15. Safety regulations and standards affect which of the following:

- a) Physical safety
- b) Information safety
- c) Environmental and community safety
- d) All of the above

Safety

16. What is the primary purpose of locking and tagging out a machine?

- a) To comply with safety regulations
- b) To keep someone from using the equipment
- c) To isolate the equipment from its energy source to prevent electric shock
- d) To protect electrical circuits

17. What color are live wires?

- a) green
- b) grey
- c) black
- d) red

18. The fuel for a Type B fire is

- a) paper
- b) wood
- c) gasoline
- d) ignitable metal

19. An equipment ground is designed to protect:

- a) power lines
- b) workers
- c) insulation
- d) circuit breakers

20. Ground-fault circuit interrupters are used:

- a) in very dry conditions
- b) to prevent electrocution
- c) to shut off power very quickly
- d) when it is raining

21. Safety glasses are worn as a precaution against:

- a) flying debris
- b) high voltage
- c) chemical vapors
- d) fire

22. Chronic toxicity:

- a) can result from long-term exposure to a substance
- b) gradually poisons the body
- c) can result from first contact with substance
- d) usually only occurs from exposure to a large amount of a chemical

23. Respirators are designed to protect workers from:

- a) power lines
- b) hazardous atmospheric contaminants
- c) insulation
- d) electric shock

24. Modifying PPE is:

- a) allowable when adapting PPE for an unapproved use
- b) encouraged for personalization
- c) allowable to adjust proper fit
- d) allowable when adding approved accessories

25. Injury from an electric arc:

- a) may include severe burns
- b) can be prevented by wearing dielectric PPE
- c) is always fatal
- d) can be prevented by wearing flame resistant PPE

26. Minimum approach distance for an unqualified utility worker approaching an energized power line is:

- a) 10 feet for every 10 kilovolts
- b) 10 feet for the first 50 kilovolts and 4 inches for every additional 10 kilovolts
- c) 4 feet for the first 50 kilovolts and 10 feet for every additional 10 kilovolts
- d) 10 feet for 50,000 volts

27. When working on power lines downed by a rain storm, utility workers should wear:

- a) rubber-soled street shoes
- b) steel-toe work boots
- c) dielectric footwear
- d) leather shoes

Electric Power Generation

28. The steam-electric cycle uses water heated by:

- a) burning coal
- b) nuclear fission
- c) hydropower
- d) combustion of natural gas

29. The steam-electric cycle loses energy from:

- a) radiation
- b) absorption
- c) fission
- d) friction

30. Examples of hydrocarbons include:

- a) gasoline
- b) natural gas
- c) turpentine
- d) sulfur dioxide

31. To start combustion, the following must be present:

- a) carbon dioxide
- b) oxygen
- c) heat
- d) fuel

32. For electric power generation, natural gas is used either in steam turbine generation or by using _____ to turn turbines.

- a) hot water
- b) oil deposits found with natural gas
- c) generators
- d) hot combustion gases

33. What impurities are removed from natural gas before it is transported?

- a) Mercaptan
- b) sand
- c) ash
- d) hydrogen sulfide

34. During nuclear fission, small particles called _____ hit the uranium atom and split it.

- a) protons
- b) electrons
- c) quarks
- d) neutrons

35. During a nuclear reaction, _____ is emitted that can be used to change water into steam.

- a) heat
- b) radioactivity
- c) magnetism
- d) electricity

36. Peaking power plants typically include the following types of plants:

- a) coal-fired
- b) natural gas
- c) nuclear
- d) hydroelectric

37. Hydroelectric plants can be built only in specific places due to:

- a) water flow
- b) elevation
- c) customer demand
- d) fish ladders

38. Renewable fuel sources are those that:

- a) are more efficient
- b) can be replenished in a short period of time
- c) have a nearly limitless supply
- d) are most commonly used to generate electricity in the U.S.

39. Examples of systems that generate electricity through solar energy include:

- a) photovoltaic systems
- b) passive solar heating systems
- c) solar steam systems
- d) active solar heating systems

40. Agricultural energy sources come from:

- a) waste-to-energy power plants
- b) municipal waste
- c) crops planted and harvested for use as biofuel
- d) post-harvest residue

Electric Power Transmission

41. A _____ is a specially designed conductor having low resistance.

- a) insulator
- b) resistor
- c) bus

42. Insulators such as _____ and _____ are good materials that do not allow electrical current to flow through them.

- a) glass and fiberglass
- b) copper and aluminum
- c) wood and titanium

43. If there are fewer turns in the primary winding than in the secondary winding, the transformer is said to be a _____ transformer.

- a) step-down
- b) step-up
- c) powerful

44. In the United States, commercial power generation companies produce a _____ current.

- a) 480-hertz
- b) 60-hertz
- c) 240-hertz
- d) 120-hertz

45. Underground transmission lines are cooled by _____.

- a) air cooling systems
- b) water cooling systems
- c) ice
- d) oil cooling systems

46. Increased voltage loads on overhead transmission lines require:

- a) larger insulators
- b) taller towers
- c) generators
- d) ground wires

47. _____ develops in the iron core of a transformer as alternating current flows in the primary winding.

- a) Arcing
- b) Three-phase service
- c) Transmission switching
- d) A magnetic field

48. What are balancing authorities?

- a) regional organizations responsible for planning for electrical power demand
- b) national entities that compete for electrical power customers
- c) local entities that charge consumers for power
- d) regional entities that monitor the grid for reliability

49. Transmission control center operators are responsible for:

- a) assessing real-time data
- b) supervising the level of power generation
- c) setting prices for electric power
- d) monitoring the flow of electricity over transmission lines

50. Scheduled outages are pre-planned interruptions in service for:

- a) maintenance
- b) improvements
- c) peak customer load
- d) load shedding

Electric Power Distribution

51. Because distribution systems operate at a _____ voltage, they rely on _____ power lines in a neighborhood.

- a) higher, larger
- b) lower, larger
- c) higher, smaller
- d) lower, smaller

52. High voltage transmission circuits interconnect to the transmission and distribution system by going through:

- a) generating plants
- b) high voltage transmission circuit-supplying switching stations
- c) substations
- d) commercial connections

53. Distribution circuits are protected by:

- a) relays
- b) ground wires
- c) meters
- d) circuit breakers

54. _____ adjust the voltage in a distribution circuit to maintain a constant power supply to customers.

- a) Circuit breakers
- b) Circuit regulators
- c) Switching stations
- d) Primary circuits

55. Distribution circuits are comprised of:

- a) circuit breakers
- b) circuit regulators
- c) feeder circuits
- d) busbars

57. Overhead power distribution lines are also known as:

- a) circuit breakers
- b) cables
- c) conductors
- d) busbars

58. A capacitor is used to regulate_____.

- a) meters
- b) circuit breakers
- c) voltage
- d) customer electricity use

59. A kilowatt hour refers to:

- a) one hundred kilowatts of electrical energy used per hour
- b) one thousand kilowatts of electrical energy used per hour
- c) ten thousand kilowatts of electrical energy used per hour
- d) one million kilowatts of electrical energy used per hour

Natural Gas Transmission and Distribution

60. Natural gas can be used as a source of energy for:

- a) electric power generation
- b) cooking
- c) heating
- d) air conditioning

61. Natural gas is:

- a) petroleum
- b) pure methane
- c) a mixture of gases
- d) a hydrocarbon

62. Processing of natural gas may yield valuable by-products such as:

- a) carbon dioxide
- b) butane
- c) ethane
- d) propane

63. Gas pressure is lost due to _____ as it travels through pipelines.

- a) impurities
- b) compressors
- c) crowding
- d) friction

64. Transmission pipelines utilize specialized _____ to reduce pressure.

- a) regulators
- b) mains
- c) wells
- d) service connections

Energy Related Careers and Entry Requirements

65. Utility workers can be employed at:

- a) Power generating plants
- b) Power distribution companies
- c) Natural gas companies
- d) All of the above

66. To work in the energy industry you must have which of the following skills:

- a) Critical thinking and problem solving
- b) Reading comprehension
- c) Math
- d) All of the above

67. What kinds of people are employed by power companies:

- a) Linemen
- b) Instrumentation technicians
- c) OSHA inspectors
- d) A and B

68. The Electric Utility Technology certificate from Yavapai College will:

- a) guarantee you a job with APS
- b) guarantee you an interview with any power company you want
- c) prepare you for a position as an apprentice-level line worker
- d) prepare you for the energy industry employability test

69. Which of the following classes are required for the Electric Utility Technology certificate?

- a) Career and Personal Development
- b) Introduction to AC/DC
- c) Technical Math
- d) Critical Thinking

New and Emerging Technologies

70. Advanced metering technologies allow consumers to save energy and money by sharing _____ with them.

- a) real-time data
- b) revenues
- c) accurate sensing
- d) control house data

71. The smart grid:

- a) is a smart meter
- b) reacts to the power grid
- c) communicates with multiple parts of the system
- d) is a nationwide interoperable system

72. Power plants that burn garbage as fuel are called:

- a) biomass power plants
- b) waste-to-energy power plants
- c) fermentation power plants
- d. biogas power plants

73. While geothermal plants release a minimal amount of emissions, they may cause _____.

- a) subsidence
- b) erosion
- c) subduction
- d. faults

74. A tidal barrage using ____ generates power by allowing the turbines to operate as the tide comes in and out.

- a) ebb generation
- b) flood generation
- c) wave generation
- d. two-way generation

75. An arrangement of connected solar panels is called:

- a) a photovoltaic cell
- b) a solar farm
- c) an array
- d) a photovoltaic module