Final Exam

Continuing Education Course #498 National Electric Code: Solar Power

1. What area of jurisdiction most aptly describes that of the National Electrical Code (NEC)?
   - a. Generation Stations
   - b. End User Buildings
   - c. Transmission Lines
   - d. Transmission Substations

2. Which type of unit conversion ensures a part is interchangeable?
   - a. English to Metric
   - b. Hard Conversion
   - c. Metric to English
   - d. Soft Conversion

3. Which chapter(s) is(are) stand-alone and not modified by the other chapter(s)?
   - a. Chapters 1-4
   - b. Chapter 5-6
   - c. Chapter 7
   - d. Chapter 8

4. What type of circuit conductor are from the final overcurrent device and the outlet?
   - a. Branch
   - b. Feeder
   - c. Main Feeder
   - d. Subfeeder

5. What is the Code name for what a layman often calls the "safety ground" or "green ground"?
   - a. Equipment Grounding Conductor
   - b. Grounding Electrode Conductor
   - c. Ground Electrode
   - d. Neutral

6. A wire with black insulation has three grey stripes on it. What type of wire is this meant to be?
   - a. Ground
   - b. Hot
   - c. Neutral
   - d. Phase C

7. The wire that connects the neutral bus to earth ground is called the _____?
   - a. Equipment Safety Ground
   - b. Grounding Electrode Conductor

○ c. Grounding Electrode Jumper
○ d. Neutral Bonding Jumper

8. Island Mode of operation using isolated microgrids differ from interconnected microgrids in their use of _____?
○ a. Diesel Generators
○ b. Disconnecting Means
○ c. Solar Arrays
○ d. Stand-Alone Power Production

9. What approximate voltage is produced by solar cell made of silicon?
○ a. 0.5
○ b. 1.2
○ c. 2.0
○ d. 3.7

10. What NEC annex provides examples of ampacity calculations?
○ a. Annex A
○ b. Annex B
○ c. Annex C
○ d. Annex E

11. Energy gaps form when the atomic spacing _____.
○ a. Decreases
○ b. Increases
○ c. Is Disturbed by Electric Forces
○ d. Is Disturbed by Magnetic Forces

12. Light at a wavelength of 600 nm oscillates at what frequency in hertz?
○ a. 200×10^{12}
○ b. 500×10^{12}
○ c. 600×10^{14}
○ d. 700×10^{14}

13. In what region of a pn junction is light absorbed releasing electrons into the circuit?
○ a. n doped region
○ b. p doped region
○ c. space charge region
○ d. surface region

14. What is the approximate silicon solar cell efficiency?
○ a. 5 %
○ b. 10 %
○ c. 20%
○ d. 50%

15. A silicon solar module designed for a 12 V system has an open circuit voltage of 21 V maximum. Six of the modules are to be used in series. The system is to be utilized where the ambient temperature is expected to be 75°F.

What is the maximum voltages to use for design purposes?
○ a. 12 V
○ b. 21 V

○ c. 126 V
○ d. 128 V

16. What is the point where the maximum current must be determined by an industry standard method by a licensed professional engineer?
○ a. 10 kW
○ b. 100 kW
○ c. 125 kW
○ d. 1000 kW

17. When multiple parallel PV strings are protected by a single overcurrent device, the conductors are sized for the following.
○ a. 3 Hour Local Noon Rate
○ b. Overcurrent Device Rating
○ c. Sum of Short-Circuit Current Ratings x 125%
○ d. Sum of B and C

18. What is the air mass coefficient for the following conditions?

Distance to Zenith: 9 km
Distance of Effective Light Path through Atmosphere: 11 km
○ a. 0.2
○ b. 0.8
○ c. 1.0
○ d. 1.2

19. What is the air mass coefficient if the solar panels are tilted 35° from local zenith?
○ a. 0.2
○ b. 0.8
○ c. 1.0
○ d. 1.2

20. A PV system installed on a building requires arc-fault circuit protection if the voltage is ____ V or greater.
○ a. 30
○ b. 50
○ c. 80
○ d. 115

21. Controlled conductors inside an array boundary must be less than what voltage in what timeframe following shutdown initiation?
○ a. <30 V in 30 s
○ b. <80 V in 30 s
○ c. <30 V in 80 s
○ d. <80 V in 3 s

22. An XLPE cable rated for 125°C and sized at 10 gauge is to be used for a home solar system. The ambient temperature can be as high as 110°F.

What is the ampacity of this conductor for the situation as described?
○ a. 41 A
○ b. 42 A

○ c. 44 A
○ d. 46 A

23. PV system cables that conduct AC are to be grouped together by cable ties at no more than every _____?
○ a. 1.6 ft
○ b. 2.0 ft
○ c. 4.0 ft
○ d. 6.0 ft

24. What is the voltage requirement for including a Ground-Fault Detector-Interrupter in a PV system?
○ a. >30 V AC
○ b. >30 V DC
○ c. >80 V AC
○ d. >80 V DC

25. Requirements for independent microgrid systems and interconnected systems in island mode can be found in the parallel systems requirements of what portion of the Code?
○ a. Annex B
○ b. Article 690
○ c. Article 691
○ d. Article 705