Visit Suncam.com for more courses

Continuing Education Course #633
Materials Science & Engineering:
Electrical & Magnetic Materials

1. What is the Engineer focused on according to the MSE Tetrahedron?
- a. performance
- b. processing
- c. properties
- d. structure

2. Iron, cobalt, and nickel are known as what?
- a. ceramics
- b. insulators
- c. semi-conductors
- d. transition metal

3. Name the type of material that contains metallic and nonmetallic elements.
- a. ceramics
- b. composites
- c. metals
- d. polymers

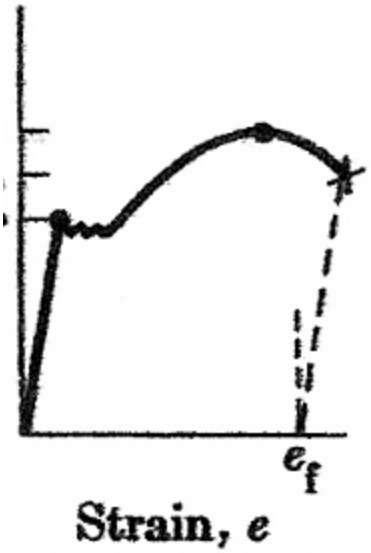
4. How extended will a 0.1 inch wire become if supporting 1100 lbf weight?

The wire is originally 10 ft long
The modulus of elasticity is 30,000,000 psi.

Hint: Strain (e)= s/E
- a. 0.005 in
- b. 0.05 in
- c. 0.06 in
- d. 0.6 in

5. The amount of energy absorbed during failure is called the _____.
- a. ductility
- b. strength
- c. toughness
- d. yield

6. Consider the following figure.



Which description defines this stress-strain curve?

- a. ductile with a yield point
- b. ductile with no marked yield point
- c. nominal stress-strain curve
- d. non-ductile, no plastic deformation

7. Which type of battery cell rechargeable?

- a. cycle cell
- b. electrolyte cell
- c. primary cell
- d. secondary cell

8. What does the potential difference in a battery cell depend on?

- a. anode & cathode used
- b. electrolyte properties
- c. volume of materials used
- d. overall shape of the materials

9. The anode is _____ with respect to the battery, which results in a _____ electrode.

- a. negative / negative
- b. negative / positive
- c. positive / negative
- d. positive / positive

10. A lithium anode [E = -3.05V] is used with a copper cathode [E = +0.52V].

What is the standard potential of this cell?

- a. -0.24
- b. +0.24
- c. -1.28V
- d. 1.28V

11. Oxidation always takes place on the _____.

- a. anode
- b. cathode

○ c. positive electrode
○ d. depends on type of cell

12. What is the difference between an insulator and a dielectric?
○ a. dielectric supports an electric field
○ b. insulator supports an electric field
○ c. dielectric supports a magnetic field
○ d. insulator supports a magnetic field

13. What type of insulator is used in high-voltage power line supports?
○ a. ceramic
○ b. fiberglass
○ c. glass
○ d. rubber

14. A piece of electrical equipment is said to have a 10 year life span if operated at 40°C.

What roughly is the expected lifetime if the environment is expected to be 50°C [a desert environment]?
○ a. 1 year
○ b. 3 years
○ c. 5 years
○ d. 10 years

15. What class of insulators do esterimide fall into?
○ a. Class A
○ b. Class B
○ c. Class F
○ d. Class H

16. An insulating spacer of length 80 mm has a cross-section area of 15 mm by 15 mm. It is mounted between two pieces of metal. The volume resistivity is 0.01 TΩ.m. The voltage on the metal plates is 65,000 V.

What most nearly is the leakage current through the volume?
○ a. 1μA
○ b. 5μA
○ c. 10mA
○ d. 15mA

17. The BIL is an insulation level based on the _____ value of the standard lightning impulse.
○ a. crest
○ b. front
○ c. slope
○ d. transient

18. What is the PQI for a surge arrester designed to protect a 120V system at a protection level of 400V and reseals at 80% of the phase voltage level of the system?
○ a. 0.01
○ b. 0.10
○ c. 0.15
○ d. 0.24

19. What are the best metal conductors, in order?

- a. Ag, Cu, Au, Al
- b. Au, Ag, Cu, Al
- c. Cu, Al, Au, Ag
- d. Cu, Ag, Au, Al

20. A given wire has a diameter of 0.3 inches. How many circular mils is this wire?
- a. 90 cmils
- b. 300 cmils
- c. 30MCM
- d. 90 kCM

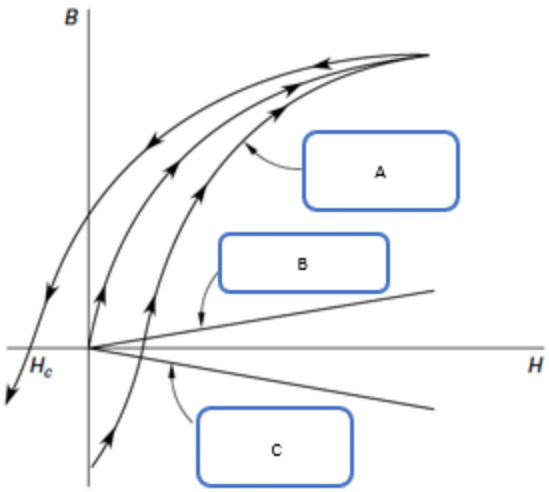
21. A #12 AWG copper wire used in a fuse has a diameter of 2.05 mm..

What most nearly is the fusing current?
- a. 2 A
- b. 100 A
- c. 140 A
- d. 200 A

22. What type of electrons produce a magnetic field?
- a. accelerating
- b. moving
- c. orbital
- d. stationary

23. The most magnetic materials, iron, cobalt, nickel, have partially fixed _____ shells.
- a. 3d
- b. 3s
- c. 4s
- d. 4p

24. Which of the following curves represent ferromagnetism?



- a. A
- b. B

○ c. C
○ d. none

25. What is the magnetic equivalent of Ohm's Law for a magnetic circuit?
○ a. $V_m = \phi\mathbb{R}$
○ b. $\mathbb{R} = \dfrac{l}{\mu A}$
○ c. $P_m = \dfrac{\mu A}{l}$
○ d. $G = \dfrac{1}{R}$

Purchase this course on Suncam.com