1. What composes all matter whether a liquid, solid, or gas?
   A. Atoms
   B. Electrons
   C. Protons
   D. Neutrons
   ANSWER: A

2. Which of the following is not a basic part of an atom?
   A. Electron
   B. Proton
   C. Neutron
   D. Coulomb
   ANSWER: D

3. What is the smallest element of a matter?
   A. atom
   B. molecule
   C. crystal
   D. wafer
   ANSWER: A

4. To determine whether a material can support the flow of electricity or not, we need to examine its
   A. atomic structure
   B. physical state
   C. molecular structure
   D. chemical composition
   ANSWER: A

5. Approximate diameter of an atom
   A. 10^{-10} μμm
   B. 10^{-10} μm
   C. 10^{-10} mm
   D. 10^{-10} m
   ANSWER: D

6. The lightest kind of atom or element
   A. Helium
   B. Oxygen
   C. Hydrogen
   D. Titanium
   ANSWER: C

7. Known as the simplest type of atom.

A. Hydrogen
B. Oxygen
C. Helium
D. Nitrogen

ANSWER: A

8. Approximate diameter of a Hydrogen atom
   A. 1.1×10^{-10} μμm
   B. 1.1×10^{-10} μm
   C. 1.1×10^{-10} mm
   D. 1.1×10^{-10} m

   ANSWER: B

9. A commonly used model in predicting the atomic structure of a material.
   A. String model
   B. Wave model
   C. Particle model
   D. Bohr model

   ANSWER: D

10. Is at the center of an atomic structure in a Bohr model.
    A. electrons
    B. protons
    C. neutrons
    D. nucleus

    ANSWER: D

11. The nucleus of an atom is normally
    A. neutral
    B. positively charged
    C. negatively charged
    D. either positively or negatively charged

    ANSWER: A

12. What particles that revolve around the positive nucleus?
    A. electrons
    B. protons
    C. neutrons
    D. electrons & protons

    ANSWER: A

13. In electricity, positive electric charge refers to _____.
    A. protons
    B. neutrons

C. electrons
D. atoms

ANSWER: A

14. What is the charge of an electron?
    A. 1.6022×10^{-19} C
    B. 9.1096×10^{-19} C
    C. 1.6022×10^{-31} C
    D. 9.1096×10^{-31} C

ANSWER: A

15. The mass of a proton is approximately
    A. 1.6726×10^{-19} Kg
    B. 1.6726×10^{-27} Kg
    C. 1.6022×10^{-19} Kg
    D. 1.6022×10^{-27} Kg

ANSWER: B

16. Protons are about _____ heavier than electrons.
    A. 1,800 times
    B. less than thrice
    C. less
    D. twice

ANSWER: A

17. Approximately, how many electrons that could equal to the mass of a single proton or neutron?
    A. 1,863 electrons
    B. 1,683 electrons
    C. 1,638 electrons
    D. 1,836 electrons

ANSWER: D

18. The maximum number of electrons (Ne) that can occupy a given shell (n) is determined by the formula
    A. $N_e = 2n^2$
    B. $N_e = n^2$
    C. $N_e = 2^n$
    D. $N_e = 2n$

ANSWER: A

19. The discrete amount of energy required to move an electron from a lower shell to a higher shell.
    A. negative energy

B. positive energy
C. quantum
D. quanta

ANSWER: C

20. Maximum number of orbiting electrons at the first or K shell
A. 2
B. 4
C. 6
D. 8

ANSWER: A

21. Electron is derived from the Greek name elektron which means
A. huge
B. tiny
C. particle
D. amber

ANSWER: D

22. Electric charge of neutron is the same as
A. proton
B. electron
C. current
D. atom

ANSWER: D

23. In an atomic structure, what particle that has no charge and therefore has no effect on its atomic charge
A. electrons
B. protons
C. neutrons
D. nucleons

ANSWER: C

24. The atomic number of an element is determined by the number of
A. electrons
B. valence electrons
C. protons
D. protons or neutrons

ANSWER: C

25. The atomic weight of an element is determined by the number of
A. electrons
B. valence electrons

C. protons
D. protons and neutrons

ANSWER: D

26. If an element has an atomic number of 12, there are how many protons and electrons?
A. 6 protons and 12 electrons
B. 12 protons and 6 electrons
C. 12 protons and 12 electrons
D. 12 protons and 24 electrons

ANSWER: C

27. Suppose there is an atom containing eight protons and eight neutrons in the nucleus, and two neutron are added to the nucleus, the resulting atomic weight is about
A. 8
B. 10
C. 16
D. 18

ANSWER: D

28. It is composed of a series of energy levels containing the valence electrons.
A. conduction band
B. forbidden band
C. side band
D. valence band

ANSWER: D

29. Electrons at the conduction band are called
A. free electrons
B. valence electrons
C. deep state electrons
D. shallow state electrons

ANSWER: A

30. _____ are electrons at the outer shell
A. Inside shell electrons
B. Conductor electrons
C. Outside shell electrons
D. Valence electrons

ANSWER: D

31. Electrons at the outermost shell are called
A. free electrons
B. valence electrons
C. deep state electrons

D. shallow state electrons

ANSWER: B

32. Which material has more free electrons?
    A. Conductor
    B. insulators
    C. mica
    D. dielectric

ANSWER: A

33. Which material has the least number of valence electrons?
    A. conductor
    B. semiconductor
    C. insulator
    D. semi-insulator

ANSWER: A

34. What elements possess four valence electrons?
    A. Insulators
    B. Semi-insulators
    C. Semiconductors
    D. Conductors

ANSWER: C

35. A good conductor has how many valence electrons?
    A. 1
    B. 2
    C. 4
    D. 8

ANSWER: A

36. Materials that might have eight valence electrons
    A. conductor
    B. insulator
    C. semiconductor
    D. semi-insulator

ANSWER: B

37. An insulating element or material has capability of _____.
    A. conducting large current
    B. storing voltage
    C. storing high current
    D. preventing short circuit between two conducting wires

ANSWER: D

38. A law of nature makes certain materials tend to form combinations that will make them stable. How many electrons in the valence orbit are needed to give stability?
    A. 1
    B. 2
    C. 4
    D. 8
    ANSWER: D

39. Determine which statement is true?
    A. The current carriers in conductors are protons.
    B. The current carriers in conductors are valence electrons.
    C. Valence and inner electrons are the carriers in conductors.
    D. Valence electrons are not the ones that become free electrons.
    ANSWER: B

40. A material that contains an abundance of free carrier is called
    A. insulator
    B. semi-insulator
    C. conductor
    D. semiconductor
    ANSWER: C

41. From the combined energy-gap diagram, which material has the widest gap between valence band and the conduction band?
    A. conductor
    B. semiconductor
    C. super conductor
    D. insulator
    ANSWER: D

42. From the combined energy-gap diagram, which material has the smallest energy gap between valence band and the conduction band?
    A. conductor
    B. semiconductor
    C. super conductor
    D. insulator
    ANSWER: A

43. _____ has a unit of electronvolt(eV).
    A. Charge
    B. Potential difference
    C. Energy
    D. Current

ANSWER: C

44. The difference in energy between the valence and conduction bands of a semiconductor is called
    A. band gap
    B. extrinsict photoeffect
    C. conductivity
    D. energy density

    ANSWER: A

45. The energy gap between the valence band and conduction band of a conductor is in the order of
    A. zero electron volt (0 eV)
    B. one electron volt (1 eV)
    C. five electron volt (5 eV)
    D. ten electron volt (10 eV)

    ANSWER: A

46. The energy gap of an insulator is in the order of
    A. zero electron volt (0 eV)
    B. one electron volt (1 eV)
    C. five electron volt (5 eV)
    D. one-tenth electron volt (0.1 eV)

    ANSWER: C

47. In materials, what do you call the region that separates the valence and conduction bands?
    A. energy gap
    B. forbidden band
    C. insulation band
    D. energy gap or forbidden band

    ANSWER: D

48. What do you call the potential required to remove a valence electron?
    A. valence potential
    B. threshold potential
    C. critical potential
    D. ionization potential

    ANSWER: D

49. A factor that does not affect the resistance of the material.
    A. atomic structure
    B. mass
    C. length

D. cross-sectional area

ANSWER: B

50. Copper atom has how many protons?
    A. 1
    B. 4
    C. 8
    D. 29

ANSWER: D

51. Ion is _____.
    A. an atom with unbalanced charges
    B. free electron
    C. proton
    D. nucleus without protons

ANSWER: A

52. What will happen to an atom if an electron is either taken out or taken into the same atom?
    A. Becomes negative ion
    B. Becomes positive ion
    C. Becomes an ion
    D. Nothing will happen

ANSWER: C

53. When an atom gains an additional _____, it results to a negative ion.
    A. neutron
    B. proton
    C. electron
    D. atom

ANSWER: C

54. An electrical insulator can be made a conductor by
    A. ionizing
    B. electroplating
    C. oxidizing
    D. metalization

ANSWER: A

55. Refers to the lowest voltage across any insulator that can cause current flow.
    A. conduction voltage
    B. breakdown voltage
    C. voltage flow
    D. voltage drop

ANSWER: B

56. Dielectric is another name for
    A. conductor
    B. semiconductor
    C. insulator
    D. semi-insulator
ANSWER: C

57. When all atoms of a molecule are the same, the substance is called
    A. a crystal
    B. an element
    C. a compound
    D. an ion
ANSWER: B

58. An isotope
    A. has a negative charge
    B. has a positive charge
    C. might have either positive or negative charge
    D. is neutral
ANSWER: D

59. Isotope means, the same element but with different number of
    A. electrons
    B. neutrons
    C. protons
    D. atoms
ANSWER: B

60. The particles that make up the lattice in ionic crystal
    A. molecules
    B. ions
    C. electrons
    D. neutrons
ANSWER: C

61. A structure for solids in which the position of atoms are predetermined
    A. Crystalline
    B. Polycrystalline
    C. Lattice
    D. Non-Crystalline
ANSWER: A

62. A solid, which has no defined crystal structure.
    A. Crystalline
    B. Non-crystalline
    C. Amorphous
    D. Non-crystalline or Amorphous
    ANSWER: D

63. States that each electron in an atom must have a different set of quantum numbers.
    A. Quantum principle
    B. Fermi-Dirac principle
    C. Spin principle
    D. Exclusion principle
    ANSWER: D

64. Given an atomic structure of a certain material, what data can you determine out from it?
    A. atomic number
    B. atomic mass
    C. the number of protons and electrons
    D. all of the above
    ANSWER: D

65. Ideally, all atoms have the same number of positively charged protons and negatively charged electrons, and is therefore considered as
    A. electrically neutral
    B. physically stable
    C. magnetically aligned
    D. technically rigid
    ANSWER: A

66. When the charge of an atom becomes unbalanced, the atom is said to carry
    A. Electric charge
    B. Magnetic charge
    C. Electromagnetic charge
    D. Electrical current
    ANSWER: A

67. A charged atom is also known as
    A. ion
    B. anion
    C. cation
    D. domain
    ANSWER: A

68. An atom or group of atoms that carries a net electric charge is called

A. ion
B. anion
C. cation
D. domain
ANSWER: A

69. A negative ion results when an atom
A. loss some of its inside electrons
B. loss some of its valence electrons
C. gains additional electron
D. gains additional proton
ANSWER: C

70. A positive ion has
A. excess of electrons
B. excess of neutrons
C. lack of electrons
D. lack of protons
ANSWER: C

71. What do you call a positively charged ion?
A. cathode
B. anion
C. cation
D. domain
ANSWER: C

72. What do you call a negatively charged ion?
A. electron
B. anion
C. cation
D. domain
ANSWER: B

73. _____ is the procedure by which an atom is given a net charge by adding or taking away electron.
A. Polarization
B. Irradiation
C. Ionization
D. Doping
ANSWER: C

74. Is a process by which an atom is constantly losing and then regaining electrons?
A. oxidation

B. passivation
C. metallization
D. ionization

ANSWER: D

75. The process in which atoms are changed into ions.
A. oxidation
B. passivation
C. metallization
D. ionization

ANSWER: D

76. Gases with charged particles.
A. inert
B. plasma
C. conductive
D. reactive

ANSWER: B

77. One Coulomb of charge has how many electrons?
A. 6.24×10^{18} electrons
B. 6.24×10^{19} electrons
C. 62.4×10^{18} electrons
D. 62.4×10^{19} electrons

ANSWER: A

78. Coulomb is the SI unit of charge, how about in cgs?
A. Statcoulomb
B. electron volt
C. electron unit
D. static unit

ANSWER: A

79. Statcoulomb is also known as
A. electrostatic unit (esu)
B. electron volt
C. electron unit
D. static unit

ANSWER: A

80. An isolated body under normal condition is always
A. neutral
B. positively charged
C. negatively charged

D. ionized

ANSWER: A

81. What is the charge magnitude, Q of a body if it lacks 5 electrons?
    A. 5×10^{-19} Coulomb
    B. 5 Coulomb
    C. 8×10^{-19} Coulomb
    D. 19×10^{-19} Coulomb

ANSWER: C

82. The net movement of charged particles in one direction or another.
    A. flow
    B. current
    C. drift current
    D. diffusion current

ANSWER: B

83. The rate at which electrons pass a given point in the circuit gives the magnitude of
    A. electron current
    B. magnetic current
    C. drift current
    D. diffusion current

ANSWER: A

84. The unit of current.
    A. Ampere
    B. Ampere/sec.
    C. Ampere-sec.
    D. Ampere-hr.

ANSWER: A

85. The unit Ampere is equivalent to
    A. one Coulomb/second
    B. one Coulomb/min
    C. one Joule/sec
    D. one Joule/min

ANSWER: A

86. When one coulomb of electric charge continuously passes a given point every second, the electric current is said to
    A. 1 μA
    B. 1 mA
    C. 1 A
    D. 10 A

ANSWER: C

87. One ampere is equal to how many electrons per second?
    A. 1×10^{18} electrons/sec.
    B. 1×10^{19} electrons/sec.
    C. 6.25×10^{18} electrons/sec.
    D. 6.25×10^{19} electrons/sec.

ANSWER: D

88. The bigger the diameter of a wire,
    A. more current can pass
    B. less current can pass
    C. more heat is generated when current flow
    D. the higher is the electrical resistance

ANSWER: A

89. If in a material, current can hardly pass, it means
    A. the material is very hard
    B. the material is very soft
    C. the material has high resistance
    D. the material has less resistance

ANSWER: C

90. The greater the diameter of a wire, the _____ is the resistance.
    A. greater
    B. lesser
    C. harder
    D. bigger

ANSWER: B

91. The longer the wire the _____ is the resistance
    A. higher
    B. lesser
    C. harder
    D. smaller

ANSWER: A

92. If a conductor's cross-sectional area is doubled and its length is halved, the value of its resistance will
    A. double
    B. quadruple
    C. decrease by a factor of two
    D. decrease by a factor of four

ANSWER: D

93. The amount of resistance that a wire has with regards to the flow of electric current
    A. is less for a conductor than for an insulator
    B. is less for an insulator than for a semiconductor
    C. is less for a semiconductor than for a conductor
    D. is high for a semiconductor than for an insulator
    ANSWER: A

94. The area of a conductor whose diameter is 0.001 inch is equal to
    A. one angstrom
    B. one circular mil
    C. one micron
    D. one steradian
    ANSWER: B

95. A 100m long wire with a cross-sectional area $A=10^{-3}$ m^2 has a resistance of 10Ω. Determine the resistivity of the wire.
    A. 10^{-2} Ω-m
    B. 10^{-3} Ω-m
    C. 10^{-4} Ω-m
    D. 10^{-5} Ω-m
    ANSWER: C

96. the reciprocal of resistance
    A. permeance
    B. elastance
    C. inductance
    D. conductance
    ANSWER: D

97. The science of physical phenomena at very low temperature, approaching absolute zero is called _____.
    A. crytanalysis
    B. cybernetics
    C. temperature inversion
    D. cryogenics
    ANSWER: D

98. What happens in the resistance of copper wire when its temperature is raised?
    A. decreased
    B. steady
    C. increased
    D. zero
    ANSWER: C

99. A wire has a resistance of 5Ω at room temperature and a temperature coefficient $\alpha=4x10^{-3}/°C$, calculate the wire resistance at 75°C.
    A. 8.925 Ω
    B. 7.925 Ω
    C. 6.925 Ω
    D. 6.050 Ω
    ANSWER: D

100. The temperature coefficient of resistance of a certain wire is known to be 0.004/°C at zero degrees Celsius. What would be the temperature coefficient at room temperature?
    A. 0.00018/°C
    B. 0.00036/°C
    C. 0.00180/°C
    D. 0.00360/°C
    ANSWER: D

101. Where does practically all of the RF current flow in a conductor?
    A. along the surface
    B. in the center of the conductor
    C. in the electromagnetic field in the conductor center
    D. in the magnetic field around the conductor
    ANSWER: A

102. _____ is one factor that does not affect resistance.
    A. Cross sectional area
    B. Resistivity
    C. Mass
    D. Length
    ANSWER: C

103. Why is the resistance of a conductor different for RF current than for DC?
    A. Because of skin effect
    B. Because conductors are non-linear devices
    C. Because the insulation conducts current at radio frequency
    D. Because of the Heisenberg effect
    ANSWER: A

104. The ability of a material to resist current flow is called “resistance”. What is (are) the factor(s) that affect its value?
    A. temperature
    B. length & cross-sectional area
    C. atomic structure

D. all of these

ANSWER: D

105. Find the charge in coulombs of dielectric that has a positive charge of 14.5 x 10 to the 18^{th} power protons.
   A. 29 x 10 to the 16^{th} Coulombs
   B. 14.5 x 10 to the 16^{th} Coulombs
   C. 14.5 x 10 to the 18^{th} Coulombs
   D. 29 x 10 to the 18^{th} Coulombs

ANSWER: C

106. Electron volt (eV) is a unit of
   A. power
   B. energy
   C. magnetic field
   D. magnetic force

ANSWER: B

107. One electron volt (eV) is equivalent to
   A. 1.0 watt-sec
   B. 1.6×10^{-19} watt-sec
   C. 1.0 Joule
   D. 1.6×10^{-19} Joules

ANSWER: D

108. What law that describes the force of attraction or repulsion between two charges is directly proportional to their strengths and inversely proportional to the square of the distance between them?
   A. Coulomb's first law
   B. Coulomb's second law
   C. Coulomb's third law
   D. Coulomb's law or law of electrostatics

ANSWER: D

109. What is the law whereby the force of attraction and repulsion between poles is inversely proportional to the square of the distance between them?
   A. Newton's first law
   B. Newton's second law
   C. Norton's law
   D. Coulomb's second law

ANSWER: D

110. Is usually used to detect the presence of electric charge.
   A. experimental charge

B. unit charge
C. dipole
D. test charge

ANSWER: D

111. Test charge has a charge of
A. 0 Coulomb
B. +1 Coulomb
C. -1 Coulomb
D. Infinity

ANSWER: B

112. Three charges of +5 C, -6 C and +7 C are placed inside a sphere, what is the total charge of the sphere?
A. +5 Coulomb
B. -6 Coulomb
C. -7 Coulomb
D. +6 Coulomb

ANSWER: D

113. A combination of two charges, with equal charge magnitude but opposite signs.
A. magnetic dipole
B. static dipole
C. dynamic dipole
D. electric dipole

ASNWER: D

114. The space outside or surrounding an electric charge where it has a force of attraction or repulsion.
A. Electric field
B. Magnetic field
C. Electromagnetic field
D. Electric flux

ANSWER: A

115. Refers to a force of field that exists between ions where they either repel or attract each other.
A. Resisting field
B. Potential field
C. Dielectric
D. Electromotive

ANSWER: D

116. The imaginary lines representing the electric field.

A. Electric field
B. Electric flux
C. Electric flux density
D. Electric lines of force

ANSWER: D

117. What is true in visualizing electric field lines of force from a charge body?
A. Field lines are continuous curve and they never intersect.
B. The spacing between these lines increases as they get far from the charged body.
C. The number of field lines is directly proportional to the magnitude of the electric field.
D. All of the above.

ANSWER: D

118. What do you call the total number of electric lines of force in an electric field?
A. Electric field
B. Electric flux
C. Electric flux density
D. Electric lines of force

ANSWER: B

119. The number of lines per unit area in a plane perpendicular to the electric lines of force.
A. Electric field
B. Electric flux
C. Electric flux density
D. Electric lines of force

ANSWER: C

120. Electric lines of force leave and enter the charge surface at what angle?
A. 15°
B. 30°
C. 45°
D. 90°

ANSWER: D

121. Find the dielectric constant of air.
A. approximately 1
B. approximately 0
C. approximately 2
D. approximately 4

ANSWER: A

122. Electric field intensity is measured in terms of

A. Volts/meter
B. Newtons/meter
C. Watts/meter
D. Amperes/meter

ANSWER: A

123. Electric field intensity is
A. a scalar quantity
B. a vector quantity
C. an absolute value
D. a relative value

ANSWER: B

124. Electric flux is a/an _____ quantity.
A. scalar
B. vector
C. absolute
D. relative

ANSWER: A

125. Electric flux density is a/an _____ quantity.
A. scalar
B. vector
C. absolute
D. relative

ANSWER: B

126. Three charges of +5 C, -6 C, and +7 C are inside a sphere, what is the total electric flux passing through the surface of the sphere?
A. 5 Coulombs
B. 6 Coulombs
C. 7 Coulombs
D. 8 Coulombs

ANSWER: B

127. An electric charge produces a total electric field of 6 Coulombs, calculate the electric flux density in an area of one square meter ($1m^2$).
A. 1 C/m^2
B. 2 C/m^2
C. 4 C/m^2
D. 6 C/m^2

ANSWER: D

128. The measure of density of the electric charge

A. Electric gradient
B. Electric current
C. Electric charge
D. Electric potential

ANSWER: D

129. The ability of the material to store electrical potential energy under the influence of an electric field.
A. capacity
B. permeability
C. permittivity
D. conductivity

ANSWER: C

130. The absolute permittivity of air or free space.
A. $1/36\pi \times 10^{-9}$ F/m
B. $36\pi \times 10^{-9}$ F/m
C. $1/36\pi \times 10^{-19}$ F/m
D. $36\pi \times 10^{-19}$ F/m

ANSWER: A

131. The relative permittivity of air.
A. 0
B. 1
C. $1/36\pi \times 10^{-9}$ F/m
D. 8.854×10^{-12} F/m

ANSWER: B

132. Calculate the permittivity of a material with relative permittivity of 5.
A. 8.854×10^{-11} F/m
B. 4.42×10^{-11} F/m
C. $1/36\pi \times 10^{-9}$ F/m
D. 8.854×10^{-12} F/m

ANSWER: B

133. What is the term used to express the amount of electrical energy stored in an electrostatic field?
A. Volts
B. Watts
C. Coulombs
D. Joules

ANSWER: D

134. How does permittivity affect electric field intensity?

A. It causes the field intensity to increase.
B. It causes the field intensity to decrease.
C. It causes the field intensity to fluctuate up and down.
D. It has no effect on field intensity.

ANSWER: B

135. Relative permittivity is also known as
A. dielectric constant
B. dielectric strength
C. isolation strength
D. permeability

ANSWER: A

136. Most materials' relative permittivity lies between
A. 0.01 – 1
B. 1 – 10
C. 10 – 50
D. 50 – 100

ANSWER: B

137. Charge body at rest is said to exhibit electric field, which interacts with other bodies. The study of this phenomena is known as
A. electricity
B. electrostatics
C. electromagnetism
D. field interactions

ANSWER: B

138. The basic law for interaction of charged bodies at rest.
A. Charged law
B. Gauss' law
C. Faraday's law
D. Coulomb's law

ANSWER: D

139. The force between the two electrically charged body is called
A. electromotive force
B. electrostatic force
C. electromagnetic force
D. magnetic force

ANSWER: B

140. The force between two electrically charged body is
A. directly proportional to the charge

B. inversely proportional to the charge
C. not affected by the charge
D. universally constant

ANSWER: A

141. In 1784, who demonstrated that the force between charges is inversely related to the square of the distance between them?
A. Maxwell
B. Gauss
C. Tesla
D. Coulomb

ANSWER: D

142. Determine the force in Newton between 4μC charges separated by 0.1 meter in air.
A. 1.44 N
B. 14.4 N
C. 144 N
D. 1440 N

ANSWER: B

143. What will happen when two opposite charges get closer?
A. repels less
B. attracts less
C. repels more
D. attracts more

ANSWER: D

144. The value of k in Coulomb's electrostatic force equation ($F = kQ_1Q_2/r^2$) is oftentimes expressed as $1/4\pi\varepsilon o$. What is ε_o?
A. absolute permeability
B. absolute permittivity
C. relative permeability
D. relative permittivity

ANSWER: B

145. The measure of electric field strength per unit length is known as electric field intensity or simply electric intensity. What is its unit?
A. Volt/meter (V/m)
B. Joules/Coulomb-meter (J/Cm)
C. Newton/Coulomb (N/C)
D. All of the above

ANSWER: D

146. Calculate the electric field intensity 10cm from a charge Q=5nC.

A. 450 N/C
B. 900 N/C
C. 4.5×10^3 N/C
D. 9.0×10^3 N/C

ANSWER: C

147. Determine the magnitude of the electric field inside a sphere that encloses a net charge of 2μC.
A. 0 (zero)
B. 9×10^7 N/C
C. 1.8×10^8 N/C
D. infinite

ANSWER: A

148. Calculate the total electric field at the surface of a sphere of radius r=1cm, and enclosing a net charge of 2μC.
A. 0 (zero)
B. 9×10^7 N/C
C. 1.8×10^8 N/C
D. infinite

ANSWER: C

149. A 2nC point charge will produce what potential at 2m away?
A. 4.0 Volts
B. 6.0 Volts
C. 7.5 Volts
D. 9.0 Volts

ANSWER: D

150. A charged body in free space produces 10-V potential at a distance 25cn away. What will be the potential at 50cm away?
A. 5.0 Volts
B. 7.5 Volts
C. 10.0 Volts
D. 15.0 Volts

ANSWER: A

151. What do you call the phenomenon whereby substance attracts pieces of iron?
A. Permeability
B. Magnetism
C. Naturalism
D. Electromagnetism

ANSWER: B

152. The condition in which a substance attracts pieces of iron is known as
    A. Electromagnetism
    B. Electrolysis
    C. Magnetism
    D. Magnetic Induction
ANSWER: C

153. A substance that attracts pieces iron is known as
    A. magnet
    B. conductor
    C. ferrite
    D. superconductor
ANSWER: A

154. A natural magnet
    A. loadstone
    B. carbon
    C. lodestone
    D. magnesium
ANSWER: C

155. Group of magnetically aligned atoms.
    A. Lattice
    B. Crystal
    C. Domain
    D. Range
ANSWER: C

156. In a magnet, what do you call the point in which the magnetic lines of force is maximum?
    A. maximum pole
    B. intensified pole
    C. unit pole
    D. magnetic pole
ANSWER: D

157. Which of the following refers to a characteristic of a magnetic line of force?
    A. Travels from south to north through the surrounding medium of a bar magnet
    B. Travels back and forth between the north and south pole of a bar magnet
    C. Travels from north to south through the surrounding medium of a bar magnet
    D. Stay stationary between the north and the south of a bar magnet
ANSWER: C

158. Is believed to be the pole where the magnetic lines of force are originating.

A. North Pole
B. South Pole
C. Unit Pole
D. Universal Pole

ANSWER: A

159. What do you call a pole that when place in air with a similar and equal pole will cause a force of repulsion of $1/4\pi\mu_o$ Newtons?
A. South Pole
B. Unit pole
C. Convergence pole
D. Universal Pole

ANSWER: B

160. In a magnet, the straight line passing through the two poles is called
A. real axis
B. imaginary axis
C. Cartesian axis
D. magnetic axis

ANSWER: D

161. The phenomenon in which a substance becomes a magnet when placed near a magnet.
A. magnetic transfer
B. magnetic induction
C. electromagnetism
D. magnetism

ANSWER: B

162. A force which causes a substance to become a magnet.
A. magnetizing force
B. magnetomotive
C. creative force
D. electromagnetic force

ANSWER: A

163. What do you call the quantity of magnetism retained by a magnetic material after the withdrawal of a magnetizing force?
A. Left over magnetism
B. Coercivity
C. Hysteresis
D. Residual magnetism

ANSWER: D

164. Is the property of magnetic materials, which retain magnetism after the withdrawal of magnetizing force.
    A. retentivity
    B. permeability
    C. reluctivity
    D. susceptability
ANSWER: A

165. A substance having high retentivity is best suited in making
    A. an electromagnet
    B. a temporary magnet
    C. a permanent magnet
    D. two pole magnet
ANSWER: C

166. Which of the materials below that can be easily magnetized?
    A. soft magnetic materials
    B. hard magnetic materials
    C. low conductive materials
    D. high conductive materials
ANSWER: A

167. Materials that can be easily magnetized in both directions
    A. soft magnetic materials
    B. hard magnetic materials
    C. diamagnetic
    D. paramagnetic
ANSWER: A

168. Ability of a material to conduct magnetic flux through it refers to
    A. permittivity
    B. permeability
    C. reluctivity
    D. conductivity
ANSWER: B

169. The ability to concentrate magnetic lines of force.
    A. retentivity
    B. permeability
    C. susceptability
    D. reluctivity
ANSWER: B

170. The permeability of free space.

A. $4\pi \times 10^{-7}$ H/m
B. 12.56×10^{-7} F/m
C. 8.854×10^{-7} H/m
D. 8.854×10^{-12} F/m

ANSWER: A

171. The ratio of material permeability to the permeability of air or vacuum.
A. relative conductivity
B. relative permeability
C. inverse permeability
D. inverse permittivity

ANSWER: B

172. What is the relative permeability of air?
A. 0
B. 1
C. $4\pi \times 10^{-7}$ H/m
D. 8.854×10^{-12} F/m

ANSWER: B

173. Materials with permeability slightly less than that of free space.
A. diamagnetic
B. paramagnetic
C. ferromagnetic
D. antimagnetic

ANSWER: A

174. Materials with permeability slightly greater than that of free space.
A. diamagnetic
B. paramagnetic
C. ferromagnetic
D. antimagnetic

ANSWER: B

175. What do you call materials, which possess very high permeabilities?
A. diamagnetic
B. paramagnetic
C. ferromagnetic
D. antimagnetic

ANSWER: C

176. What is the relative permeability of paramagnetic substance?
A. slightly greater than 1
B. very much greater than 1

C. slightly less than 1
D. very much smaller than 1

ANSWER: A

177. Permeability of a material means:
A. The ability of the material to conduct electric field
B. The conductivity of the material for electromagnetic field
C. The ability of the material to hold magnetic flux
D. The conductivity of the material for magnetic lines of force

ANSWER: D

178. Nonmetallic materials that has ferromagnetic properties.
A. termites
B. ferrites
C. ferrous
D. loadstone

ANSWER: B

179. Cores of magnetic equipment use magnetic material which has
A. very low permeability
B. moderate permeability
C. low permeability
D. high permeability

ANSWER: D

180. Hydrogen is an example of a _____ material.
A. diamagnetic
B. ferromagnetic
C. paramagnetic
D. magnetic

ANSWER: A

181. Cobalt is an example of a _____ material.
A. diamagnetic
B. ferromagnetic
C. paramagnetic
D. magnetic

ANSWER: B

182. The space outside a magnet where its poles has a force of attraction or repulsion on another magnetic pole.
A. magnetic field
B. magnetic flux
C. magnetic flux density

D. magnetic lines of force

ANSWER: A

183. The imaginary lines representing the magnetic field.
   A. magnetic field
   B. magnetic flux
   C. magnetic flux density
   D. magnetic lines of force

ANSWER: D

184. What do you call the total number of magnetic lines of force in a magnetic field?
   A. magnetic field
   B. magnetic flux
   C. magnetic flux density
   D. magnetic lines of force

ANSWER: B

185. The number of lines per unit area in a plane perpendicular to the magnetic lines of force.
   A. magnetic field
   B. magnetic flux
   C. magnetic flux density
   D. magnetic lines of force

ANSWER: C

186. The direction of field lines outside a magnet is
   A. from north to south pole
   B. from south to north pole
   C. either from north to south or south to north pole
   D. dependent on the magnet's orientation with respect to the earth's magnetic pole

ANSWER: C

187. The entire group of magnetic field lines flowing outward from the north pole of a magnet.
   A. magnetic field
   B. magnetic flux density
   C. magnetic flux
   D. electromagnetic field

ANSWER: C

188. Magnetic lines of force are called
   A. magnetic field
   B. magnetic flux density
   C. magnetic flux

D. electromagnetic field

ANSWER: C

189. What is the unit of magnetic flux in SI system?
   A. Weber
   B. Maxwell
   C. Tesla
   D. Gauss

ANSWER: A

190. The unit of magnetic flux density in SI:
   A. Gauss
   B. Weber
   C. Maxwell
   D. Tesla

ANSWER: D

191. A magnetic flux of 25,000 maxwell in an area of 5 sqcm. results in flux density of
   A. 5,000 Gauss (G)
   B. 125,000 G
   C. 5,000 Tesla (T)
   D. 125,000 T

ANSWER: A

192. Calculate the flux density in Gauss (G) having a flux of 12,000 Mx through a perpendicular area of 6cm.
   A. 200 G
   B. 2,000 G
   C. 7,200 G
   D. 72,000 G

ANSWER: B

193. What does a gaussmeter measure?
   A. flux
   B. magnetic field
   C. magnetic flux density
   D. mmf

ANSWER: C

194. The capacity of a substance to become magnetized. This is expressed as a ratio between the magnetization produced in a substance to the magnetizing force producing it.
   A. magnetic conductivity
   B. magnetic susceptibility

C. magnetic resistivity
D. magnetic reluctivity

ANSWER: B

195. The typical saturation flux density for most magnetic materials.
A. 0.1 Wb/m^2
B. 2 Wb/m^2
C. 10 Wb/m^2
D. 20 Wb/m^2

ANSWER: B

196. The force between two magnetic poles is _____ permeability of the medium.
A. directly proportional to the
B. inversely proportional to the
C. not dependent of the
D. exponentially proportional to the

ANSWER: B

197. If the distance between two magnetic poles is halve, the force between them
A. decreases two times
B. decreases four times
C. increases two times
D. increases four times

ANSWER: D

198. A force of 20 N is acting on a 10 Wb magnetic pole, calculate the intensity of the magnetic field?
A. 0.5 N/Wb
B. 2 N/Wb
C. 10 N/Wb
D. 20 N/Wb

ANSWER: B

199. Unit of permeability
A. Henry/meter (H/m)
B. Farad/meter (F/m)
C. Henry-meter (H-m)
D. Farad-meter (F-m)

ANSWER: A

200. The unit of permittivity
A. Henry/meter (H/m)
B. Farad/meter (F/m)
C. Henry-meter (H-m)

D. Farad-meter (F-m)

ANSWER: B

201. Magnetic intensity is
A. a vector quantity
B. a scalar quantity
C. an imaginary quantity
D. either a vector or scalar

ANSWER: A

202. The Gauss is a unit of
A. permeability
B. electromagnetic force
C. magnetic force
D. magnetic flux density

ANSWER: D

203. What is the unit of flux in cgs?
A. Ampere-turn (At)
B. Coulomb/sec. (C/s)
C. Maxwell (Mx)
D. Gauss

ANSWER: C

204. One Weber is equivalent to
A. 10^8 Maxwells
B. 10^6 Maxwells
C. 10^4 Maxwells
D. 10^2 Maxwells

ANSWER: A

205. The equivalent of 1 x 10^9 Maxwells is
A. 1 Weber
B. 10 Weber
C. 100 Weber
D. 1,000 Weber

ANSWER: B

206. A magnetic flux of 500,000,000 lines is equivalent to
A. 5 x 10^8 Maxwells
B. 5 Weber
C. 500 x 10^6 MAxwells
D. all of the above

ANSWER: D

207. The unit of flux density in mks
    A. Gauss
    B. Weber/m^2
    C. Maxwell
    D. Tesla
ANSWER: B

208. What do you call the force that sets up or tends to set up magnetic flux in a magnetic circuit?
    A. electromotive force
    B. potential difference
    C. magnetomotive force
    D. dynamic force
ANSWER: C

209. Voltage in electrical circuits is analogous to _____ in magnetic circuits.
    A. Ampere-turn
    B. Magnetomotive force
    C. Magnetizing force
    D. Flux
ANSWER: B

210. Electrical current is analogous to _____ in magnetic circuits.
    A. Ampere-turn
    B. Magnetomotive force
    C. Magnetizing force
    D. Flux
ANSWER: D

211. _____ capability is analogous to permeance.
    A. Admittance
    B. Conductance
    C. Reluctance
    D. Resistance
ANSWER: B

212. Resistance in electrical circuits is analogous to _____ in magnetic circuits.
    A. Conductance
    B. Permeance
    C. Elastance
    D. reluctance
ANSWER: D

213. The property of a material which opposes the creation of magnetic flux.
    A. elastance
    B. permeance
    C. susceptance
    D. reluctance
    ANSWER: D

214. The reciprocal of reluctance
    A. conductance
    B. permeance
    C. elastance
    D. capacitance
    ANSWER: B

215. Permeance is analogous to
    A. conductance
    B. resistance
    C. impedance
    D. elastance
    ANSWER: A

216. Is the reciprocal of reluctance and implies the readiness of a material to develop magnetic flux.
    A. elastance
    B. permeance
    C. susceptance
    D. conductance
    ANSWER: B

217. Magnetic circuit property that permits flux.
    A. elastance
    B. permeance
    C. susceptance
    D. conductance
    ANSWER: B

218. It is easier to establish flux line in soft iron than it is to establish them in air, this is because iron has a lower
    A. Permeance
    B. Inductance
    C. elastance
    D. reluctance
    ANSWER: D

219. The Oersted (Oe) is the same as
    A. 1 Gb/cm
    B. 1 Gb/m
    C. 10 Gb/cm
    D. 10 Gb/cm
    ANSWER: A

220. The unit of reluctance
    A. Gilbert
    B. Tesla
    C. At/Wb
    D. Gauss
    ANSWER: C

221. It is the specific reluctance of a material.
    A. resistivity
    B. retentivity
    C. reluctivity
    D. permeability
    ANSWER: C

222. At/m is a unit of
    A. magnetic field
    B. reluctance
    C. magnetizing force
    D. magnetic power
    ANSWER: C

223. Magnetomotive force has a unit of
    A. Volt (V)
    B. Watt (W)
    C. Joule (J)
    D. Ampere-turn (At)
    ANSWER: D

224. The cgs unit of magnetomotive force
    A. Volt
    B. Weber
    C. Gilbert
    D. Ampere-turn
    ANSWER: C

225. One Gilbert is equal to
    A. 0.0796 At

B. 0.796 At
C. 7.96 At
D. 79.6 At

ANSWER: B

226. One Ampere-turn (At) is equivalent to
A. 0.126 Gilbert
B. 1.260 Gilberts
C. 12.60 Gilberts
D. 126 Gilberts

ANSWER: B

227. The current needed for a coil of 200 turns to provide a 400 ampere turn magnetizing force is
A. 2 A
B. 4 A
C. 6 A
D. 8 A

ANSWER: A

228. Determine the ampere-turns when a 10 V battery is connected across a solenoid having 100 turns and a resistance of 5 Ω.
A. 50 At
B. 200 At
C. 100 At
D. 1,000 At

ANSWER: B

229. What is residual magnetism?
A. The external magnetic field when the current is flowing through the exciting coil.
B. The flux density, which exist in the iron core when the magnetic field intensity is reduced to zero.
C. The flux density, which exist in the iron core when the magnetic field intensity is at its maximum value.
D. The flux density when the magnetic core is saturated.

ANSWER: B

230. When you demagnetize property by applying an AC field and then gradually reduced it to zero, it is called
A. damping
B. decaying
C. degaussing
D. gaussing

ANSWER: C

231. In a magnetic circuit, a flux that drifts away from its intended path is called
    A. lost flux
    B. linked flux
    C. drift flux
    D. leakage flux
ANSWER: D

232. Is the quantity of magnetizing force needed to counter balance the residual magnetism of a magnetic material.
    A. hysteresis
    B. degaussing
    C. retentivity
    D. coercivity
ANSWER: D

233. What do you call the loss of electrical energy in counter balancing the residual magnetism in each cycle?
    A. hysteresis
    B. magnetomotive
    C. leakage
    D. coercivity
ANSWER: D

234. The amount of magnetic field needed to remove residual magnetism from a transformer core during each half cycle is called the
    A. coercive force
    B. residual field
    C. hysteresis field
    D. demagnetizing force
ANSWER: A

235. If a wire coil has 100 turns and carries 1.3 A of current, calculate the magnetomotive force in Gilbert.
    A. 163.3
    B. 16.33
    C. 1.633
    D. 0.1633
ANSWER: A

236. An advantage of an electromagnet over a permanent magnet
    A. An electromagnet can be demagnetized
    B. An electromagnet is simpler
    C. An electromagnet is cheaper

D. An electromagnet can be switched ON and OFF

ANSWER: D

237. Electromagnet whose core is in the form of a close magnetic ring
   A. solenoid
   B. relay
   C. toroid
   D. circular

ANSWER: C

238. Magnetic flux can always be attributed to
   A. static charged particles
   B. motion of charge particles
   C. static electric field
   D. every applied potential

ANSWER: B

239. What is a magnetic field?
   A. A force set up when current flows through a conductor.
   B. A force set up when a charged body is at static.
   C. The space between two electrically charged particles.
   D. The space around a conductor.

ANSWER: A

240. Which of the following determines the strength of a magnetic field around a conductor?
   A. amount of current
   B. diameter of the conductor
   C. length of the conductor
   D. amount of voltage

ANSWER: A

241. The magnetic flux around a straight, current carrying wire, is stronger
   A. near the edge
   B. near the wire
   C. at the center
   D. at both edge

ANSWER: B

242. In what direction is the magnetic field about a conductor when current is flowing?
   A. In a direction determined by the left-hand rule.
   B. Always in a clock wise direction.
   C. Always in a counter clockwise direction.
   D. In a direction determined by the right-hand screw rule.

ANSWER: A

243. If the electrical current carried by each of the two long parallel wire is doubled, and their separation is also doubled, the force between them
    A. also doubles
    B. increases by a factor of four
    C. decreases by a factor of four
    D. decreases by a factor of two

ANSWER: A

244. Reversing the flow of current in a circuit
    A. reverses the magnetic polarity
    B. increase the magnetic field intensity
    C. decreases the magnetic intensity
    D. enhances hysteresis

ANSWER: A

245. Is used to maintain strength of magnetic field.
    A. storer
    B. energizer
    C. gausser
    D. keeper

ANSWER: D

246. What law that describes the force of attraction or repulsion between two magnetic poles is directly proportional to their strengths?
    A. Coulomb's first law
    B. Coulomb's second law
    C. Ampere's law
    D. Gauss' law

ANSWER: A

247. What is the law whereby the force of attraction or repulsion between poles is inversely proportional to the square of the distance between them?
    A. Coulomb's first law
    B. Coulomb's second law
    C. Coulomb's third law
    D. Coulomb's law

ANSWER: B

248. The physical motion resulting from the forces of magnetic fields.
    A. motor action
    B. linear motion
    C. rectilinear motion
    D. generator action

ANSWER: A

249. What law in electronics where an induced current will be in such a direction that its own magnetic field will oppose the magnetic field that produces the same?
   A. Electromagnetic law
   B. Nortons law
   C. Lenz law
   D. Maxwell law

ANSWER: C

250. A changing magnetic field
   A. produces an electric field
   B. induces potential
   C. produces a fluctuating electric field
   D. produces a steady electric field

ANSWER: B

251. The emf induced in a coil due to the change of its flux linked with it is called
   A. mutual emf
   B. crossfire induced emf
   C. self induced emf
   D. virtually induced emf

ANSWER: C

252. If two coils are close enough together for their magnetic fields to interact, a change in current in one will induce a corresponding voltage in the other, This condition is known as
   A. self-inductance
   B. mutual inductance
   C. crossfire inductance
   D. linked inductance

ANSWER: B

253. If the magnetic flux through a coil changes, the induced EMF acts in such a direction as to
   A. oppose that change
   B. magnify that change
   C. augment that change
   D. amplify that change

ANSWER: A

254. When a conductor is moved through a magnetic field a voltage is always induced. The amount of voltage is always proportional to
   A. the diameter of the conductor used

B. the length of the conductor
C. the distance of the conductor from the field
D. the rate at which the conductor is moved

ANSWER: D

255. The term of energy that is stored in an electromagnetic or electrostatic field
A. kinetic energy
B. static energy
C. dynamic energy
D. potential energy

ANSWER: D

256. What is meant by back EMF?
A. A voltage that is applied in the reverse direction.
B. An EMF that is dude to the fly wheel effect.
C. An EMF that is generated from the back of an electromagnet.
D. A voltage that opposes the applied EMF.

ANSWER: D

257. When current in a conductor increases, Lenz' law states that the self-induced potential will
A. produce current opposite to the increasing current
B. tend to produce more magnetic field
C. tend to augment the increase in current
D. produce current with the same direction to the increasing current

ANSWER: A

258. If a magnetic flux occurs across 100 turns at a rate of 2 Wb/sec. What is the induced voltage as per Faraday's law?
A. 100 V
B. 400 V
C. 200 V
D. 800 V

ANSWER: C

259. The circuit element that is used represent the energy stored in a magnetic field.
A. resistance
B. capacitance
C. inductance
D. elastance

ANSWER: C

260. Which of the given below can produce the most induced voltage?
A. 1 A dc

B. 1 A, 60 Hz
C. 50 A dc
D. 1 A, 400 Hz

ANSWER: D

261. In all cases of electromagnetic induction, the current set-up by an induced voltage tends to create flux whose direction opposes any change in the existing flux. This law is called
A. Ampere's law
B. Lenz' law
C. Coulomb's law
D. Faraday's law

ANSWER: B

262. In electromagnetism, what law that determines the polarity of an induced voltage?
A. Ampere's law
B. Lenz' law
C. Coulomb's law
D. Faraday's law

ANSWER: B

263. In electromagnetism, what law that determines the amount of induced voltage?
A. Ampere's law
B. Lenz' law
C. Coulomb's law
D. Faraday's law

ANSWER: D

264. Electromotive force (emf) is induced whenever a conductor cuts magnetic flux
A. Faraday's first law
B. Faraday's second law
C. Coulomb's first law
D. Coulomb's second law

ANSWER: A

265. The magnitude of electromotive force (emf) that is induced when a conductor cuts magnetic flux is directly proportional to its rate.
A. Faraday's first law
B. Faraday's second law
C. Coulomb's first law
D. Coulomb's second law

ANSWER: B

266. The effect that describes the ability of a mechanically stressed ferromagnetic wire to recognize rapid switching of magnetization when subjected to a DC magnetic field.
    A. Wiegand effect
    B. Wertheim effect
    C. Wiedemann effect
    D. Wall effect

ANSWER: A

267. The concept whereby a small voltage is generated by a conductor with current in an external magnetic field is known as
    A. Wiegand effect
    B. Hall effect
    C. Wiedemann effect
    D. Wall effect

ANSWER: B

268. _____ is called the magnetic field.
    A. The force that drives current through a resistor
    B. Current flow through space around a permanent magnet
    C. The force between the plates of charged capacitor
    D. A force set up when current flow through a conductor

ANSWER: D

269. The natural magnet refers to
    A. steel
    B. soft iron
    C. magnesia
    D. loadstone (lodestone)

ANSWER: D

270. The force between two magnetic poles in relation to their pole strength is _____.
    A. not related
    B. inversely proportional
    C. directly proportional
    D. independent

ANSWER: C