

MULTIPLE CHOICE
QUESTIONS in
CHEMISTRY

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1. What are found in the nucleus of an atom?

- A. Eledctrions and Protons
- B. Protons and Neutrons**
- C. Cations and Anions
- D. Electrons and Neutrons

2. What is the negatively charged particle of an atom?

- A. Electrons**
- B. Protons
- C. Neutron
- D. Molecule

3. What is the positively charged particle of an atom?

- A. Electrons
- B. Protons**
- C. Neutron
- D. Molecule

4. What is the particle of an atom that has no electrical charge?

- A. Electrons
- B. Protons
- C. Neutron**
- D. Molecule

5. The word “atom” comes from Greek “Atomos” which means what?

- A. Extremely Small
- B. Invisible
- C. Indivisible**
- D. Microscopic

6. Who was the first person to propose that atoms have weights?

- A. Ernest Rutherford
- B. Democritus
- C. John Dalton**
- D. Joseph John Thomson

7. Who discovered the electron?

A. Joseph John Thomson

B. John Dalton

C. Humphrey Davy

D. Ernest Rutherford

8. Who discovered the proton?

A. Eugene Goldstein

B. Pierre Curie

C. Ernest Rutherford

D. Michael Faraday

9. Who discovered the neutron?

A. James Chadwick

B. Eugene Goldstein

C. Niels Bohr

D. Julius Lothar Meyer

10. What is anything that occupies space and has mass?

A. Element

B. Ion

C. Matter

D. Molecule

11. All forms of matter are composed of the same building blocks called_____.

A. molecules

B. atom

C. elements

D. ions

12. How are substances classified?

A. Elements or Compounds

B. Metals or Non-metals

C. Acids or Bases

D. Homogeneous or Heterogeneous

13. What is a substance that cannot be broken down into simpler substances?

- A. Ion
- B. Atom
- C. Molecule
- D. Element**

14. What is the result from the combination, in definite proportion of mass, of two or more elements?

- A. Mixture
- B. Compound**
- C. Substance
- D. Chemical Reaction

15. How are mixtures classified?

- A. Elements or Compounds
- B. Metals, Nonmetals or Metalloids
- C. Homogeneous or Heterogeneous
- D. Suspension, Colloids or Solutions**

16. The mixture of soil and water is an example of what classification of a mixture?

- A. Homogeneous
- B. Suspension**
- C. Colloid
- D. Solution

17. A very fine particle of soil when mixed to water will form a cloudy mixture. How is this mixture classified?

- A. Colloid**
- B. Suspension
- C. Solution
- D. Compound

18. The particles of sugar dispersed in water are so small that a clear homogeneous mixture. What is this homogeneous mixture called?

- A. Colloid
- B. Compound
- C. Suspension
- D. Solution**

19. How are elements classified?

- A. Metals, Nonmetals or Metalloids**
- B. Homogeneous or Heterogeneous
- C. Suspension, Colloid, Solution
- D. Quarks, Solids or Liquids

20. What are the three states of matter?

- A. Solid, Liquid and Gas**
- B. Metals, Nonmetals and Metalloids
- C. Suspension, Colloid and Solution
- D. Quarks, Photons and Quasar

21. Compounds are mostly classified as:

- A. Homogeneous and Heterogeneous
- B. Acids and Bases**
- C. Gases, Liquids and Solids
- D. Metals and Nonmetals

22. What is the property of metals that allow them to be rolled without breaking?

- A. Ductility
- B. Malleability**
- C. Luster
- D. Elasticity

23. What is the property of metals that reflects the light that strikes their surfaces, making them appear shiny?

- A. Malleability
- B. Ductility
- C. Luster**
- D. Plasticity

24. Which of the following is NOT a property of metals?

- A. Metals are neither malleable nor ductile.**
- B. Metals have high thermal conductivity.
- C. Metals have high electrical conductivity.
- D. Metals have more luster.

25. What are elements that have properties intermediate between metals and nonmetals?

- A. Gases
- B. Solids
- C. Liquids
- D. Metalloids**

26. Which of the following is NOT a property of acids?

- A. Taste sour
- B. Feel slippery on the skin**
- C. Turn litmus paper to red
- D. Dissolve metals producing various salts and hydrogen gas

27. Which of the following is NOT a property of bases?

- A. Feel slippery on the skin
- B. Turn litmus paper to blue
- C. Taste bitter
- D. Dissolve metals producing various salts and hydrogen gas**

28. An acid can react with base to produce a _____.

- A. hydrogen gas
- B. salt**
- C. oxide
- D. hydroxide

29. Vinegar is a solution of water and what kind of acid?

- A. Phosphoric acid
- B. Sulfuric acid
- C. Nitric acid
- D. Acetic acid**

30. What acid is added to carbonated drinks to produce a tart test?

- A. Citric acid
- B. Phosphoric acid**
- C. Sulfuric acid
- D. Nitric acid

31. Table salt or sodium chloride may be formed by the reaction of:

- A. Hydrochloric acid and sodium bicarbonate
- B. Sodium and chlorine
- C. Hydrochloric acid and sodium carbonate
- D. Hydrochloric acid and sodium hydroxide**

32. What occurs when a substance is transformed into another substance with a totally different composition and properties?

- A. Physical change
- B. Chemical change**
- C. Catalyst
- D. Chemical reaction

33. What occurs when a substance changes its appearance without changing its composition?

- A. Chemical reaction
- B. Chemical change
- C. Physical change**
- D. Catalyst

34. What is another term for “chemical change”?

- A. Chemical reaction**
- B. Phase change
- C. State change
- D. Composition change

35. A material is said to be _____ if its composition and properties are uniform throughout.

- A. homogeneous**
- B. heterogeneous
- C. pure substance
- D. pure compound

36. A material is said to be _____ if its composition and properties are not uniform throughout.

- A. Un-pure
- B. homogeneous
- C. heterogeneous**
- D. malicible

37. The properties of a material that changes when the amount of substance changes are called _____ properties.

- A. intensive
- B. extensive**
- C. physical
- D. chemical

38. The properties of a material that do not change when the amount of substance changes are called _____ properties.

- A. intensive**
- B. extensive
- C. chemical
- D. physical

39. Which of the following is NOT an intensive property of a material?

- A. Color
- B. Surface area**
- C. Melting point
- D. Taste

40. Which of the following is NOT an extensive property of a material?

- A. Length
- B. Volume
- C. Density**
- D. Weight

41. "When two or more elements form more than one compound, the ratio of the masses of one element that combine with a given mass of another element in the different compounds is the ratio of small whole numbers." This statement is known as:

- A. Graham's Law of diffusion
- B. The uncertainty principle
- C. Law of definite proportion
- D. Law of multiple proportion**

42. "The masses of elements in a pure compound are always in the same proportion." This statement is known as _____.

- A. Law of multiple proportion
- B. Law of definite proportion**
- C. The periodic law
- D. Dalton's atomic theory

43. Who formulated the atomic theory?

- A. John Dalton**
- B. Humphrey Davy
- C. Henri Becquerel
- D. Ernest Rutherford

44. Who revised the atomic theory by replacing the hard, indestructible spheres imagined by Dalton and proposed the "raisin bread model" of the atom?

- A. Pierre Curie
- B. Robert Andrews Millikan
- C. Joseph John Thomson**
- D. Humphrey Davy

45. How does Joseph John Thomson call his model of the atom?

- A. Orbital model
- B. Planetary model
- C. Radioactive model
- D. Plum-pudding model**

46. The discovery of radioactivity further confirms the existence of subatomic particles. Who discovered radioactivity?

- A. Henri Becquerel**
- B. Marie Curie
- C. Pierre Curie
- D. Niels Bohr

47. What is the common unit used to indicate the mass of a particle?

- A. Atomic mass unit (amu)**
- B. Charge unit
- C. Coulomb
- D. Gram

48. What is the unit for a charge of a particle?

- A. Coulomb
- B. Charge unit**
- C. Atomic mass unit
- D. Lepton

49. What is the charge of an electron in coulomb?

- A. $-1.70217733 \times 10^{-19}$
- B. $-1.60217733 \times 10^{-19}$**
- C. $-1.50217733 \times 10^{-19}$
- D. $-1.40217733 \times 10^{-19}$

50. What is the charge of an electron in charge unit?

- A. 0
- B. 1 +
- C. 1 -**
- D. 0 -

51. What is the charge of a proton in coulombs?

- A. $+1.70217733 \times 10^{-19}$
- B. $+1.60217733 \times 10^{-19}$**
- C. $+1.50217733 \times 10^{-19}$
- D. $+1.40217733 \times 10^{-19}$

52. What is the charge of a proton in charge unit?

- A. 0
- B. 1 +**
- C. 1 -
- D. 0 -

53. What is the mass of an electron in gram?

- A. 10203×10^{-23}
- B. 8.218290×10^{-25}
- C. 1.672623×10^{-24}
- D. 9.109387×10^{-28}**

54. What is the mass of an electron in amu?

- A. 2.490210×10^{-4}
- B. 3.890140×10^{-4}
- C. 1.007276×10^{-4}
- D. 5.485799×10^{-4}**

55. What is the mass of a proton in gram?

- A. 2.490210×10^{-24}
- B. 3.890140×10^{-24}
- C. 1.007276×10^{-24}
- D. 5.485799×10^{-24}**

56. What is the mass of a proton in amu?

- A. 1.0052981
- B. 1.0072765**
- C. 1.0086600
- D. 1.0066241

57. What is the mass of a neutron in grams?

- A. 1.47495×10^{24}
- B. 1.37495×10^{-24}
- C. 1.67495×10^{-24}**
- D. 1.77495×10^{-24}

58. What is the mass of a neutron in amu?

- A. 1.00866**
- B. 1.00521
- C. 1.00324
- D. 1.00000

59. The protons and neutrons are not considered are fundamental particles because they consist of a smaller particles called_____.

- A. bosons
- B. quarks**
- C. leptons
- D. fermions

60. The atomic number of an element is:

- A. the sum of number of protons and electrons
- B. the number of protons in the nucleus**
- C. the number of electrons
- D. the sum of the number of protons and neutrons in the nucleus

61. Atoms of the same element which have different masses are called _____.

- A. molecules
- B. ions
- C. nuclides
- D. isotopes**

62. What is an atom specific isotope called?

- A. Nuclide
- B. Ion**
- C. Molecule
- D. Fermion

63. The number of _____ in an atom defines what element the atom is.

- A. neutron
- B. electrons
- C. protons**
- D. protons and electrons

64. The number of _____ in an atom defines the isotopes of an element.

- A. neutrons**
- B. protons
- C. electrons
- D. protons and neutrons

65. If electrons are removed from or added to a neutral atom, a charged particle of the same element, called _____ is formed.

- A. ion**
- B. cation
- C. anion
- D. isotope

66. A negatively charged ion which results when an electron is added to an atom called _____.

- A. Boson
- B. Fermion
- C. Cation
- D. Anion**

67. A positively charged ion which results when an electron is removed from an atom is called _____.

- A. Anion
- B. Cation**
- C. Fermion
- D. Lepton

68. What is “density number” of an atom?

- A. Atomic number**
- B. Mass number
- C. Atomic mass
- D. Atomic weight

69. The _____ of an atom is the sum of the number of protons and neutrons in the nucleus of an atom.

- A. mass number**
- B. atomic weight
- C. atomic mass
- D. atomic number

70. “When the elements are arranged in the order of increasing atomic number, elements with similar properties appear at periodic intervals.” This statement is known as _____.

- A. Law of multiple proportion
- B. Law of definite proportion
- C. The periodic law**
- D. Dalton’s atomic theory

71. Who are the two chemists credited for the discovery of the periodic law?

A. Julius Lothar Meyer and Demitri Ivanovich Mendeleev

B. Humphrey Davy and Henri Becquerel

C. Henri Becquerel and Ernest Rutherford

D. Ernest Rutherford and Julius Lothar Meyer

72. The elements with similar properties are placed in columns of the periodic table. These columns are commonly called _____.

A. Periods

B. Groups

C. Families

D. Groups or families

73. What are the rows in the periodic table called?

A. Periods

B. Transitions

C. Groups

D. Families

74. Elements in Group 1A in the periodic table are _____.

A. Boron group

B. Alkaline earth metals

C. Alkali metals

D. Carbon group

75. Elements in Group IIA in the periodic table are _____.

A. Halogens

B. Alkaline earth metals

C. Alkali metals

D. Nitrogen group

76. The boron group is what group in the periodic table?

A. Group IIIA

B. Group IVA

C. Group VA

D. Group VIA

77. What group in the periodic table is the carbon group?

- A. Group IIIA
- B. Group IVA**
- C. Group VA
- D. Group VIA

78. What group in the periodic table is the nitrogen group?

- A. Group VA**
- B. Group VIA
- C. Group VIIA
- D. Group IVA

79. The chalcogens are elements in what group in the periodic table?

- A. Group VA
- B. Group VIA**
- C. Group VIIA
- D. Group IVA

80. Halogens belong to what group in the periodic table?

- A. Group IVA
- B. Group VA
- C. Group VIA
- D. Group VIIA**

81. The elements, germanium and silicon, which are commonly use for semiconductors belongs what group of elements?

- A. Boron group
- B. Carbon group**
- C. Nitrogen group
- D. Halogens

82. What group in the periodic table are the noble gases?

- A. Group 0
- B. Group VIIIA
- C. Group VIIA
- D. Group 0 or VIIIA**

83. Which of the following is NOT a noble gas?

- A. Argon
- B. Xenon
- C. Radon
- D. Antimony**

84. What is the atomic number for oxygen?

- A. 6
- B. 7
- C. 8**
- D. 9

85. What is the atomic number of germanium?

- A. 14
- B. 32**
- C. 18
- D. 23

86. What is the atomic number of carbon?

- A. 6**
- B. 7
- C. 8
- D. 10

87. Which alkaline earth metal has the smallest atomic number?

- A. Beryllium**
- B. Magnesium
- C. Calcium
- D. Barium

88. Which noble gas has the smallest atomic number?

- A. Argon
- B. Krypton
- C. Neon
- D. Helium**

89. What is the most abundant element in terms of the number of atoms?

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

90. What is the most abundant element in the human body?

- A. Carbon
- B. Hydrogen
- C. Oxygen**
- D. Calcium

91. What is the second most abundant element in the human body?

- A. Carbon**
- B. Hydrogen
- C. Oxygen
- D. Nitrogen

92. Which of the following is NOT a metalloid?

- A. Antimony
- B. Boron
- C. Magnesium**
- D. Silicon

93. Caustic soda is used in making soap, textiles and paper. What is another term for caustic soda?

- A. Sodium benzoate
- B. Sodium hydroxide**
- C. Potassium chlorate
- D. Cesium bromide

94. What is used for the manufacture of explosives and fireworks?

- A. Magnesium hydroxide
- B. Potassium chlorate
- C. Potassium perchlorate**
- D. Cesium bromide

95. All alkaline metals will tarnish in air except _____.

- A. Magnesium
- B. Barium
- C. Radium
- D. Beryllium**

96. What alkali metal is usually used for x-ray apparatus because of its ability to allow x-rays to pass through with minimum absorption?

- A. Magnesium
- B. Radium
- C. Beryllium**
- D. Barium

97. What element is used as a coating for iron to make galvanized iron a corrosion-resistant material?

- A. Magnesium
- B. Titanium
- C. Zinc**
- D. Chromium

98. What element is used as electric power source for pacemakers artifact hearts?

- A. Promethium**
- B. Neodymium
- C. Uranium
- D. Plutonium

99. What element is commonly used in making lasers?

- A. Chromium
- B. Neodymium**
- C. Promethium
- D. Terbium

100. What is regarded as the most unique element in the periodic table?

- A. Hydrogen
- B. Oxygen
- C. Carbon**
- D. Uranium

101. What is the most abundant element in the atmosphere?

- A. Oxygen
- B. Nitrogen**
- C. Helium
- D. Inert gases

102. What is the only gas in Group VIA in the periodic table?

- A. Argon
- B. Krypton
- C. Oxygen**
- D. Helium

103. What is the second most abundant element in the atmosphere?

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

104. What element is used in advertising signs?

- A. Neon**
- B. Helium
- C. Sodium
- D. Xenon

105. What principle states about the fundamental limitation that, for a particle as small as the electron, one cannot know exactly where it is and at the same time know its energy how it is moving?

- A. Aufbau principle
- B. Uncertainty principle**
- C. Pauli exclusion principle
- D. Kinetic molecular theory

106. Who discovered the uncertainty principle?

- A. Werner Karl Heisenberg principle?**
- B. Louie de Broglie
- C. Albert Einstein
- D. John Newlands

107. What principle states that the electrons fill the orbitals, one at a time, starting with the lowest orbital then proceeding to the one with higher energy?

- A. Aufbau principle**
- B. Uncertainty principle
- C. Pauli exclusion principle
- D. Kinetic molecular theory

108. What principle states that no two electrons in the same atom can have the same set of four quantum numbers?

- A. Aufbau principle
- B. Uncertainty principle
- C. Pauli exclusion principle**
- D. Kinetic molecular theory

109. What describes how the electrons are distributed among the orbitals?

- A. Electronegativity of the element
- B. Electron configuration of an atom**
- C. Energy state of the atom
- D. Pauli exclusion principle

110. The _____ of the atom describes the atom as having a nucleus at the center around which electrons move?

- A. spin number
- B. quantum mechanical model**
- C. quantum number
- D. azimuthal number

111. What are the main energy levels where the valence electrons belong called?

- A. Valence shells**
- B. Azimuthal shells
- C. Spin shells
- D. Quantum shells

112. The elements of groups IA, IIA, IIIA, IVA, VA, VIA, VIIA and VIIIA are called main group elements or

- A. transition
- B. representatives**
- C. inner transitions
- D. metals or nonmetals

113. For the representative elements, the number of valence electrons is the same as the _____.

- A. number of electrons
- B. number of neutrons
- C. the rightmost digit of the group number of the element**
- D. number of electrons less the number of neutrons

114. For transition elements, the number of valence electron is the same as _____.

- A. the group number**
- B. the rightmost digit of the group number of the element
- C. the number of electrons less the number of neutrons
- D. the number of electrons less the number of protons

115. The size of the atom is dependent on which of the following:

- A. the size of the nucleus
- B. the region of space occupied by its electrons**
- C. the number of protons and neutrons
- D. all of the choices above

116. What happens to the atomic size of the elements in a group when you go from top to bottom of the group?

- A. It remains the same
- B. It increases**
- C. It decreases
- D. It become zero

117. Who first predicted the Bose-Einstein condensate (BEC) in 1924?

- A. Albert Einstein**
- B. Satyendra Nath Bose
- C. Carl Wieman
- D. Wolfgang Ketterie

118. The ionization energy is _____ to the atomic size of atom.

- A. directly proportional
- B. inversely proportional**
- C. equal to
- D. not related

119. What refers to the measure of the atom's tendency to attract an additional electron?

- A. Period number
- B. Electron affinity**
- C. Ionization energy
- D. Electronegativity

120. The process of gaining or losing an electron results to the formation of a charged atom or molecule called _____.

- A. ion**
- B. cation
- C. anion
- D. crystal

121. Aside from liquid, gas and solid, there are two other states of matter.

- A. Plasma and Quark
- B. Quartz and Plasma
- C. Quartz and Quasar
- D. Plasma and Bose-Einstein condensate**

122. Who first identified plasma in 1879?

- A. William Crookes**
- B. Irving Langmuir
- C. Albert Einstein
- D. Eric Cornell

123. Who coined the term "plasma" in 1928?

- A. William Crookes
- B. Irving Langmuir**
- C. Albert Einstein
- D. Eric Cornell

124. What is made of gas atoms that have been cooled to near absolute zero at which temperature the atoms slow down, combine and forms a single entity known called a superatom?

- A. Ionized gas
- B. Bose-Einstein condensate (BEC)**
- C. Plasma
- D. Quark

125. The fifth state of matter, the BEC (Bose-Einstein condensate) was first created in what year?

- A. 1992
- B. 1993
- C. 1994
- D. 1995**

126. What is a high-energy, electrically charged gas produced by heating the gas until the electrons in the outer orbitals of the atoms separate, leaving the atoms with a positive charge?

- A. Quartz
- B. Quark
- C. BEC
- D. Plasma**

127. Water has bigger density when it is in what state?

- A. Liquid**
- B. Gas
- C. Solid
- D. Vapor

128. What is the temperature of water in solid state at 1 atm?

- A. 4°C
- B. 25°C
- C. 0°C**
- D. 5°C

129. The density of water is the largest at what temperature?

- A. 2⁰C
- B. 1⁰C
- C. 3⁰C
- D. 4⁰C**

130. What element has a very high melting point and ideal for filaments of light bulbs?

- A. Barium
- B. Aluminum
- C. Tungsten**
- D. Titanium

131. Metals can be drawn into wires. This illustrates what property of metals?

- A. Malleability
- B. Ductility**
- C. Rigidity
- D. Plasticity

132. Steel is the widely used construction material because of its high tensile strength. It is a combination of what element?

- A. Iron and carbon**
- B. Iron and aluminum
- C. Lead and carbon
- D. Lead and aluminum

133. What refers to the electrostatic attraction that holds together the oppositely charged ions, the cations and anions, in the solid compound?

- A. Electronic bond
- B. Metallic bond
- C. Covalent bond
- D. Ionic bond**

134. What states that atoms tend to gain, lose or share electrons until they are surrounded by eight valence electrons?

- A. Figure of 8 rule
- B. Octet rule**
- C. Ionic rule
- D. Lewis rule

135. What indicates the number of valence electrons to the atom represented by dots scattered on four sides of the atomic symbol?

- A. Electron dot structure
- B. Lewis structure
- C. Crystalline structure
- D. Electron dot structure or Lewis structure**

136. What is formed by sharing of electrons between atom?

- A. Covalent bond**
- B. Ionic bond
- C. Metallic bond
- D. Electronic band

137. What is the distance between the nuclei of two bonded atoms called?

- A. Bond length**
- B. Molecular length
- C. Atomic distance
- D. Atomic radius

138. The overall shape of a molecule is described by which two properties?

- A. Bond distance and bond size
- B. Bond distance and bond angle**
- C. Bond radius and bond angle
- D. Bond angle and bond size

139. What is an angle made by the lines joining the nuclei of the atoms in the molecule?

- A. Atomic angle
- B. Bond angle**
- C. Molecular angle
- D. Ionic angle

140. "The best arrangement of a given number of shared and unshared electrons is the one that minimizes the repulsion among them". This is known as _____.

- A. valence bond theory
- B. electron group theory
- C. molecular polarity theory
- D. valence-shell electron-pair repulsion theory**

141. "A covalent bond is formed by the overlap of atomic orbitals." This statement is the basic idea of which theory?

- A. Valence bond theory**
- B. Energy group theory
- C. Molecular polarity theory
- D. Valence-shell electron-pair repulsion (VSPER) theory

142. What refers to the ability of an atom in a molecule to attract shared electrons?

- A. Electronegativity**
- B. Electron affinity
- C. Ionization energy
- D. Periodic number

143. What type of bond occurs when the difference in electronegativity is greater than or equal to 2?

- A. Ionic**
- B. Nonpolar covalent
- C. Polar covalent
- D. Either nonpolar covalent or polar covalent

144. Nonpolar covalent bond occurs if the difference in electronegativity ranges from:

- A. 0.00 to 0.40
- B. 0.50 to 1.90**
- C. 1.90 to 2.00
- D. 2.00 and up

145. When can we say that a molecule is polar?

A. When the centers of positive and negative charge do not coincide

B. When the centers of positive and negative charge coincide

C. When there is no positive nor negative charge

D. When there is only one charge, either positive or negative

146. What is the sum of the masses of the atoms in the molecule of the substance called?

A. Atomic mass

B. Molecular mass

C. Formula mass

D. Atomic weight

147. What refers to the number of atoms in exactly 12 grams of carbon-12?

A. Avogadro's number

B. Mole

C. Molar mass

D. amu

148. Which one is the Avogadro's number?

A. 6.20×10^{23}

B. 6.62×10^{23}

C. 6.32×10^{23}

D. 6.22×10^{23}

149. What is defined as the amount of substance that contains 6.02×10^{23} particles of that substance?

A. Mole

B. Molar mass

C. Atomic mass

D. amu

150. What refers to the mass in grams of one mole of a substance?

A. Molar mass

B. Molecular mass

C. Atomic mass

D. Atomic weight

151. What is the unit of molar mass?

- A. amu
- B. mole
- C. grams
- D. grams per mole**

152. "The total pressure of a mixture of gases equals the sum of the partial pressures of each of the gases in the mixture". This statement is known as _____.

- A. Dalton's law of partial pressure**
- B. Gay-Lusaac law
- C. Boyle's law
- D. Charle's law

153. The dry air is composed of how many percent nitrogen?

- A. 73.1%
- B. 74.4%
- C. 76.1%
- D. 78.1%**

154. The dry air is composed of how many percent oxygen?

- A. 20.9%**
- B. 21.2%
- C. 22.1%
- D. 23.7%

155. How much carbon dioxide is present in dry air?

- A. 0.003%
- B. 0.03%**
- C. 0.3%
- D. 3%

156. What is the mixing of gases due to molecular motion called?

- A. Diffusion**
- B. Effusion
- C. Fission
- D. Fusion

157. What refers to the passage of molecules of a gas from one container to another through a tiny opening between the containers?

- A. Diffusion
- B. Effusion**
- C. Fission
- D. Fusion

158. The rate of effusion of a gas is inversely proportional to the square root of its molar mass. Who discovered this?

- A. Gilbert Lewis
- B. John Tyndall
- C. Robert Brown
- D. Thomas Graham**

159. What law states that the rate of effusion of a gas, which is the amount of gas that through the hole in a given amount of time, is inversely proportional to the square root of its molar mass?

- A. Henry's law
- B. Graham's law of effusion**
- C. Hund's law
- D. Lewis theory

160. What is a poisonous gas generated mostly by motor vehicles?

- A. Carbon monoxide**
- B. Carbon dioxide
- C. Hydroxide
- D. Nitric acid

161. What is considered as one of the pollutants responsible for among and acid rain?

- A. Sulfur dioxide
- B. Nitrogen dioxide**
- C. Carbon dioxide
- D. Hydroxide

162. What refers to the forces of attraction that exist between molecules in a compound?

- A. Interaction forces
- B. Dispersion forces
- C. Intermolecular forces**
- D. Induction forces

163. All are basic types of van der Waals forces except one. Which one?

- A. Dipole-dipole interaction
- B. London dispersion forces
- C. Heat bonding**
- D. Hydrogen bonding

164. The three types of intermolecular forces exist in neutral molecules are collectively known as van der Waals forces. This is named after _____.

- A. Diderick van der Waals**
- B. Derick van der Waals
- C. Doe van der Waals
- D. Eric van der Waals

165. A dipole has how many electrically charged pole(s)?

- A. 1
- B. 2**
- C. 3
- D. 4

166. Compounds containing hydrogen and other element are known as _____.

- A. Hydroxides
- B. Hydrides**
- C. Hydros
- D. Hydrates

167. What is a special kind of dipole-dipole interaction formed when a hydrogen atom bonded to a highly electronegative atom is attracted to the lone pair of a nearby electronegative atom?

- A. Hydride bond
- B. Hydro bond
- C. Hydrogen bond**
- D. Hydrate bond

168. What is the process of changing from gas state to liquid state?

- A. Sublimation
- B. Condensation**
- C. Deposition
- D. Vaporization

169. What is the process of changing from liquid state to solid state?

- A. Melting
- B. Freezing**
- C. Sublimation
- D. Condensation

170. What is the process of changing fro, liquid state to gas state?

- A. Vaporization**
- B. Sublimation
- C. Condensation
- D. Deposition

171. What is the process of changing from solid state to gas state?

- A. Vaporization
- B. Deposition
- C. Sublimation**
- D. Condensation

172. What is the process of changing from gas state to solid state?

- A. Deposition**
- B. Vaporization
- C. Condensation
- D. Sublimation

173. What is the process of changing from solid state to liquid state?

- A. Freezing
- B. Melting**
- C. Condensation
- D. Vaporization

174. What refers to the amount of heat absorbed by one mole of a substance to change from solid to liquid?

- A. Molar heat of vaporization
- B. Molar heat of solidification
- C. Molar heat of fission
- D. Molar heat of fusion**

175. What refers to the amount of heat released by one mole of a substance when it change from liquid to solid?

- A. Molar heat of vaporization
- B. Molar heat of solidification
- C. Molar heat of fission
- D. Molar heat of fusion**

176. What refers to the amount of heat required by one mole of a substance to change from liquid to gas?

- A. Molar heat of vaporization**
- B. Molar heat of solidification
- C. Molar heat of fission
- D. Molar heat fusion

177. What refers to the amount of heat required by one mole of a substance to change from gas to liquid?

- A. Molar heat of vaporization
- B. Molar heat of solidification
- C. Molar heat of condensation**
- D. Molar heat of fusion

178. Liquid that vaporizes easily are called _____ liquids.

- A. volatile**
- B. nonvolatile
- C. surfactant
- D. hydrophilic

179. What refers to the temperature above which a gas cannot be liquefied by an increase in pressure?

- A. Absolute temperature
- B. Absolute zero
- C. Critical temperature**
- D. Maximum temperature

180. What is a homogeneous mixture made of particles that exist as individual molecules or ions?

- A. Solution**
- B. Solute
- C. Solvent
- D. Colloid

181. What is the component of a solution that is dissolved?

- A. Solvent
- B. Solute**
- C. Catalyst
- D. Colloid

182. What is the component of the solution in which the solute is dissolved?

- A. Solvent**
- B. Catalyst
- C. Reactant
- D. Medium

183. Bronze is a solid solution of copper and tin. Which of the following is true?

- A. Tin is a solvent.
- B. Copper is a solute.
- C. Copper is the solvent.**
- D. The solution is called aqueous solution.

184. When the solvent of the solution is water, it is a/an _____ solution.

- A. wet
- B. liquid
- C. aqueous**
- D. fluid

185. What is the most common solvent in medicines?

- A. Paracetamol
- B. Acid
- C. Ethanol**
- D. Starch

186. What is the term generally used to describe the combination of solute molecules or ions with solvent molecules?

- A. Solubility
- B. Solvation**
- C. Saturation
- D. Transformation

187. What is the term used to describe the maximum amount of solute that a given solvent can dissolve to give a stable solution at a given temperature?

- A. Solubility**
- B. Solvation
- C. Saturation
- D. Transformation

188. When the maximum amount of solute is dissolved in the given solvent at a stated temperature, this solution formed is _____.

- A. unsaturated
- B. saturated**
- C. supersaturated
- D. undersaturated

189. When the solution contains less solute particles than the maximum amount the solvent can dissolve at that temperature, the solution is _____.

- A. unsaturated**
- B. saturated
- C. supersaturated
- D. undersaturated

190. When the solution contains more solute particles than the solvent can normally hold, the solution is _____.

- A. unsaturated
- B. saturated**
- C. supersaturated
- D. undersaturated

191. What is the most common solution on earth?

- A. Air
- B. Seawater**
- C. Blood
- D. Freshwater

192. Solutions composed of two or more metals are called _____.

- A. saturated solutions
- B. supersaturated solutions
- C. unsaturated solutions
- D. alloys**

193. The solubility of a substance in another substance is affected by the following factors except _____.

- A. nature of solute and solvent
- B. pressure
- C. volume**
- D. temperature

194. Liquids that do not mix are said to be _____.

- A. miscible
- B. immiscible**
- C. soluble
- D. nonsoluble

195. Water and alcohol are both liquids that can be mixed in any proportion. They are said to be —.

- A. miscible**
- B. immiscible
- C. soluble
- D. nonsoluble

196. How will an increase in temperature in solids affect the solubility?

- A. It will cause a decrease in solubility.
- B. It will not affect the solubility at all.
- C. It will slightly affect solubility.
- D. It will cause an increase in solubility.**

197. How will an increase in temperature of gases dissolving in liquids affect the solubility?

- A. It will cause a decrease in solubility.**
- B. It will not affect solubility at all.
- C. It will slightly affect solubility.
- D. It will cause an increase in solubility.

198. How does pressure affects the solubility of gases in liquids?

- A. It decreases solubility.
- B. It does not affect solubility at all.
- C. It slightly affects solubility.
- D. It increases solubility.**

199. How does pressure affects the solubility in liquids or of liquids in another liquid?

- A. It decreases solubility.
- B. It does not affect solubility at all.
- C. It slightly affects solubility.**
- D. It increases solubility.

200. “The solubility of a gas in liquid is directly proportional to the partial pressure of the gas above the solution.” This is known as _____.

- A. Hund’s law
- B. Pascal’s law
- C. Henry’s law**
- D. Dalton’s law

201. What refers to the measure of how fast a substance dissolves?

- A. Rate of solubility
- B. Rate of agitation
- C. Rate of dissolution**
- D. Rate of solution

202. How can the rate of dissolution be increased?

- A. Reduce particle size
- B. Agitation
- C. Application of heat
- D. All of the above**

203. _____ means there is only a little amount of solute dissolved in a solution.

- A. Concentrated
- B. Dilute**
- C. Saturated
- D. Unsaturated

204. _____ means there is a large amount of solute dissolved in the solution.

- A. Concentrated**
- B. Dilute
- C. Saturated
- D. Unsaturated

205. What is the ratio of the number of moles of one component of a solution to the total number of moles of all the components?

- A. Molarity
- B. Molality
- C. Formality
- D. Mole fraction**

206. What is the ratio of the number of moles of solute to the volume of the solution in liters?

- A. Molarity**
- B. Molality
- C. Formality
- D. Mole fraction

207. What is the ratio of the number of moles of solute per kilogram of solvent?

- A. Molarity
- B. Molality**
- C. Formality
- D. Mole fraction

208. What is the process of making a solution less concentrated as in the addition of more solvent?

- A. Concentration
- B. Dilution**
- C. Saturation
- D. Colligation

209. What is the process of changing liquid to gas that is usually accompanied by the production of the bubbles of vapor in the liquid?

- A. Vaporizing
- B. Boiling**
- C. Condensing
- D. Sublimation

210. What is the temperature at which the vapor pressure of the liquid equals the prevailing atmospheric pressure?

- A. Boiling point**
- B. Triple point
- C. Saturation point
- D. Critical point

211. What is the temperature at which liquid and solid are in equilibrium?

- A. Boiling point
- B. Resting point
- C. Freezing point**
- D. Critical point

212. What refers to the decrease in the freezing point of a pure liquid when another substance is dissolved in the liquid?

- A. Freezing point compression
- B. Freezing point extension
- C. Freezing point depression**
- D. Freezing point dilution

213. If two solutions have the same concentration of solute, they are _____.

- A. hypertonic
- B. hypotonic
- C. isotonic**
- D. photonic

214. If one of the two solutions has a bigger concentration of solute particles than the other, the one with the higher concentration is described as _____.

- A. hypertonic**
- B. hypotonic
- C. isotonic
- D. photonic

215. If one of the two solutions has a bigger concentration of solute particles than the other, the one with the lower concentration is described as _____.

- A. hypertonic
- B. hypotonic**
- C. isotonic
- D. photonic

216. The movement of solvent particles through a semi-permeable membrane from the region lower solute concentration to the region of higher solute concentration is called _____.

- A. osmosis**
- B. hymolysis
- C. orenation
- D. dialysis

217. The term “colloid” comes from the Greek “kolla” and “oidos” which means _____.

- A. cloudy appearance
- B. cloudy shape
- C. glue appearance**
- D. glue color

218. What are suspensions of liquid or solid particles in a gas called?

- A. Emulsions
- B. Aerosols**
- C. Foams
- D. Sols

219. What in some aerosol products that can cause harm to the atmosphere?

- A. Smog
- B. Chlorofluorocarbons (CFC)**
- C. Emulsifying agent
- D. Hydrocarbons

220. What are colloidal dispersion of gas bubbles in liquids or solids?

- A. Emulsions
- B. Aerosols
- C. Foams**
- D. Sols

221. What is a colloidal dispersion of a liquid in either a liquid or a solid?

- A. Emulsions**
- B. Gels
- C. Foams
- D. Sols

222. What is a solid dispersed in either a solid or a liquid?

- A. Emulsions
- B. Gels
- C. Foams
- D. Sols**

223. What is a colloidal system in which the dispersed phase consists of fibrous, interwoven particles called fibrils which exert a marked effect on the physical properties of the dispersing medium?

- A. Emulsions
- B. Gels**
- C. Foams
- D. Sols

224. Most cosmetics and ointments and creams used in medicines are _____.

- A. emulsions**
- B. gels
- C. foams
- D. sols

225. The substance usually used in cleaning toilets bowls and tiles is muriatic acid. What is another term for this?

- A. Nitric acid
- B. Sulfuric acid
- C. Hydrochloric acid**
- D. Phosphoric acid

226. "Upon dissociation in water, acids yield hydrogen ions while bases yield hydroxide ions." What is this statement commonly called?

- A. Arrhenius theory**
- B. pH concept
- C. Bronstead-Lowry theory
- D. Le Chatelier's principle

227. What is defined as a substance which, upon reaction with water causes an increase in the concentration of the solvent cation, H_3O^+ ?

- A. Lewis acid
- B. Lewis base
- C. Arrhenius base
- D. Arrhenius acid**

228. What is defined as a substance which, upon reaction with water causes an increase in the concentration of the solvent anion, OH?

- A. Lewis acid
- B. Lewis base
- C. Arrhenius base**
- D. Arrhenius acid

229. What is the dissolution constant of water at 25⁰C?

- A. 1.8×10^{-15}
- B. 1.8×10^{-16}**
- C. 1.8×10^{-17}
- D. 1.8×10^{-18}

230. What theory states that an acid is any substance that donates a proton to another substance, and a base is any substance that can accept a proton from any other substance?

- A. Arrhenius theory
- B. Bronsted-Lowry theory**
- C. Lewis theory
- D. pH concept

231. What theory states that an acid is a substance that can accept a lone pair from another molecule, and a base is a substance that has a lone pair of electrons?

- A. Arrhenius theory
- B. Bronsted-Lowry theory
- C. Lewis theory**
- D. pH concept

232. An acid described as an electron pair acceptor is the _____ acid.

- A. Arrhenius
- B. Pure
- C. Lewis**
- D. Bronsted-Lowry

233. The Bronsted-Lowry acid is:

- A. a proton donor**
- B. a proton acceptor
- C. an electron pair acceptor
- D. an electron pair donor

234. The Bronsted-Lowry base is:

- A. a proton donor
- B. a proton acceptor**
- C. an electron pair acceptor
- D. an electron pair donor

235. According to Gilbert Lewis an acid-base reaction as the sharing of an electron pair will form what type of bond?

- A. Coordinate ionic bond
- B. Coordinate covalent bond**
- C. Coordinate metallic bond
- D. Coordinate bond

236. What is the type of covalent bond in which the shared electrons are donated by one, not both, of the atoms involved?

- A. Synchronous covalent bond
- B. Coordinated covalent bond**
- C. Asynchronous covalent bond
- D. Translating covalent bond

237. What is the term used for the product of a Lewis acid-base reaction?

- A. Oxyacids
- B. Binary acids
- C. Acibas
- D. Adduct**

238. Acids composed of only two elements; hydrogen and nonmetal are called _____.

- A. Binary acids**
- B. Ternary acids
- C. Oxyacids
- D. Organic acids

239. What is added to hydrochloride to form hydrochloric acid?

- A. Oxygen
- B. Sulfur
- C. Water**
- D. Carbon

240. Acids consist of three elements; hydrogen and two nonmetals are called _____.

- A. Triacids
- B. Ternary acids**
- C. Oxyacids
- D. Organic acids

241. If one of the two nonmetals of a ternary acid is oxygen, the acid is called _____.

- A. Oxide
- B. Oxyacid**
- C. Oxide acid
- D. Acidic acid

242. Which of the following is the formula of sulfuric acid?

- A. H_2SO_4**
- B. H_2SO_3
- C. HNO_2
- D. HNO_3

243. Which of the following is the formula of nitric acid?

- A. HNO_4
- B. H_2NO_3
- C. HNO_2
- D. HNO_3**

244. What acid is usually used in vinegars?

- A. Sulfuric acid
- B. Acetic acid**
- C. Nitric acid
- D. Carbonic acid

245. What acid is used in glass etching?

- A. Acetylsalicylic acid
- B. Hydrofluoric acid**
- C. Phosphoric acid
- D. Hydrochloric acid

246. What acid is usually present in some fruits?

- A. Citric acid**
- B. Carbonic acid
- C. Organic acid
- D. Nitric acid

247. What acid is used in carbonated drinks?

- A. Carbonic acid**
- B. Hydrofluoric acid
- C. Nitric acid
- D. Citric acid

248. What acid usually used to reduce pain and inflammation such as aspirin and other pain relievers?

- A. Carbonic acid
- B. Acetylsalicylic acid**
- C. Sulfuric acid
- D. Phosphoric acid

249. What acid is usually used in the manufacture of fertilizers?

- A. Carbonic acid
- B. Acetylsalicylic acid
- C. Sulfuric acid
- D. Phosphoric acid**

250. What acid is usually used in the manufacture of explosives?

- A. Carbonic acid
- B. Acetylsalicylic acid
- C. Nitric acid**
- D. Phosphoric acid

251. What acid is used in the batteries of cars or automobiles?

- A. Carbonic acid
- B. Acetylsalicylic acid
- C. Sulfuric acid**
- D. Phosphoric acid

252. Bases are compounds consisting of:

- A. metal and oxide ion
- B. nonmetal and oxide ion
- C. metal and hydroxide ion**
- D. nonmetal and hydroxide ion

253. Which base is used to remove carbon dioxide from air?

- A. Lithium hydroxide**
- B. Sodium hydroxide
- C. Aluminum hydroxide
- D. Magnesium hydroxide

254. What base is used as an antacid with no dosage restriction?

- A. Magnesium hydroxide**
- B. Sodium hydroxide
- C. Aluminum hydroxide
- D. Lithium hydroxide

255. Magnesium hydroxide is a base used as antacid if consumed in small amounts and laxative if consumed in large dosage. What is common term for magnesium hydroxide?

- A. Skim of Magnesia
- B. Oil of Magnesia
- C. Cream of Magnesia
- D. Milk of Magnesia**

256. What is the most convenient way of expressing hydronium ion concentration?

- A. Hydrometer reading
- B. pH scale**
- C. Alkalinity
- D. Basicity

257. Who proposed the pH scale in 1909?

- A. Albert Einstein
- B. J. Williard Gibbs
- C. Henri Hess
- D. Soren Sorensen**

258. What does the symbol pH stands for?

- A. The power of the hydroxide compound
- B. The power of the hydroxide ion
- C. The power of the hydrogen ion**
- D. The power of hydrogen

259. What is the pH of pure water?

- A. 6.1
- B. 6.5
- C. 7**
- D. 7.4

260. Which two substances have the same pH, which is 6.5?

- A. Saliva and milk**
- B. Orange juice and tomato juice
- C. Vinegar and calamansi juice
- D. Urine and apple juice

261. Which is most acidic?

- A. Vinegar
- B. Calamansi juice**
- C. Carbonated drink
- D. Orange juice

262. Which is the best description of strong acids?

- A. They dissociate or ionize completely in water.**
- B. They don't dissociate or ionize completely in water.
- C. They are normally found in vinegars.
- D. They are the acids that do not contain hydrogen.

263. Which is the best description of weak acids?

- A. They dissociate or ionize completely in water.
- B. They don't dissociate or ionize completely in water.**
- C. They are normally found in hydrogen chloride form.
- D. They are the acids that not found in vinegars.

264. What is a measure of the H_3O^+ concentration of a solution?

- A. pH**
- B. pOH
- C. indicator
- D. OH^-

265. What is a measure of the OH^- concentration of a solution?

- A. pH**
- B. pOH
- C. Indicator
- D. H_3O^+

266. What is the pH of a neutral solution?

- A. 5
- B. 6
- C. 7**
- D. 8

267. Which of the following pH is the most basic?

- A. pH 8
- B. pH 9
- C. pH 11
- D. pH 13**

268. What is the substance that changes color at a certain pH range?

- A. Litmus paper
- B. Indicator**
- C. Balancer
- D. Lichen

269. What refers to the reaction between an acid and a base forming salt and water?

A. Neutralization

B. Titration

C. Hydrolysis

D. Buffer

270. What is the process of measuring the concentration of an acid or base in one solution by adding a base or acid solution of known concentration until the acid or base in the solution of unknown concentration is fully neutralized?

A. Neutralization

B. Titration

C. Hydrolysis

D. Buffer

271. What refers to the point at which the added base or acid solution in titration is enough to fully neutralize the acid or base?

A. Neutral point

B. Titrant point

C. Central point

D. Equivalence point

272. What refers to the reaction between the ions of a salt and the ions of water?

A. Salt titration

B. Salt buffering

C. Salt neutralization

D. Salt hydrolysis

273. What is a solution consisting of a weak acid and its conjugate base, or of a weak base and its conjugate acid?

A. Seawater

B. Salt

C. Buffer

D. Aqueous solution

274. What is the most common chemical reaction, which is the reaction of materials with oxygen accompanied by the giving off of energy in the form of heat?

- A. Combustion**
- B. Exothermic reaction
- C. Endothermic reaction
- D. Kinetic reaction

275. What is the area of chemistry that concerns with the rate at which chemical reactions occur?

- A. Chemical collision theory
- B. Chemical dynamics
- C. Chemical kinematics
- D. Chemical kinetics**

276. What is the minimum amount of energy need for a chemical reaction to occur called?

- A. Initial energy
- B. Activation energy**
- C. Ignition energy
- D. Catalytic energy

277. If the energy is released as the reaction occurs, it is a _____ reaction.

- A. instantaneous
- B. spontaneous
- C. exothermic**
- D. endothermic

278. If the energy is absorbed during the reaction, it is a _____ reaction.

- A. instantaneous
- B. spontaneous
- C. exothermic
- D. endothermic**

279. What is a substance that, when added to a reaction mixture, increases the rate of the reaction but is itself unchanged after the reaction is done?

- A. Hydroxide ions
- B. Accelerations
- C. Catalyst**
- D. Neutral substance

280. What is a substance that slows down a chemical reaction?

- A. Inhibitors**
- B. Retardant
- C. Catalyst
- D. Decelerators

281. How are catalysts classified?

- A. Homogeneous and heterogeneous**
- B. Slow and fast
- C. Pure and composite
- D. Acidic and basic

282. What type of catalyst exists in the same phase as the reactants in a reaction mixture?

- A. Homogeneous catalyst**
- B. Heterogeneous catalyst
- C. Pure catalyst
- D. Composite catalyst

283. What type of catalyst exists in separate phase as the reactants in the reaction mixture?

- A. Homogeneous catalyst
- B. Heterogeneous catalyst**
- C. Pure catalyst
- D. Composite catalyst

284. Most heterogeneous catalyst are _____.

- A. liquids
- B. solids**
- C. gases
- D. plasma

285. Which one is a factor that affects the rate of chemical reactions?

- A. Temperature
- B. Concentration and surface area of reactants
- C. Presence of a catalyst
- D. All of the above**

286. What refers to the state at which the rates of the forward and backward reactions are equal?

A. Chemical equilibrium

B. Reversible equilibrium

C. Reaction equilibrium

D. Haber equilibrium

287. What is the study of heat formed or required by the chemical reaction?

A. Stoichiometry

B. Thermochemistry

C. Thermodynamics

D. Enthalpy

288. What is the ratio of the equilibrium concentration of the products to the equilibrium concentration reactants with each species concentration raised to the corresponding stoichiometric coefficient found in the balanced reaction?

A. Equilibrium constant

B. Equilibrium concentration

C. Chemical equilibrium

D. Reaction quotient

289. What term is used as a qualitative description of the extent of a chemical reaction?

A. Equilibrium position

B. Chemical equilibrium

C. Equilibrium

D. Reaction equilibrium

290. What quantity is used to determine how far from equilibrium the chemical reaction is?

A. Reaction index

B. Chemical quotient

C. Equilibrium quotient

D. Reaction quotient

291. What states that if a change in conditions is imposed on a system at equilibrium, the equilibrium position will shift in the direction that tends to reduce the effects of that change?

- A. Hess' principle
- B. Catalyst effect
- C. Haber process principle
- D. Le Chateller's principle**

292. What refers to the reaction of oxygen with an element or compound?

- A. Reduction
- B. Oxidation**
- C. Oxygenation
- D. Oxygenization

293. The loss of electron by a substance is known as _____.

- A. oxidation**
- B. covalent process
- C. reduction
- D. ionic process

294. The gain of electrons by a substance is known as _____.

- A. oxidation
- B. covalent process
- C. reduction**
- D. ionic process

295. What represents the charge that the atom would have if the electrons in each bond belonged entirely to the more electronegative atom?

- A. Oxidation number**
- B. Atomic number
- C. Atomic weight
- D. Electron affinity

296. A reduced substance is what type of agent?

- A. Oxidizing agent**
- B. Redox agent
- C. Reducing agent
- D. Nonredox agent

297. The oxidized substance is what type agent?

- A. Oxidizing agent
- B. Redox agent
- C. Reducing agent**
- D. Nonredox agent

298. What reaction does not involve any change in oxidation number?

- A. Redox reaction
- B. Nonredox reaction**
- C. Reducing reaction
- D. Oxidizing reaction

299. What is an apparatus that uses a spontaneous redox reaction to generate electricity?

- A. Voltaic cell**
- B. Fuel cell
- C. Lead cell
- D. Nickel cadmium cell

300. What is a branch of chemistry which is the study of carbon-containing molecules known as organic compounds?

- A. Organic chemistry**
- B. Inorganic chemistry
- C. Stoichiometry
- D. Biochemistry

301. Which of the following is a crystalline form of carbon?

- A. Diamond**
- B. Graphite
- C. Fullerenes
- D. All of the above

302. What crystalline carbon is soft, black, slippery solid that possess metallic luster and conduct electricity?

- A. Charcoal
- B. Graphite**
- C. Diamond
- D. Coke

303. What is formed when hydrocarbons such as methane are heated in the presence of very little oxygen?

A. Carbon black

B. Charcoal

C. Coke

D. Diamond

304. What type of carbon is produced when wood is heated intensely in the absence of air?

A. Carbon black

B. Charcoal

C. Coke

D. Diamond

305. What type of carbon is used to remove undesirable odors from air?

A. Carbon black

B. Charcoal

C. Coke

D. Diamond

306. What carbon is produced when coal is strongly heated in the absence of air?

A. Carbon black

B. Charcoal

C. Coke

D. Diamond

307. What type of carbon is used in the manufacture of car tires?

A. Carbon black

B. Charcoal

C. Coke

D. Diamond

308. Which of the following is NOT a property of inorganic compounds?

A. High melting and boiling points

B. Mostly soluble in water

C. Conduct electric current

D. Usually flammable and combustible

309. Organic compounds:

- A. Are generally soluble in non-polar systems
- B. Are usually flammable and combustible
- C. Have presence of covalent bond
- D. All of the above**

310. Inorganic compounds:

- A. Are generally soluble in non-polar solvents
- B. Are generally non flammable
- C. Have presence of ionic bond
- D. All of the above**

311. The organic compounds are related to each other by a common feature involving a certain arrangement of atoms called _____.

- A. Hydrocarbons
- B. Chain
- C. Functional groups**
- D. Alkanes

312. What is the simplest and most commonly encountered class of organic compounds?

- A. Carbides
- B. Oxides
- C. Carbon Oxides
- D. Hydrocarbons**

313. Based on the type of bond existing between two carbon atoms, how do hydrocarbons classified?

- A. Saturated and unsaturated**
- B. Pure and unpure
- C. Organic and inorganic
- D. Natural and artificial

314. What hydrocarbons contain only single bonds?

- A. Alkanes**
- B. Alkyne
- C. Alkene
- D. Benzene

315. When a hydrocarbon consists of carbon links that form a long, straight or branched chain, it is classified as _____ type.

- A. Cyclic
- B. Chain**
- C. Pole
- D. Linear

316. When hydrocarbon consists of carbon links that form a ring, it is classified as _____ type.

- A. Cyclic**
- B. Chain
- C. Pole
- D. Linear

317. The aromatic hydrocarbons contain the structural unit called _____.

- A. Alkyne
- B. Benzene**
- C. Alkene
- D. Alkane

318. What is a six- carbon ring with three alternating double bonds, or closely related rings or rings of similar nature where nitrogen replaces carbon in one or more ring positions?

- A. Alkyne
- B. Benzene**
- C. Alkene
- D. Alkane

319. What is another term for “Alkanes”?

- A. Olefins
- B. Acetylene
- C. Paraffins**
- D. Methyl

320. What is the simplest alkane which is a major component of nature gas?

- A. Methane**
- B. Octane
- C. Olefin
- D. Acetylene

321. What are hydrocarbons that contain one or more double bonds?

- A. Alkyne
- B. Benzene
- C. Alkene**
- D. Alkane

322. What is another term for “alkenes”?

- A. Olefins**
- B. Ethene
- C. Paraffins
- D. Methyls

323. What is the simplest alkene, which is a plant hormone that plays important role in seed germination and ripening of fruits?

- A. Anthracene
- B. Propyl
- C. Ethyne
- D. Ethene**

324. What are hydrocarbons that contain one or more triple bonds?

- A. Alkyne**
- B. Benzene
- C. Alkene
- D. Alkane

325. What is the simplest alkyne which is a highly reactive molecule?

- A. Ethene
- B. Acetylene or Ethyne**
- C. Propyl
- D. Alkyl

326. The compounds, benzene, naphthalene and anthracene are examples of what hydrocarbon?

- A. Aliphatic hydrocarbon
- B. Aromatic hydrocarbon**
- C. Alkenes
- D. Alkynes

327. What aromatic hydrocarbon is used as a component of mothballs?

- A. Benzene
- B. Naphthalene**
- C. Anthracene
- D. Methyl

328. In 1956, the International Union of Pure and Applied Chemistry (IUPAC) devised a systematic way of naming organic compounds. What is this called?

- A. System of Nomenclature**
- B. System of Identification
- C. System of Verification
- D. System of Unification

329. In naming of hydrocarbons, what refers to a side chain that is formed by removing a hydrogen atom from an alkane?

- A. Alkyl group**
- B. Alken group
- C. Methyl group
- D. Alkyn group

330. Compounds that contain halogens are called _____.

- A. Amines
- B. Halides**
- C. Ethers
- D. Aldehydes

331. The organic compounds that contain oxygen but not in the carbonyl group are called _____.

- A. Alcohols and Ethers**
- B. Amines and Amides
- C. Halides
- D. Aldehydes

332. What organic compounds contain the hydroxyl as the functional group and are considered derivatives of water?

- A. Alcohols**
- B. Ethers
- C. Aldehydes
- D. Ketones

333. What organic compounds contain nitrogen?

- A. Halides
- B. Amines and Amides**
- C. Alcohols
- D. Ethers

334. What organic compounds in which two hydrocarbon groups that can be aliphatic or aromatic are attached to one oxygen atom?

- A. Amines
- B. Alcohols
- C. Ethers**
- D. Halides

335. Which of the following gases is usually used as a refrigerant?

- A. Ketone
- B. Muscone
- C. Propyl ether
- D. Dimethyl ether**

336. Which of the following statements regarding organic substances is FALSE?

- A. Organic substances generally dissolve in high concentration acids
- B. All organic matter contains carbon
- C. Organic matter is generally stable at very high temperatures**
- D. Organic substances generally do not dissolve in water

337. A substance that dissociates in solutions to produce positive and negative ions is called _____.

- A. Base
- B. Acid
- C. Electrolyte**
- D. Solvent

338. Which of the following is most likely to prove that a substance is inorganic?

- A. The substance evaporates in room temperature and pressure
- B. The substance is heated together with copper oxide and the resulting gases are found to have no effect on limestone**
- C. Analysis shows that the substance contains hydrogen
- D. The substance floats in water

339. Which of the following elements and compounds is unstable in its pure form?

- A. Helium
- B. Neon
- C. Carbon Dioxide
- D. Sodium**

340. What element is known as the lightest metal?

- A. Aluminum
- B. Manganese
- C. Magnesium
- D. Lithium**

341. What refers to the attraction between like molecules?

- A. Absorption
- B. Diffusion
- C. Adhesion
- D. Cohesion**

342. Which of the following is the strongest type of bonds?

- A. Van de Waals
- B. Metallic
- C. Covalent**
- D. Ionic

343. When all of the atoms of a molecule are the same, the substance is called a/an _____.

A. Compound

B. Chemical

C. Element

D. Ion

344. Reactions generally proceed faster at high temperatures because of which of the following?

A. The molecules are less energetic

B. The molecules collide more frequently

C. The activation energy is less

D. The molecules collide more frequently and the activation energy is less

345. The condition of a liquid electrolyte is measured in terms of its:

A. Specific Gravity

B. Acid Content

C. Voltage output

D. Current value

346. An element maybe defined as a substance with all atoms of which have the same _____.

A. Number of neutrons

B. Radioactivity

C. Atomic weight

D. Atomic number

347. The device which measures the acid content of the cell is called _____.

A. Acid meter

B. Hydrometer

C. Hygrometer

D. Pyrometer

348. In a copper atom, the valence ring contains how many electrons?

A. No electron

B. One electron

C. Two electrons

D. Four electrons

349. A _____ is a cell designed to produce electric current and can be recharged

A. Secondary cell

B. Electrolyte cell

C. Chemical cell

D. Battery

350. Which of the following statement is FALSE?

A. In general, as reaction products are formed, they react with each other and reform reactants

B. At equilibrium, the net reaction rate is zero

C. The different rate is the mathematical expression that shows how the rate of a reaction depends on volume

D. The net rate at which a reaction proceeds from left to right is equal to the forward rate minus the reverse rate

351. What is the opposite of alkali?

A. Acid

B. Fluid

C. Carbon

D. Oxide

352. The amount of electricity a battery can produce is controlled by the _____.

A. Thickness of the plate

B. Plate surface area

C. Strength of the acid

D. Discharge load

353. What represents the number of protons in the nucleus of an atom?

A. Molecular number

B. Proton number

C. Mass number

D. Atomic number

354. The electrolyte is a solution of water and _____.

A. Sulfuric acid

B. Uric acid

C. Nitric acid

D. Formic acid

355. What is deuteron?

- A. A neutron plus two protons
- B. A nucleus containing a neutron and a proton**
- C. An electron with a positive charge
- D. A helium molecules

356. Which of the following elements is NOT radioactive?

- A. Plutonium
- B. Californium
- C. Uranium
- D. Cobalt**

357. The formula for Dinitrogen Pentoxide is:

- A. N_2O_5**
- B. NO_3
- C. NO
- D. N_3O_4

358. One of the following statements is wrong. Which one is it?

- A. Electron is an elementary quantity of negative electricity
- B. Proton is an elementary quantity of positive electricity
- C. An atom is composed of a central nucleus and orbital electrons
- D. The mass of an electron is heavier than that of a proton**

359. What are compounds with the same molecular formula but with different structural formula?

- A. Aldehydes
- B. Amines
- C. Isomers**
- D. Esters

360. What is formed when a carboxylic acid and an alcohol react, with water as a by-product?

- A. Amine
- B. Ester**
- C. Polymer
- D. Teflon

361. What common carboxylic acid is found in yogurt?

- A. Lactic acid**
- B. Citric acid
- C. Tartaric acid
- D. Lauric acid

362. What carboxylic acid is found in grapes?

- A. Lactic acid
- B. Citric acid
- C. Tartaric acid**
- D. Lauric acid

363. What carboxylic acid is found in coconut oil?

- A. Lactic acid
- B. Citric acid
- C. Tartaric acid
- D. Lauric acid**

364. What do you call the distance pattern in space which the atoms of metal arranged themselves when they combine to produce a substance of recognizable size?

- A. Space-lattice**
- B. Crystal
- C. Grain
- D. Unit cell

365. When a solid has crystalline structure, the atoms arranged in repeating structures called _____.

- A. Lattice
- B. Unit cell**
- C. Crystal
- D. Domain

366. What refers to a crystal imperfection characterized by regions of severe atomic misfit where atoms are not properly surrounded by neighbor atoms?

- A. Discrystallization
- B. Dislocation**
- C. Slip step
- D. Dispersion

367. In electrochemistry, oxidation is a loss of _____.

- A. Ion
- B. Electron**
- C. Proton
- D. Anode

368. What is the process of putting back the lost electrons to convert the ion back to a metal?

- A. Oxidation
- B. Corrosion
- C. Reduction**
- D. Ionization

369. Oxidation in an electrochemical cell always takes place where?

- A. At the anode**
- B. At the cathode
- C. At the electrode
- D. At both cathode and anode

370. Reduction in an electrochemical cell always takes place where?

- A. At the anode
- B. At the cathode**
- C. At the electrode
- D. At both cathode and anode

371. What is equal to the fraction of the isotope in a naturally occurring sample of the element?

- A. The chemical atomic weight of the isotope
- B. The relative abundance of the isotope**
- C. The electromagnetivity of the isotope
- D. The quantum number of the isotope

372. What refers to salts of weak bases dissolving in water to form acidic solution?

- A. Hydrolysis**
- B. Neutralization
- C. Bufferization
- D. Titration

373. Which of the following elements has the highest atomic number?

- A. Titanium
- B. Plutonium**
- C. Uranium
- D. Radium

374. All are properties of gaseous state except one. Which one?

- A. May be expanded or may be compressed
- B. Have low densities
- C. Indefinite shape
- D. Mixed uniformly when soluble in one another**

375. All are properties of liquid state except one. Which one?

- A. Do not expand nor compress to any degree
- B. Usually flow readily
- C. Indefinite shape but fixed volume
- D. Do not mix by diffusion**

376. What type of hydrocarbons that do not contain the benzene group or the benzene ring?

- A. Aromatic hydrocarbon
- B. Aliphatic hydrocarbon**
- C. Simple hydrocarbon
- D. Carbon hydrocarbon

377. What is an organic compound that contains the hydroxyl group?

- A. Base
- B. Acid
- C. Alcohol**
- D. Wine

378. What is a reaction in which one molecule adds to another?

- A. Partial reaction
- B. Monomolecular reaction
- C. Molecular reaction
- D. Additional reaction**

379. What refers to the minimum amount of energy required to initiate a chemical reaction?

- A. Atomic energy
- B. Activation energy**
- C. Initial energy
- D. Reaction energy

380. Oxygen comprises what percent in mass in the earth's crust?

- A. 50.0
- B. 49.5**
- C. 48.5
- D. 47.5

381. What percent of the human body is carbon?

- A. 22%
- B. 20%
- C. 18%**
- D. 16%

382. What refers to how closely a measured value agrees with the correct value?

- A. Accuracy**
- B. Precision
- C. Relative precision
- D. Relative accuracy

383. What refers to how closely individual measurements agree with each other?

- A. Accuracy
- B. Precision**
- C. Relative precision
- D. Relative accuracy

384. What is the physical appearance of sodium?

- A. Silver metal**
- B. Yellowish metal
- C. White crystal
- D. Reddish gas

385. What is the physical appearance of chlorine?

- A. Silver metal
- B. White crystal
- C. Yellowish gas**
- D. White metal

386. What is the physical appearance of sodium chloride?

- A. Silver metal
- B. White crystal**
- C. Yellowish gas
- D. White metal

387. Who proposed the quantum theory in 1900?

- A. J,J Thomson
- B. Neils Bohr
- C. Max Planck**
- D. Ernest Rutherford

388. What is a general term that refers to an allowed energy state for an electron in the atom?

- A. Quantum orbital level
- B. Quantum energy level**
- C. Orbital
- D. Quantum Theory

389. Who performed an experiment in 1887 that yielded the charge-to-mass ratio of the electrons?

- A. Niels Bohr
- B. Ernest Rutherford
- C. J.J Thompson**
- D. Max Planck

390. What is an alloy of mercury with another metal or metals?

- A. Amalgram**
- B. Amine
- C. Allotrope
- D. Alkynes

391. A compound that contains at least one amino group and at least one carboxyl group is called _____.

- A. Allotrope
- B. Amino acid**
- C. Alkenes
- D. Alkynes

392. A molecular orbit that is of higher energy and lower stability than the atomic orbitals from which it was formed is called _____.

- A. Main molecular orbital
- B. Partial molecular orbital
- C. Bonding molecular orbital
- D. Anti-bonding molecular orbital**

393. A molecular orbit that is of lower energy and greater stability than the atomic orbitals from which it was formed is called _____.

- A. Main molecular orbital
- B. Partial molecular orbital
- C. Bonding molecular orbital**
- D. anti-bonding molecular orbital

394. An ion containing a central metal cation bonded to one or more molecules or ions called _____.

- A. Compound ion
- B. Complex ion**
- C. Simplex ion
- D. Buffer ion

395. Compounds containing CN ion are called _____.

- A. Cyanides**
- B. Cycloalkanes
- C. Carbides
- D. Carboxylic acids

396. A molecule that does not possess a dipole moment is called _____.

- A. Polar molecule
- B. Non-polar molecule**
- C. Non-electrolytic molecule
- D. Electrolytic molecule

397. What refers to a substance that when dissolved in water, gives a solution that is not electrically conducting?

- A. Non-polar
- B. Electrolyte
- C. Non-electrolyte**
- D. Polar

398. What refers to a chemical formula that shows how atoms are bonded to one another in a molecule?

- A. Molecular formula
- B. Structural formula**
- C. Standard formula
- D. Bonding formula

399. What refers to ions that are not involved in the overall reaction?

- A. Guest ion
- B. Special ions
- C. Spectator ions**
- D. Extra ions

400. A compound distinguished by a high molar mass, ranging into thousands and millions of grams, and made up of many repeating cells is called _____.

- A. Electrolyte
- B. Polymer**
- C. Nucleotide
- D. Oxoacid

401. Determine the density of the space occupied by the electrons in the Na atom. The radius of the nucleus is given, and 3.04 fm. The radius of Na atom is 186 pm and atomic number is 11.

- A. $4.21 \times 10^{-4} \text{ g/cm}^3$
- B. $3.71 \times 10^{-4} \text{ g/cm}^3$**
- C. $7.31 \times 10^{-4} \text{ g/cm}^3$
- D. $8.31 \times 10^{-4} \text{ g/cm}^3$

402. Calculate the moles of Magnesium (Mg) present in 93.5 g of Mg? (Mg atomic mass = 24.31g)

- A. 3.85 moles**
- B. 4.15 moles
- C. 5.38 moles
- D. 3.35 moles

403. How many number of atoms are there in 1.32×10^3 g of Lead (Pb)? Pb atomic mass is 207.7g.

- A. 3.84×10^{23} atoms
- B. 4.38×10^{23} atoms
- C. 3.84×10^{24} atoms**
- D. 4.38×10^{24} atoms

404. How many grams are there in 4.57×10^{21} amu?

- A. 6.95×10^{-3} g
- B. 5.45×10^{-3} g
- C. 5.96×10^{-3} g
- D. 7.59×10^{-3} g**

405. Calculate the number of moles of cobalt (Co) atom in seven billion Co atoms?

- A. 1.16×10^{-14} moles**
- B. 1.61×10^{-13} moles
- C. 1.16×10^{-13} moles
- D. 1.43×10^{-14} moles

406. Given 16.7 moles of gold (Au), how many grams of Au are there? Atomic mass of Au is 197.0g.

- A. 3.51×10^3 g
- B. 3.29×10^3 g**
- C. 2.39×10^3 g
- D. 3.76×10^3 g

407. Determine the mass in grams of a single atom of Ge which has an atomic mass of 72.59.

- A. 2.21×10^{-22} g/Ge atom
- B. 1.21×10^{-22} g/Ge atom**
- C. 1.12×10^{-22} g/Ge atom
- D. 1.31×10^{-22} g/Ge atom

408. Zinc (Zn) atom has atomic mass of 65.39. Calculate the number of atoms present in 4.22 g of zinc (Zn).

- A. 3.75×10^{22} Zn atoms
- B. 3.93×10^{22} Zn atoms
- C. 3.89×10^{22} Zn atoms**
- D. 4.04×10^{22} Zn atoms

409. Calculate for the number of molecules of ethane (C_2H_6) present in 0.431 g of C_2H_6 . (C atomic mass = 12.01g; H atomic mass = 1.008 g)

- A. 8.63×10^{21} C_2H_6 molecules**
- B. 8.75×10^{21} C_2H_6 molecules
- C. 7.69×10^{21} C_2H_6 molecules
- D. 9.13×10^{21} C_2H_6 molecules

410. How many oxygen (O) atoms are there in 2.31×10^4 g of urea $[(NH_2)_2CO]$. Given molar mass of urea is 60.062g.

- A. 2.43×10^{26} atoms
- B. 2.12×10^{26} atoms
- C. 2.32×10^{26} atoms**
- D. 2.52×10^{26} atoms

411. How many water molecules are present in 5.34 mL of water at a temperature of $4^\circ C$, which the density of water at this temperature is 1.00 g/mL? Atomic masses of H and O are 1.008 g and 16.00 g respectively.

- A. 1.84×10^{23} molecules
- B. 1.78×10^{23} molecules**
- C. 1.74×10^{23} molecules
- D. 1.87×10^{23} molecules

412. Which of the following is the molecular formula of peroxyacetyl nitrate (PAN), one of the components of smog, and is a compound of C, H, N, O, with percent composition by mass: 19.8% C, 2.5% H, 11.6% N. Given that its molar mass is about 120 g. (Atomic masses: C = 12.01g; H = 1.008g; N = 14.01g; O = 16.00g).

- A. $C_2H_3NO_2$
- B. $C_2H_5NO_3$
- C. $C_4H_6N_2O_{10}$
- D. $C_2H_3NO_5$**

413. Calculate the molecular mass of methanol (CH_4O), given the atomic masses of C = 12.01 g, H = 1.008 g and O = 16 g.

- A. 29.018 amu
- B. 34.241 amu
- C. 32.042 amu**
- D. 30.026 amu

414. How many moles of chloroform ($CHCl_3$) are there in 210.45 g of chloroform? C = 12.01 amu, H = 1.008 amu and Cl = 35.45 amu.

- A. 1.76 $CHCl_3$ moles**
- B. 2.12 $CHCl_3$ moles
- C. 4.34 $CHCl_3$ moles
- D. 2.51 $CHCl_3$ moles

415. The atomic masses of carbon, hydrogen, and oxygen are 12.07g, 1.008g and 16.00g respectively. Calculate the number of C atoms present in 84.5 g of isopropanol (rubbing alcohol), C_3H_8O ?

- A. 2.88×10^{24} C atoms
- B. 3.72×10^{24} C atoms
- C. 2.54×10^{24} C atoms**
- D. 2.00×10^{24} C atoms

416. What is the percent composition by mass of oxygen (O) element in sulfuric acid (H_2SO_4)? H = 1.008 amu, S = 32.07 amu, S = 32.07 amu and O = 16.00 amu.

- A. 62.25 %
- B. 63.34 %
- C. 64.45 %
- D. 65.25 %**

417. If atomic masses of Al and O are 26.98 amu and 16.00 amu, respectively, how many grams of Al are there in 431g of Al_2O_3 ?

- A. 228 g**
- B. 215 g
- C. 237 g
- D. 114 g

418. Which is the molecular formula of a sample of a compound containing 6.444 g of boron (B) and 1.803 g of hydrogen (H)? The compound has a molar mass of about 30 g. Given boron (B) has 10.81 amu and hydrogen (H) has 1.008 amu.

- A. B_2H_3
- B. BH
- C. B_2H_6**
- D. BH_3

419. The atomic masses of carbon, hydrogen, and oxygen are 12.01g, 1.008g, and 16g respectively. Calculate the molarity of a 90-mL ethanol ($\text{C}_2\text{H}_5\text{OH}$) solution which contains 2.15 g of ethanol.

- A. 0.52 M**
- B. 0.25 M
- C. 0.61 M
- D. 0.44 M

420. Determine the volume in mL of stock solution that must be diluted to produce 3.00×10^2 mL of 0.856 M NaOH solution, starting with a 5.27 M stock solution?

- A. 47.8 mL
- B. 48.7 mL**
- C. 51.2 mL
- D. 48.1 mL

421. Bromine (Br) and Silver has atomic masses of 79.90g and 107.9g, respectively. In a certain experiment, a sample of 0.3320g of an ionic compound containing the bromide ion (BrI) is dissolved in water and treated with an excess of AgNO_3 if the mass of the AgBr precipitate that forms is 0.734 g, calculate the percent by mass of Br in the original compound?

- A. 42.55 %
- B. 49.70 %
- C. 84.10 %
- D. 94.07 %**

422. Solve for the volume occupied by 3.12 moles of nitric oxide (NO) which exerts 5.43 atm of pressure at a temperature of 82°C.

- A. 16.75 L**
- B. 13.84 L
- C. 15.76 L
- D. 16.48 L

423. Calculate the volume occupied by 50.6 g of HCl at STP. H = 1.008 amu and Cl = 35.45 amu.

- A. 83.2 L
- B. 31.1 L**
- C. 27.4 L
- D. 1.38 L

424. Calculate the final pressure if a sample of a certain gas is cooled from 34°C to -73°C, with an initial pressure of 1.45 atm.

- A. 1.42 atm
- B. 3.11 atm
- C. 0.94 atm**
- D. 1.63 atm

425. An 867-mL sample of chlorine gas exerts a pressure of 738 mmHg. Determine the pressure of the gas if the volume is reduced to 321 mL at constant temperature.

- A. 1.99×10^3 mm Hg**
- B. 2.73×10^3 mm Hg
- C. 1.21×10^3 mm Hg
- D. 2.13×10^3 mm Hg

426. Determine the final pressure of a gas, initially at 3.0 L, 2.2 atm, and 72°C, which undergoes a change so that its final volume and temperature are 0.9 L and 41°C.

- A. 7.66 atm
- B. 6.67 atm**
- C. 4.18 atm
- D. 5.73 atm

427. Calculate the density of uranium hexafluoride (UF₆) with pressure of 697 mmHg at 57°C temperature. Atomic masses: U = 238 g; F = 19 g.

- A. 90.55 g/L
- B. 52.42 g/L
- C. 68.98 g/L
- D. 11.92 g/L**

428. Calculate the molar mass of a certain gaseous organic compound having a density of 0.00356 g/mL at 2.12 atm and 45°C.

- A. 6.20 g/mol
- B. 42.84 g/mol**
- C. 0.043 g/mol
- D. 4.384 g/mol

429. Determine the molecular formula of a gaseous compound which is 78.14% boron and 21.86% H. At a temperature of 27°C, 33.2864-mL of the gas exerted a pressure of 2.5 atm, and the mass of the gas was 0.0934g. B = 10.81 amu and H = 1.008 amu.

- A. BH₂
- B. BH₃
- C. B₂H₆**
- D. BH₃

430. The atomic mass of chlorine is 35.45 g. What is the root-mean-square of molecular chlorine in m/s at 31°C?

- A. 104 m/s
- B. 10 m/s
- C. 327 m/s**
- D. 193 m/s

431. Assuming there is no change in volume, determine the molarity of the acid solution if a 3.12-L sample of hydrogen chloride gas at 2.57 atm and 27.5°C, which is completely dissolved in a 700 mL of water to form hydrochloric acid solution.

- A. 0.644 M
- B. 0.000464 M
- C. 0.464 M**
- D. 0.0464 M

432. A certain sample of natural gas contains 0.377 mole of ethane (C₂H₆), 7.48 moles of methane (CH₄), and 0.134 mole of propane (C₃H₈). Calculate the partial pressure of propane gas, if the total pressure of the gases is 1.79 atm.

- A. 1.68 atm
- B. 0.084 atm
- C. 0.94 atm
- D. 0.03 atm**

433. A 2.102g of methanol (CH_3OH) was burned in a constant-volume bomb calorimeter. Consequently, the temperature of the water was rose by 5.13°C . Solve for the molar heat of combustion of methanol, if the heat capacity of the bomb plus water was $11.8 \text{ kJ}/^\circ\text{C}$. Carbon has 12.01 amu, hydrogen has 1.008 amu and oxygen has 16.00 amu.

- A. 922.75 kJ/mol
- B. - 922.75 kJ/mol**
- C. 60.534 kJ/mol
- D. - 28.79 kJ/mol

434. Caffeine ($\text{C}_8\text{H}_{10}\text{N}_4\text{O}_2$) is a stimulant found in tea and coffee. What is its empirical formula?

- A. $\text{C}_4\text{H}_5\text{N}_2\text{O}$**
- B. $\text{C}_5\text{H}_3\text{NO}_2$
- C. $\text{C}_2\text{H}_6\text{NO}_3$
- D. $\text{C}_8\text{H}_{10}\text{N}_4\text{O}_2$

435. Calculate the mass of a piece of platinum metal with a density of $34.1 \text{ g}/\text{cm}^3$ and has a volume of 5.2 cm^3 .

- A. 17.732 g
- B. 1773.2 g
- C. 177.32 g**
- D. 1.7732 g

436. Calculate the number of molecules of oxygen gas present in 1.5 L of air at STP. Assuming that air contains 31% O_2 , 67% N_2 and 2% Ar, all by volume.

- A. 1.87×10^{23} molecules
- B. 4.18×10^{24} molecules
- C. 2.81×10^{23} molecules
- D. 1.25×10^{22} molecules**

437. Calculate the mass of F in grams in 31.2 g of the compound Tin (II) fluoride (SnF_2), which is often added to toothpaste as an ingredient for the prevention of tooth decay. Tin = 118.7 amu and Flourine = 19.00 amu.

- A. 3.78 g
- B. 7.57 g**
- C. 4.30 g
- D. 8.61 g

438. Which of the following is the molar mass of the gas at 752 torr and 41°C? Ten grams of a gas occupy a volume of 5.12 L.

- A. 51 g/mol**
- B. 1.96 g/mol
- C. 149 g/mol
- D. 1144 g/mol

439. Determine the pressure exerted by hydrogen bromide (HBr) gas having a density of 2.978 g/L at a temperature of 46°C. Hydrogen and bromine has atomic masses of 1.008g and 79.9 g, respectively.

- A. 73 mm Hg
- B. 106 mm Hg
- C. 733 mm Hg**
- D. 0.964 mm Hg

440. How many grams of mercury (Hg = 200.6 amu) are there in 7.18 moles?

- A. 0.036 g
- B. 1440 g**
- C. 312 g
- D. 1004 g

MULTIPLE CHOICE
QUESTIONS in
ENGINEERING MECHANICS

Encoded by:

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1. What is the magnitude of the resultant force of the two forces which are perpendicular to each other? The two forces are 20 units and 30 units respectively.

- A. 36**
- B. 42
- C. 25
- D. 40

2. A rope is stretched between two rigid walls 40 feet apart. At the midpoint, a load of 100 lbs was placed that caused it to sag 5 feet. Compute the approximate tension in the rope.

- A. 206 lbs**
- B. 150 lbs
- C. 280 lbs
- D. 240 lbs

3. What is the effective component applied on the box that is being pulled by a 30 N force inclined at 30 degrees with horizontal?

- A. 36.21 N
- B. 25.98 N**
- C. 15.32 N
- D. 20.62 N

4. A post is supported by a guy wire which exerts a pull of 100 N on the top of the post. If the angle between the wire and the ground is 60 degrees, what is the horizontal component of the force supporting the pole?

- A. 86.6 N
- B. 50.0 N**
- C. 76.6 N
- D. 98.5 N

5. The resultant of two forces in a plane is 400 N at 120 degrees. If one of the forces is 200 lbs at 20 degrees what is the other force?

- A. 347.77 N at 114.85 degrees
- B. 435.77 N at 104.37 degrees
- C. 357.56 N at 114.24 degrees
- D. 477.27 N at 144.38 degrees**

6. Determine the resultant of the following forces: $A = 600 \text{ N}$ at 40° , $B = 800 \text{ N}$ at 160° and $C = 200 \text{ N}$ at 300° .

- A. 532.78 N , 55.32°
- B. 435.94 N , 235.12°
- C. 522.68 N , 111.57°**
- D. 627.89 N , 225.81°

7. A collar, which may slide on a vertical rod is subjected three forces. Force A is 1200 N vertically upward, Force B is 800 N at an angle of 60° from the vertical and a force F which is vertically downward to the right. Find the direction of F if its magnitude is 2400 N and the resultant is horizontal.

- A. 41.61°**
- B. 43.52°
- C. 40.13°
- D. 45.52°

8. Given the 3-dimensional vectors: $A = i(xy) + j(2yz) + k(3zx)$ and $B = i(yz) + j(2zx) + k(3xy)$. Determine the scalar product at the point $(1,2,3)$.

- A. 144
- B. 138**
- C. 132
- D. 126

9. Determine the divergence of the vector: $V = i(x^2) + j(-xy) + k(xyz)$ at the point $(3,2,1)$.

- A. 9.00**
- B. 11.00
- C. 13.00
- D. 7.00

10. The three vectors described by 10 cm/ at $120k^\circ$, $k = 0, 1, 2$ encompass the sides of an equilateral triangle. Determine the magnitude of the vector cross product: $0.5 [(10/ \text{ at } 0^\circ) \times (10/ \text{ at } 120^\circ)]$.

- A. 86.6
- B. 25.0
- C. 50.0
- D. 43.3**

11. The 5 vectors: 10 cm/ at $72k$ degrees, $k = 0, 1, 2, 3, 4$ encompass the sides of a regular pentagon. Determine the magnitude of the vector cross product: $2.5 [(10/ \text{ at } 144 \text{ deg}) \times (10/ \text{ at } 216 \text{ deg})]$.

- A. 198.1
- B. 237.7**
- C. 285.2
- D. 165.1

12. What is the angle between two vectors A and B if $A = 4i - 12j + 6k$ and $B = 24i - 8j + 6k$?

- A. 168.45 degrees
- B. 84.32 degrees**
- C. 86.32 degrees
- D. -84.64 degrees

13. Given the 3-dimensional vectors : $A = i (xy) + j (2yz) + k (3zx)$, $B = i (yz) + j (2zx) + k (3xy)$. Determine the magnitude of the vector sum $|A + B|$ at coordinates (3,2,1).

- A. 32.92
- B. 29.88**
- C. 27.20
- D. 24.73

14. What is the cross product $A \times B$ of the vectors, $A = I + 4j + 6k$ and $B = 2i + 3j + 5k$?

- A. $i - j - k$
- B. $-i + j + k$
- C. $2i + 7j - 5k$**
- D. $2i + 7j + 5k$

15. A simply supported beam is five meters in length. It carries a uniformly distributed load including its own weight of 300 N/m and a concentrated load of 100 N , 2 meters from the left end. Find the reactions if reaction A at the left end and reaction B at the right end.

- A. $R_A = 810 \text{ N}, R_B = 700 \text{ N}$**
- B. $R_A = 820 \text{ N}, R_B = 690 \text{ N}$
- C. $R_A = 830 \text{ N}, R_B = 680 \text{ N}$
- D. $R_A = 840 \text{ N}, R_B = 670 \text{ N}$

16. A man can exert a maximum pull of 1,000 N but wishes to lift a new stone door for his cave weighing 20,000 N. If he uses a lever how much closer must the fulcrum be to the stone than to his hand?

- A. 10 times nearer
- B. 20 times farther
- C. 10 times farther
- D. 20 times nearer**

17. A certain cable is suspended between two supports at the same elevation and 500 ft apart. The load is 500 lbs per horizontal foot including the weight of the cable. The sag of the cable is 30 ft. Calculate the total length of the cable.

- A. 503.21 ft
- B. 504.76 ft**
- C. 505.12 ft
- D. 506.03 ft

18. The weight of a transmission cable is 1.5 kg/m distributed horizontally. If the maximum safe tension of the cable is 60000 kg and the allowable sag is 30 m, determine the horizontal distance between the electric posts supporting the transmission cable.

- A. 897 m
- B. 926 m
- C. 967 m
- D. 976 m**

19. A cable 45.5 m long is carrying a uniformly distributed load along its span. If the cable is strung between two posts at the same level, 40 m apart, compute the smallest value that the cable may sag.

- A. 12.14 m
- B. 10.12 m
- C. 9.71 m**
- D. 8.62 m

20. A pipeline crossing a river is suspended from a steel cable stretched between two posts 100 m apart. The weight of the pipe is 14 kg/m while the cable weighs 1 kg/m assumed to be uniformly distributed horizontally. If the allowed sag is 2 m, determine the tension of the cable at the post.

- A. 9047.28 kg
- B. 9404.95 kg**
- C. 9545.88 kg
- D. 9245.37 kg

21. The distance between supports of a transmission cable is 20 m apart. The cable is loaded with a uniformly distributed load of 20 kN/m throughout its span. The maximum sag of the cable is 4 m. What is the maximum tension of the cable if one of the supports is 2 meters above the other?

A. 415.53 N

B. 413.43 N

C. 427.33 N

D. 414.13 N

22. A cable weighing 0.4 pound per foot and 800 feet long is to be suspended with sag of 80 feet. Determine the maximum tension of the cable.

A. 403 kg

B. 456 kg

C. 416 kg

D. 425 kg

23. A cable 200 m long weighs 50 N/m and is supported from two points at the same elevation. Determine the required sag if the maximum tension that the cable can carry shall not exceed 8000 N.

A. 35.1 m

B. 28.2 m

C. 40.3 m

D. 31.3 m

24. A transmission cable 300 m long, weighs 600 kg. The tensions at the ends of the cable are 400 kg and 450 kg. Find the distance of its lowest point to the ground.

A. 145 m

B. 148 m

C. 150 m

D. 153 m

25. A 250 kg block rests on a 30 degrees plane. If the coefficient of kinetic friction is 0.20, determine the horizontal force P applied on the block to start the block moving up the plane.

A. 59.30 kg

B. 58.10 kg

C. 219.71 kg

D. 265.29 kg

26. Compute the number of turns of the rope to be wound around a pole in order to support a man weighing 600 N with an input force of 10 N. Note: coefficient of friction is 0.30.

- A. 2.172**
- B. 3.123
- C. 1.234
- D. 4.234

27. A block weighing 500 N is held by a rope that passes over a horizontal drum. The coefficient of friction between the rope and the drum is 0.15. If the angle of contact is 150 degrees, compute the force that will raise the object.

- A. 740.7 N**
- B. 760.6 N
- C. 770.5 N
- D. 780.8 N

28. A circle has a diameter of 20 cm. Determine the moment of inertia of the circular area relative to the axis perpendicular to the area through the center of the circle in cm^4 .

- A. 14,280
- B. 15,708**
- C. 17,279
- D. 19,007

29. What is the branch of engineering mechanics which refers to the study of stationary rigid body?

- A. Statics**
- B. Kinetics
- C. Kinematics
- D. Dynamics

30. What is the branch of engineering mechanics which refers to the study of rigid body in motion under the action of forces?

- A. Statics
- B. Strength of materials
- C. Kinematics
- D. Dynamics**

31. What is the branch of engineering mechanics which refers to the study of rigid body in motion without reference to the force that causes the motion?
- A. Statics
 - B. Kinetics
 - C. Kinematics**
 - D. Dynamics
32. What refers to the force that holds part of the rigid body together?
- A. Natural force
 - B. External force
 - C. Internal force**
 - D. Concentrated force
33. What refers to a pair of equal, opposite and parallel forces?
- A. Couple**
 - B. Moment
 - C. Torque
 - D. All of the above
34. What is a concurrent force system?
- A. All forces act at the same point.**
 - B. All forces have the same line of action.
 - C. All forces are parallel with one another.
 - D. All forces are in the same plane.
35. When will a three-force member be considered in equilibrium?
- A. When the sum of the two forces is equal to the third force.
 - B. When they are concurrent or parallel.**
 - C. When they are coplanar.
 - D. All of the above
36. A roller support has how many reactions?
- A. None
 - B. 1**
 - C. 2
 - D. 3

37. A link or cable support has how many reactions?
- A. None
 - B. 1**
 - C. 2
 - D. 3
38. A build-in, fixed support has how many reactions and moment?
- A. 1 reaction and 1 moment
 - B. 2 reactions and 1 moment**
 - C. 1 reaction and 2 moments
 - D. 2 reactions and no moment
39. Which support has one moment?
- A. Frictionless guide
 - B. Pin connection
 - C. Fixed support**
 - D. Roller
40. What is the science that describes and predicts the effect on bodies at rest or in motion by forces acting on it?
- A. Engineering Mechanics**
 - B. Theory of Structures
 - C. Mechanics of Materials
 - D. Strength of Materials
41. What refers to a negligible body when compared to the distances involved regarding its motion?
- A. Particle**
 - B. Atomic substance
 - C. Element
 - D. Quarks
42. The resulting force of a distributed load is always acting at:
- A. the center of the beam subjected to the distributed load
 - B. the centroid of the area of the loading curve**
 - C. the 1/3 point from the higher intensity side of the loading curve
 - D. the 2/3 point from the higher intensity side of the loading curve

43. The resultant force of a distributed load is always equal to:
- A. twice the area under the loading curve
 - B. half the area under the loading curve
 - C. the area under the loading curve**
 - D. one-fourth the area under the loading curve
44. When a body has more supports than are necessary to maintain equilibrium, the body is said to be _____.
- A. in static equilibrium**
 - B. in dynamic equilibrium
 - C. statically determine
 - D. statically indeterminate
45. When does an equation be considered “dimensionally homogeneous”?
- A. When it is unitless
 - B. When the dimensions of the various terms on the left side of the equation is not the same as the dimensions of the various terms on the right side.
 - C. When the degree of the left side of the equation is the same as the right side.
 - D. When the dimensions of various terms on the left side of the equation is the same as the dimensions of the various terms on the right side.**
46. What refers to the branch of mathematics which deals with the dimensions of quantities?
- A. Unit analysis
 - B. Dimensional analysis**
 - C. System analysis
 - D. Homogeneity analysis
47. What is a “simple beam”?
- A. A beam supported only at its ends.**
 - B. A beam supported with a fixed support at one end and non on the other end.
 - C. A beam with more than two supports.
 - D. A beam with only one support at the midspan.
48. What assumption is used in the analysis of uniform flexible cable?
- A. Cable is flexible.
 - B. Cable is inextensible.
 - C. The weight of the cable is very small when compared to the loads supported by the cable.
 - D. All of the above**

49. "The sum of individual moments about a point caused by multiple concurrent forces is equal to the moment of the resultant force about the same point". This statement is known as ____.
- A. Pappus proposition
 - B. D' Alembert's principle
 - C. Varignon's theorem**
 - D. Newton's method
50. "Two forces acting on a particle may be replaced by a single force called resultant which can be obtained by drawing diagonal of parallelogram, which has the sides equal to the given forces". This statement is known as _____.
- A. Pappus Propositions
 - B. Principle of Transmissibility
 - C. Parallelogram Law**
 - D. Varignon's Theorem
51. "The condition of equilibrium or motion of a rigid body remains unchanged if a force acting at a given point of the rigid body is replaced by a force of same magnitude and direction, but acting at a different point provided that the two forces have the same line of action". This statement is known as _____.
- A. Pappus Propositions
 - B. Principle of Transmissibility**
 - C. Parallelogram Law
 - D. Varignon's Theorem
52. "If two forces acting simultaneously on a particle can be represented by the two sides of a triangle taken in order that the third side represents the resultant in the opposite order". This statement is known as _____.
- A. Principle of Transmissibility
 - B. Parallelogram Law
 - C. Varignon's Theorem
 - D. Triangle Law of Forces**
53. "If a number of concurrent forces acting simultaneously on a particle, are represented in magnitude and direction by the sides of polygon taken in order, then the resultant of this system of forces is represented by the closing side of the polygon in the opposite in the opposite order". This statement is known as _____.
- A. Principle of Transmissibility
 - B. Parallelogram Law
 - C. Polygon Law**
 - D. Triangle Law of Forces

54. A beam with more than one supports is called _____.
- A. cantilever beam
 - B. simple beam
 - C. complex beam
 - D. continuous beam**
55. A truss consisting of coplanar members is called _____.
- A. plane truss**
 - B. space truss
 - C. ideal truss
 - D. rigid truss
56. A truss consisting of non-coplanar members is called _____.
- A. plane truss
 - B. space truss**
 - C. ideal truss
 - D. rigid truss
57. What method of determining the bar force of a truss if only few members are required?
- A. Methods of joints
 - B. Method of section**
 - C. Maxwell's diagram
 - D. Method of superposition
58. Which of the following statements about friction is FALSE?
- A. The direction of frictional force on a surface is such as to oppose the tendency of one surface to slide relative to the other.
 - B. The total frictional force is dependent on the area of contact between the two surfaces.**
 - C. The magnitude of the frictional force is equal to the force which tends to move the body till the limiting value is reached.
 - D. Friction force is always less than the force required to prevent motion.
59. In the analysis of friction, the angle between the normal force and the resultant force _____ the angle of friction.
- A. may be greater than or less than
 - B. is greater than
 - C. is less than**
 - D. is equal to

60. When a block is placed on an inclined plane, its steepest inclination to which the block will be in equilibrium is called _____.

- A. angle of friction
- B. angle of reaction
- C. angle of normal
- D. angle of repose**

61. What is usually used to move heavy loads by applying a force which is usually smaller than the weight of the load?

- A. Axle
- B. Incline plane
- C. Wedge**
- D. Belt

62. The angle of inclined plane of a jack screw is also known as _____.

- A. angle of thread
- B. angle of lead**
- C. angle of friction
- D. angle of pitch

63. Center of gravity for a two dimensional body is the point at which the entire _____ acts regardless of the orientation of the body.

- A. mass
- B. weight**
- C. mass or weight
- D. volume

64. Second moment of area is the product of:

- A. area and square of the distance from the reference axis**
- B. area and distance from the reference axis
- C. square of the area and distance from the reference axis
- D. square of the area and square of the distance from the reference axis

65. Moment of inertia of an area about an axis is equal to the sum of moment of inertia about an axis passing through the centroid parallel to the given axis and _____.

- A. area and square of the distance between two parallel axes**
- B. area and distance between two parallel axes
- C. square of the area and distance between two parallel axes
- D. square of the area and square of the distance between two parallel axes

66. What is the unit of mass moment of inertia?
- A. $\text{kg}\cdot\text{m}^4$
 - B. $\text{kg}\cdot\text{m}^3$
 - C. $\text{kg}\cdot\text{m}$
 - D. $\text{kg}\cdot\text{m}^2$**
67. The number of independent degrees of freedom is:
- A. Square root of the square of the difference of total degrees of freedom – number of constrain equations
 - B. Square root of the total degrees of freedom – number of constrain equations
 - C. Total degrees of freedom – number of constrain equations**
 - D. Total degrees of freedom – half the number of constrain equations
68. What velocity is normally referred to as the derivative of position vector with respect to time?
- A. Decreasing velocity
 - B. Average velocity
 - C. Instantaneous velocity**
 - D. Increasing velocity
69. What refers to a force by which work done on a particle as it moves around any closed path is zero?
- A. Natural force
 - B. Virtual force
 - C. Conservative force**
 - D. Non-conservative force
70. When a force causes a change in mechanical energy when it moves around a closed path, it is said to be _____ force.
- A. natural
 - B. virtual
 - C. conservative
 - D. non-conservative**
71. The following are quantities that describe motion and uses Newton's law of motion and d'Alembert's principle except one. Which one?
- A. Time**
 - B. Mass
 - C. Acceleration
 - D. Force

72. Which of the following set of quantities that describe motion and uses the principle of work and energy?
- A. Force, mass, velocity, time
 - B. Force, mass, acceleration
 - C. Force, mass, distance, velocity**
 - D. Force, weight, distance, time
73. Which of the following set of quantities that describe motion and uses the principle of impulse and momentum?
- A. Force, mass, velocity, time**
 - B. Force, mass, distance, velocity
 - C. Force, mass, distance, velocity
 - D. Force, weight, distance, time
74. The principles of kinetics of particles are derived from which law?
- A. Newton's first law
 - B. Newton's second law**
 - C. Newton's third law
 - D. d'Alembert's principle
75. What type of impact is when the motion of one or both of the colliding bodies is not directed along the line impact?
- A. Central impact
 - B. Eccentric impact
 - C. Direct impact
 - D. Oblique impact**
76. What type of impact is when the centers of mass of colliding bodies are not located on the line of impact?
- A. Central impact
 - B. Eccentric impact**
 - C. Direct impact
 - D. Oblique impact
77. If the coefficient of restitution is zero, the impact is _____.
- A. partially plastic
 - B. perfectly inelastic**
 - C. perfectly elastic
 - D. partially elastic

78. A uniform circular motion can be considered as a combination of _____.
- A. linear velocity and impulse
 - B. simple harmonic motion and momentum
 - C. two simple harmonic motions**
 - D. rectilinear translation and curvilinear translation
79. The motion of a particle is defined by the relation $x = (1/3)t^3 - 3t^2 + 8t + 2$ where x is the distance in meters and t is the time in seconds. What is the time when the velocity is zero?
- A. 2 seconds**
 - B. 3 seconds
 - C. 5 seconds
 - D. 7 seconds
80. A particle moves along a straight line with the equation $x = 16t + 4t^2 - 3t^3$ where x is the distance in ft and t is the time in second. Compute the acceleration of the particle after 2 seconds.
- A. -28 ft/s^2**
 - B. -30 ft/s^2
 - C. -17 ft/s^2
 - D. -24 ft/s^2
81. Two cars A and B traveling in the same direction and stopped at a highway traffic sign. As the signal turns green car A accelerates at constant rate of 1 m/s^2 . Two seconds later the second car B accelerates at constant rate of 1.3 m/s^2 . When will the second car B overtakes the first car A?
- A. 16.27 s**
 - B. 30.45 s
 - C. 20.32 s
 - D. 10.45 s
82. Two buses start at the same time towards each other from terminals A and B, 8 km apart. The time needed for the first bus to travel from A to B is 8 minutes, and of the second bus from B to A is 10 minutes. How much is the time needed by each bus to meet each if they traveled at their respective uniform speeds?
- A. 5.45 min
 - B. 10.7 min
 - C. 4.44 min**
 - D. 2.45 min

83. A train changes its speed uniformly from 60 mph to 30 mph in a distance of 1500 ft. What is its acceleration?

A. -1.94 ft/s^2

B. 2.04 ft/s^2

C. -2.04 ft/s^2

D. 1.94 ft/s^2

84. A car starts from rest and has a constant acceleration of 3 ft/s^2 . Find the average velocity during the first 10 seconds of motion.

A. 13 ft/s

B. 15 ft/s

C. 14 ft/s

D. 20 ft/s

85. A man aimed his rifle at the bull's eye of a target 50 m away. If the speed of the bullet is 500 m/s, how far below the bull's eye does the bullet strike the target?

A. 5.0 cm

B. 6.8 cm

C. 5.7 cm

D. 6.0 cm

86. A man driving his car at a constant rate of 40 mph suddenly sees a sheep crossing the road 60 feet ahead. Compute the constant deceleration (in feet/second²) required to avoid hitting the sheep? Assume a reaction time of 0.5 second before the man applies the brake.

A. 34.65

B. 44.54

C. 55.65

D. 67.87

87. A ball is thrown vertically into the air at 120 m/s. After 3 seconds, another ball is thrown vertically. What is the velocity must the second ball have to pass the first ball at 100 m from the ground?

A. 105.89 m/s

B. 107.72 m/s

C. 108.12 m/s

D. 110.72 m/s

88. A ball is dropped from a height of 60 meters above ground. How long does it take to hit the ground?
- A. 2.1 s
 - B. 3.5 s**
 - C. 5.5 s
 - D. 1.3 s
89. A ball is thrown vertically upward from the ground and a student gazing out of the window sees it moving upward pass him at 5 m/s. The window is 10 m above the ground. How high does the ball go above the ground?
- A. 15.25 m
 - B. 14.87 m
 - C. 9.97 m
 - D. 11.28 m**
90. A ball thrown vertically upward with an initial velocity of 3 m/s from the window of a tall building. The ball strikes the sidewalk at the ground level 4 seconds later. Determine the velocity with which the ball strikes the ground.
- A. 39.25 m/s
 - B. 38.50 m/s
 - C. 37.75 m/s
 - D. 36.24 m/s**
91. A player throws a baseball upward with an initial velocity of 30 ft/sec and catches it with a baseball glove. When will the ball strike the glove? Assume the glove is position in the same elevation when the ball left his hand.
- A. 0.48 s
 - B. 0.60 s
 - C. 1.20 s
 - D. 1.86 s**
92. A highway curve has a super elevation of 7 degrees. What is the radius of the curve such that there will be no lateral pressure between the tires and the roadway at a speed of 40 mph?
- A. 265.71 m**
 - B. 438.34 m
 - C. 345.34 m
 - D. 330.78 m

93. A baseball is thrown a horizontal plane following a parabolic path with an initial velocity of 100 m/s at an angle of 30° above the horizontal. Solve the distance from the throwing point that the ball attains its original level.
- A. 890 m
 - B. 883 m**
 - C. 858 m
 - D. 820 m
94. Compute the minimum distance that a truck slides on a horizontal asphalt road if it is traveling at 20 m/s? The coefficient to sliding friction between asphalt and rubber tire is at 0.50. The weight of the truck is 8000 kg.
- A. 40.8**
 - B. 48.5
 - C. 35.3
 - D. 31.4
95. A projectile is fired from a cliff 300 m high with an initial velocity of 400 m/s. If the firing angle is 30° from the horizontal, compute the horizontal range of the projectile.
- A. 15.74 km**
 - B. 14.54 km
 - C. 12.31 km
 - D. 20.43 km
96. A 25 g mass bullet was fired at the wall. The bullet's speed upon hitting the wall is 350 m/s. What is the average force (in Newton) if the bullet penetrates 10 cm?
- A. 14,543.2 N
 - B. 11,342.2 N
 - C. 10,543.3 N
 - D. 15,312.5 N**
97. A girl tied 80 gram toy plane of a string which he rotated to form a vertical circular motion with a diameter a 1000 mm. Compute for the maximum pull exerted on the string by the toy plane if got loose leaving at the bottom of the circle at 25 m/s.
- A. 0.002 kN
 - B. 0.05 kN
 - C. 0.2 kN
 - D. 0.1 kN**

98. A gun is shot into a 0.50 kN block which is hanging from a rope of 1.8 m long. The weight of the bullet is equal to 5 N with a muzzle velocity of 320 m/s. How high will the block swing after it was hit by the bullet?

A. 0.51 m

B. 0.53 m

C. 0.32 m

D. 0.12 m

99. A train weighing 1000 kN is being pulled up a 2% grade. The train's resistance is 5N/kN. The train's velocity was increased from 6 to 12 m/s in a distance of 300 m. Compute the maximum power developed by the locomotive.

A. 600 kW

B. 450 kW

C. 520 kW

D. 320 kW

100. Determine the angle of super elevation for a highway curve of 600 ft radius so that there will be no side thrust for a speed of 45 mph.

A. 1d3.45°

B. 12.71°

C. 11.23°

D. 10.45°

101. An airplane acquires a take-off velocity of 150 mph on a 2-mile runway. If the plane started from rest and the acceleration remains constant, what is the time required to reach take-off speed?

A. 40 s

B. 45 s

C. 58 s

D. 96 s

102. Water drops from a faucet at the rate of 4 drops per second. What is the distance between two successive drops 1 second after the first drop has fallen.

A. 5.32 ft

B. 8.24 ft

C. 7.04 ft

D. 9.43 ft

103. A body which is 16.1 lb rests on a horizontal plane and acted upon by a 10-lb force. Find the acceleration of the body if the coefficient of friction between the plane and the body is 0.2. Note: $1 \text{ lbf} = 32.2 \text{ lbm-ft/s}^2$.

- A. 12.34 ft/s^2
- B. 11.57 ft/s^2
- C. 15.57 ft/s^2
- D. 13.56 ft/s^2**

104. A man on an elevator weighs 180 lbf. Compute the force exerted by the man on the floor of the elevator if it is accelerating upward at 5 ft/s^2 .

- A. 207.95 lbf**
- B. 210.45 lbf
- C. 190.56 lbf
- D. 205.54 lbf

105. A 10-lb stone is fastened to a 2-ft cord and is whirled in a vertical circle. Determine the tension in the cord when it is rotated at 100 rpm.

- A. 47.95 lbf
- B. 58.08 lbf**
- C. 19.56 lbf
- D. 20.54 lbf

106. An archer must split the apple atop his partner's head from a distance of 30 m. The arrow is horizontal when aimed directly to the apple. At what angle must he aim in order to hit the apple with the arrow traveling at a speed of 35 m/s.

- A. 8.35°
- B. 10.55°
- C. 3.25°
- D. 6.95°**

107. A hollow spherical shell has a radius of 5 units and mass of 10. What is its mass moment of inertia?

- A. 108.45
- B. 123.34
- C. 187.54
- D. 165.67**

108. A coin 20mg is placed on the smooth edge of a 25 cm-radius phonograph record as the record is brought up to its normal rotational speed of 45 rpm. What must be the coefficient of friction between the coin and the record if the coin is not to slip off?

- A. 0.45
- B. 0.56**
- C. 0.64
- D. 0.78

109. The acceleration due to gravity on the moon is 1.67m/s^2 . If an astronaut can throw a ball 10 m straight upward on earth, how high should this man be able to throw the ball on the moon? Assume that the throwing speeds are the same in the two cases.

- A. 58.67**
- B. 50.84
- C. 65.67
- D. 45.67

110. A tennis ball is dropped into a cement floor from a height of 2 m. It rebounds to a height of 1.8 m. What fraction of energy did it lose in the process of striking the floor?

- A. One-tenth**
- B. One-fourth
- C. One-third
- D. One-seventh

111. A car is at rest on a sloping driveway. By experiment the driver releases the brake of the car and let the car move at constant acceleration. How fast will the car be moving when it reaches the street? Note: The street is 4 m below the original position of the car.

- A. 8.86 m/s**
- B. 50.45 m/s
- C. 6.65 m/s
- D. 9.65 m/s

112. A solid sphere is placed at the top of a 45° incline. When released, it freely rolls down. What will be its linear speed at the foot of the incline which is 2.0 m below the initial position of the cylinder?

- A. 4.86 m/s
- B. 5.29 m/s**
- C. 6.43 m/s
- D. 3.55 m/s

113. A ball is dropped from a height y above a smooth floor. How high will rebound if the coefficient of restitution between the ball and the floor is 0.60?
- A. $0.45y$
 - B. $0.40y$
 - C. $0.60y$
 - D. $0.36y$**
114. A ball is thrown at an angle of 32.5° from the horizontal towards a smooth floor. At what angle will it rebound if the coefficient of between the ball and the floor is 0.30?
- A. 11.33°
 - B. 8.67°
 - C. 9.12°
 - D. 10.82°**
115. A 1.62-ounce marble attains a velocity of 170 mph (249.3 ft/s) in a hunting slingshot. The contract with the sling is $1/15$ th second. What is the average force on the marble during contact?
- A. 12.54 lbf
 - B. 14.56 lbf
 - C. 11.75 lbf**
 - D. 10.67 lbf
116. A man weighs 128 lb on the surface of the earth (radius = 3960 miles). At what distance above the surface of the earth would he weight 80 lb?
- A. 3000 miles
 - B. 2345 miles
 - C. 7546 miles
 - D. 1049 miles**
117. A steel wheel 800 mm in diameter rolls on a horizontal steel rail. It carries a load of 700 N. The coefficient of rolling resistance is 0.250 mm. What is the force P necessary to roll the wheel along the rail?
- A. 0.34 N
 - B. 0.54 N
 - C. 0.44 N**
 - D. 0.14 N

118. An electron strikes the screen of the cathode ray tube with a velocity of 10 to the 9^{th} power cm/s. Compute its kinetic energy in erg. The mass of an electron is 9×10^{-31} kg?

A. 4.5×10^{-10} erg

B. 3.0×10^{-10} erg

C. 2.5×10^{-10} erg

D. 1.5×10^{-10} erg

MULTIPLE CHOICES
QUESTION in
STRENGTH OF MATERIALS

Encoded by:

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1. What is the ratio of the transverse strain to the corresponding axial strain in a body subjected to uniaxial stress?

A. Poisson's ratio

B. Euler's ratio

C. Refractive index

D. Dielectric index

2. What are the four basic forms of deformation of solid bodies?

A. Tension, compression, bending and twisting

B. Tension, compression, elongation and bending

C. Tension, compression, plastic and elastic

D. Tension, compression, elongation and torsion

3. What is a structural member supported horizontally and carries transverse loading?

A. Beam

B. Column

C. Arch

D. Shaft

4. What refers to a slender member which prevents parts of a structure moving towards each other under compressive force?

A. Tie

B. Column

C. Panel

D. Strut

5. What refers to a slender member which prevents parts of a structure moving towards each other under compressive force?

A. Tie

B. Column

C. Strut

D. Arch

6. What refers to the point in which the bending moment changes sign through a zero value?

A. Critical point

B. Point of inflection

C. Point of contraflexure

D. Point of zero stress

7. What is the unit of strain?

- A. Pascal
- B. Unitless**
- C. N-m
- D. N-m/s

8. Volumetric strain is the:

- A. change in volume per unit time
- B. square root of difference of original volume and change in volume
- C. original volume minus change in volume
- D. ratio of change in volume to original volume**

9. What refers to the stress in the material at the elastic limit?

- A. Working stress
- B. Yield stress**
- C. Ultimate stress
- D. Maximum stress

10. Which of the following materials has the least modulus of elasticity?

- A. Steel
- B. Glass**
- C. Copper
- D. Aluminum

11. Within elastic limit, the shear stress is proportional to shear strain. What is the constant of proportionality of this statement called?

- A. Modulus of rigidity**
- B. Modulus of elasticity
- C. Young's modulus
- D. Bulk modulus

12. What is the unit of the modulus of elasticity?

- A. N-m
- B. Unitless
- C. Pa**
- D. N-m/s

13. Within elastic limit, the volumetric strain is proportional to the hydrostatic stress. What is the constant that relates these two quantities called?
- A. Modulus of rigidity
 - B. Modulus of elasticity
 - C. Young's modulus
 - D. Bulk modulus**
14. What is another term for modulus of rigidity?
- A. Shear modulus**
 - B. Young's modulus
 - C. Bulk modulus
 - D. Modulus of elasticity
15. How many times greater is the plastic range of strain as compared to the elastic range of strain?
- A. 100
 - B. 200
 - C. 300**
 - D. 400
16. What does it mean when the material is said to be "yielding"?
- A. The material has passed through plastic range and entered the elastic range
 - B. The material has passed through elastic range and entered the plastic range**
 - C. The material is in the elastic range only
 - D. The material is in the plastic range only
17. What refers to the parallel axis theorem for second moment of area?
- A. Mohr's theorem
 - B. Steiner's theorem**
 - C. Maxwell's theorem
 - D. Young's theorem
18. The elastic deformation of a material is:
- A. directly proportional to cross-sectional area of the material
 - B. inversely proportional to the modulus of elasticity of material**
 - C. inversely proportional to the force acting on the material
 - D. inversely proportional to the initial length of the material

19. The strain energy of a member is:
- A. inversely proportional to the square of the force acting on the member
 - B. directly proportional to the modulus of elasticity
 - C. inversely proportional to the cross-sectional area of the member**
 - D. inversely proportional to the initial length of the member
20. Stiffness is:
- A. ratio of force to deformation**
 - B. ratio of force to modulus of elasticity
 - C. ratio of product of cross-sectional area and initial length to deformation
 - D. ratio of initial length to cross-sectional area
21. Which of the following substances has the least average coefficient of linear thermal expansion?
- A. Copper
 - B. Concrete
 - C. Steel**
 - D. Tin
22. Steel has a modulus of elasticity of _____ MPa.
- A. 200
 - B. 2,000
 - C. 20,000
 - D. 200,000**
23. What is the maximum moment of a beam supported at both ends and carries a uniform load of w throughout its entire length?
- A. $wL / 2$
 - B. $wL / 8$
 - C. $wL^2 / 8$**
 - D. $wL^2 / 4$
24. _____ is the stress beyond which the material will not return to its original shape when unloaded but will retain a permanent deformation.
- A. Elastic limit**
 - B. Proportional limit
 - C. Yield limit
 - D. Yield strength

25. All are methods of determining the bar force of a truss member except one. Which one?
- A. Method of joints
 - B. Method of section
 - C. Method of virtual work
 - D. Maxwell diagram**
26. Determine the force required to punch a $\frac{1}{2}$ inch hole on a $\frac{3}{8}$ thick plate if the ultimate shearing strength of the plate is 50,000 psi.
- A. 23,562 lbs**
 - B. 19,450 lbs
 - C. 20,550 lbs
 - D. 15,422 lbs
27. A simply supported beam, 10 m long carries a uniform distributed load of 20 kN/m. What is the value of the maximum moment of the beam due to the load?
- A. 10,000 kN-m
 - B. 5,000 kN-m
 - C. 2,000 kN-m
 - D. 250 kN-m**
28. A cylindrical water tank is 8 m in diameter and 12 m high. If the tank is to be completely filled, determine the minimum thickness of the tank plating if the stress is limited to 40 MPa.
- A. 11.77 mm**
 - B. 13.18 mm
 - C. 10.25 mm
 - D. 12.60 mm
29. The stress in a 90-cm diameter pipe having a wall thickness of 9.5 cm and under a static head of 70 m of water is
- A. 325 kPa
 - B. 32.5 kPa
 - C. 32.5 MPa
 - D. 3.25 MPa**
30. A 30-m long aluminum bar is subjected to a tensile stress of 175 MPa. Determine the elongation if $E = 69116$ MPa.
- A. 78 mm
 - B. 76 mm**
 - C. 74 mm
 - D. 72 mm

31. Determine the load capacity in kN on a 25 mm diameter x 1200 mm long steel shaft if its maximum elongation shall not exceed 1 mm. Assume $E = 200,000$ MPa.
- A. 88.2 kN
 - B. 78.3 kN
 - C. 83.2 kN
 - D. 81.8 kN**
32. An iron steam pipe is 200 ft long at 0°C . What will be its increase in length when heated to 100°C ? Coefficient of linear expansion is 30×10^{-6} per $^{\circ}\text{C}$.
- A. 0.18 ft
 - B. 0.12 ft
 - C. 0.20 ft**
 - D. 0.28 ft
33. A steel railroad rails 10 m long are laid with clearance of 3 mm at a temperature of 15°C . At what temperature will the rails just touch? If there were no initial clearance Assume: $\alpha = 11.7$ micro m/m deg.C and $E = 200$ GPa.
- A. 46.90 deg
 - B. 56.06 deg
 - C. 50.36 deg
 - D. 40.64 deg**
34. A cylinder of diameter 1.0 cm at 30°C is to be slide into a hole on a steel plate. The hole has a diameter of 0.99970 cm at 30°C . To what temperature the plate must be heated? Coefficient of linear expansion for steel is 1.2×10^{-5} per $^{\circ}\text{C}$.
- A. 62°C
 - B. 55°C**
 - C. 48°C
 - D. 65°C
35. A certain steel tape is known to be 100,000 ft long at a temperature of 70°F . When the tape is at a temperature of 10°F , what tape reading corresponds to a distance of 90,000 ft? Assume a coefficient of thermal expansion equal 65×10^{-7} per $^{\circ}\text{F}$.
- A. 90,035 ft**
 - B. 89,965 ft
 - C. 90,225 ft
 - D. 89,775 ft

36. A solid shaft 2.0 m long is transmitting 27 kN-m torque. If the shear modulus of the shaft material is 85 GPa and the allowable shearing stress is 70 MPa, determine the angle of twist between the two ends of the shaft.

A. 1.52°

B. 1.02°

C. 1.44°

D. 1.32°

37. Determine the maximum shearing stress in a helical steel spring composed of 20 turns of 20 mm diameter wire on mean radius of 80 mm when the spring is supporting a load of 20 kN?

A. 529 Gpa

B. 370 Pa

C. 25 kPa

D. 121 MPa

38. A 14-ft simple beam uniformly loaded with 200 pounds per foot over its entire length. If the beam is 3.625 in wide and 7.625 in deep, what is the maximum bending stress/

A. 7974 lbf/in²

B. 8205 lbf/in²

C. 6332 lbf/in²

D. 1674 lbf/in²

39. A 19-foot beam 10 inches wide and 20 inches high supports 1500 lb/ft on two supports 14 feet apart. The right end of the beam extends 2 feet past the support. What is the shearing stress midway between supports?

A. 1.0 psi

B. 10 psi

C. 67 psi

D. 2.0 psi

40. A long beam of length L has a formula which is $48Ely = w(2x^4 - 5Lx^3 + 3(L^2)(x^2))$; where does the maximum deflection occur?

A. 0.675L

B. 0.578L

C. 0.987L

D. 0.876L

41. A steel support must connect to 30,000 pound tensile loads separated by 200 inches. The maximum allowable stress is 10,000 psi and the maximum elongation is 0.020 inch. What is the required area? $E(\text{steel}) = 3 \times 10^7$ psi
- A. 30.5 mm²
 - B. 47.1 in²
 - C. 55 mm²
 - D. 10 in²**
42. High strength steel band saw, 20 mm wide and 0.8 mm thick runs over the pulley 600 mm in diameter of pulleys can be used without exceeding the flexural stress of 400 MPa? Note: $E = 200$ GPa.
- A. 250 cm
 - B. 325 mm
 - C. 400 mm**
 - D. 150 in.
43. What weight in pounds can be lifted by a screw that has an efficiency of 80% if it is operated by a 50 lb force at the end of a 30 inched lever and the pitch of the screw is $\frac{1}{2}$ inch?
- A. 15,080**
 - B. 15,500
 - C. 10,000
 - D. 12,000
44. What is the stress in an 8-inch round x 16-inch high concrete cylinder ($E = 2.5 \times 10^6$ psi) when the unit deformation is 0.0012 inch/inch?
- A. 500 psi
 - B. 8100 psi
 - C. 210 psi
 - D. 3000 psi**
45. What uniform load will cause simple beam which is 10 ft long to deflect 0.3 in. ft it supported (in addition to the supports) by a spring at the beam mid-point. The spring constant of 30,000 lbf/in. Assume the beam is steel, 10 in. deep, rectangular, and with a centroidal moment of inertia of 100 in⁴.
- A. 3550 lbf/ft
 - B. 6445 lbf/ft
 - C. 2250 lbf/ft
 - D. 5440 lbf/ft**

46. During the stress strain test, the unit deformation at a stress of 35 MN/m^2 it was 667×10^{-6} mm. If the proportional limit was MN/m^2 , what is the modulus of elasticity?
- A. $10 \times 10^8 \text{ N/cm}^2$
 - B. $5.8 \times 10^6 \text{ N/in}^2$
 - C. $2.1 \times 10^5 \text{ N/mm}^2$**
 - D. $35 \times 10^6 \text{ N/mm}^2$
47. A 2.5 in. diameter shaft is 2 ft. long. Its maximum shear stress is 10,000 psi. What is the angular deflection in degrees?
- A. 0.96°**
 - B. 0.45°
 - C. 0.78°
 - D. 0.56°
48. An elevator weighs 1000 pounds and is supported by a $5/16$ inch diameter cable, 1500 feet long. When the elevator carries a 1500 lb, the cable elongates 6 inches more. What is the modulus of elasticity of the cable?
- A. $4.35 \times 10^7 \text{ psi}$
 - B. $5.87 \times 10^7 \text{ psi}$**
 - C. $3.42 \times 10^7 \text{ psi}$
 - D. $2.34 \times 10^7 \text{ psi}$
49. A hollow shaft has an inner diameter of 0.035 m and an outer diameter of 0.06 m. Compute the torque if the shear stress is not exceed 120 MPa.
- A. 4,500 N-m**
 - B. 4,300 N-m
 - C. 5,500 N-m
 - D. 3,450 N-m
50. A spherical tank with 10 inches inside diameter contains oxygen gas at 2,500 psi. Calculate the required wall thickness in (mm) under stress of 28,000 psi.
- A. 6.12 mm
 - B. 5.66 mm**
 - C. 4.88 mm
 - D. 7.21 mm

51. Determine the maximum shearing stress in a helical steel spring composed of 20 turns of 20 mm diameter wire on mean radius of 80 mm when the spring is supporting a load of 2 kN?

A. 121 MPa

B. 130 MPa

C. 150 MPa

D. 120 MPa

52. A single bolt is used to lap joint two steel bars together. Tensile force on the bar is 20,000 N. Determine the diameter of the bolt required if the allowable shearing stress on it is 70 MPa.

A. 25 mm

B. 19 mm

C. 15 mm

D. 12 mm

MULTIPLE CHOICE
QUESTIONS in
LAW AND ETHICS

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1. What telecommunications law deregulates the paging services in the country?
 - A. E. O. 125
 - B. R. A. 3846
 - C. R. A. 3396
 - D. R. A. 7925**

2. Republic Act No. 6849 is otherwise known as _____
 - A. "Electronics Engineering Law of 2004"
 - B. "Telecommunications Law of the Philippines"
 - C. "PRC Modernization Law"
 - D. "Municipal Telephone Act of 2000"**

3. What is otherwise known as "The Maritime Communications Law" ?
 - A. R. A. 109
 - B. R. A. 3396**
 - C. R. A. 3846
 - D. R. A. 7925

4. What government regulation in telecommunication provides the policy to improve the provision of local exchange carrier service?
 - A. O. 109**
 - B. R. A. 3846
 - C. O. 59
 - D. O. 546

5. What is the basic law that provides for the regulation of radio station, communications in the Philippines and other purposes?
 - A. R. A. 3846**
 - B. D. O. 11
 - C. D. O. 88
 - D. D. O. 5

6. What law specifically requires the service of a duly registered Electronics and Communications Engineer in the designing, installation and construction, operation and maintenance of radio stations?
 - A. R. A. 3846
 - B. R. A. 9292
 - C. R. A. 5734
 - D. D. O. 88**

7. Which law vested the jurisdiction, control and regulation over the Philippine communications satellite corporation with the National Telecommunications Commission?
- A. E. O. 109
 - B. E. O. 196**
 - C. E. O. 59
 - D. E. O. 205
8. What law provides regulation of the ownership and operation of radio and television stations and for other purposes?
- A. P. D. No. 223
 - B. P. D. No. 576-A**
 - C. P. D. No. 567-A
 - D. P. D. No. 657-A
9. What NTC memorandum circular sets the rules and regulations governing the manufacture, acquisition, sale and service of radio communication equipment?
- A. MC No. 9-13-98
 - B. MC No. 8-06-88
 - C. MC No. 4-22-99
 - D. MC No. 2-05-88**
10. What law governs the operations of cable television in the Philippines?
- A. E. O. 196
 - B. E. O. 463
 - C. E. O. 436**
 - D. E. O. 205
11. What law created the national council for the promotion of E-Commerce in the country?
- A. E. O. 467
 - B. E. O. 468**
 - C. E. O. 109
 - D. E. O. 59
12. Which law provides for a national policy on the operation and use of international satellite communications in the country?
- A. E. O. 468
 - B. E. O. 109
 - C. E. O. 205
 - D. E. O. 467**

13. What law regulates the operation of CATV systems in the country?
- A. E. O. 436
 - B. E. O. 205**
 - C. E. O. 250
 - D. E. O. 346
14. What is an executive order signed by former President Fidel Ramos in March 1998 providing the national policy in the operation and use of international satellite communications in the Philippines?
- A. E. O. 3846
 - B. E. O. 59
 - C. E. O. 456
 - D. E. O. 467**
15. When was the effectivity of Executive Order No. 59?
- A. December 21, 1993
 - B. February 24, 1993**
 - C. June 21, 1993
 - D. December 12, 1993
16. When was the effectivity of Executive Order No. 436?
- A. September 11, 1997
 - B. September 6, 1997
 - C. September 9, 1997**
 - D. September 18, 1997
17. When was the effectivity of Executive Order No. 109?
- A. July 12, 1993**
 - B. July 15, 1993
 - C. October 10, 1993
 - D. December 12, 1993
18. When was the affectivity of Executive Order No. 205?
- A. June 30, 1987**
 - B. June 21, 1987
 - C. June 12, 1987
 - D. June 1, 1987

19. When is the effectivity of Republic Act No. 7925?
- A. March 1, 1995
 - B. March 21, 1995**
 - C. February 20, 1995
 - D. March 7, 1995
20. When was Republic Act No. 7925 approved?
- A. March 1, 1995**
 - B. March 15, 1995
 - C. March 17, 1995
 - D. March 21, 1995
21. What law created the Movie and Television Review and Classification Board (MTRCB)?
- A. P. D. 223
 - B. P. D. 1986**
 - C. P. D. 1987
 - D. P. D. 1988
22. What law created the Videogram Regulatory Board (VRB)?
- A. P. D. 223
 - B. P. D. 1986
 - C. P. D. 1987**
 - D. P. D. 1988
23. What is the new regulation issued by NTC providing the guideline for mobile personal communication having a global coverage using satellite?
- A. NMT
 - B. GMPCS**
 - C. GSM
 - D. TACS
24. What government agency is the principal administrator of Republic Act No. 7925?
- A. Bureau of Communications
 - B. Department of Transportation and Communications
 - C. House of Representatives
 - D. National Telecommunications Commission**

25. What government agency was designated as the Chairman of the Electronic Commerce Promotion Council?

- A. NTC
- B. DOTC
- C. NEDA
- D. DTI**

26. The VRB Board is composed of a chairman, a vice chairman and _____ members.

- A. 10
- B. 18**
- C. 22
- D. 25

27. MTRCB Board is composed of a chairman, a vice chairman & _____ members.

- A. 5
- B. 10
- C. 20
- D. 30**

28. MTRCB law defines an “Adult” as a person ____ years of age and above.

- A. 18**
- B. 19
- C. 20
- D. 21

29. Radio programs not suitable for children must be aired after what time?

- A. 7 PM
- B. 8 PM
- C. 9 PM**
- D. 10 PM

30. All are AM radio prime time block for provincial stations except one. Which one?

- A. 5 AM to 9 AM
- B. 12 NN to 2 PM
- C. 11 AM to 3 PM**
- D. 4 PM to 7 PM

31. For CATV system, prime time refers to the five-hour period from _____ local time.

- A. 6:00 to 11:00 PM**
- B. 5:00 to 10:00 PM
- C. 4:00 to 9:00 PM
- D. 3:00 to 8:00 PM

32. What is the prime time block for FM radio for provincial stations?

- A. 5 AM to 7 PM
- B. 6 AM to 8 PM**
- C. 7 AM to 7 PM
- D. 6 PM to 7 PM

33. What is the prime time block for AM radio in Metro Manila?

- A. 5 AM to 9 AM and 4 PM to 8 PM**
- B. 4 AM to 8 AM and 4 PM to 8 PM
- C. 5 AM to 9 AM and 5 PM to 9 PM
- D. 6 AM to 10 AM and 5 PM to 9 PM

34. What is the prime time block for FM radio in Metro Manila?

- A. 7:00 AM to 7 PM
- B. 6:00 AM to 6 PM
- C. 6:00 AM to 8 PM**
- D. 7:00 AM to 8 PM

35. In Metro Manila, Class D airtime classification for FM radio is from _____.

- A. 6 AM to 8 PM
- B. 9 PM to 12 MN
- C. 5 AM to 6 AM and 8 PM to 9 PM
- D. 12 MN to 5 AM**

36. According to the medium frequency broadcast standards, the term “nighttime” refers to the period of time between _____ UTC.

- A. 1000 to 2200**
- B. 1000 to 1600
- C. 1000 to 1500
- D. 1000 to 1800

37. What is the maximum power suggested by KBP on 919 – 1312 AM broadcast station in Metro Manila?
- A. 10 kW
 - B. 20 kW**
 - C. 15 kW
 - D. 5 kW
38. What is the minimum carrier power output of a standard AM broadcast where effective and direct supervision of an Electronics and Communications Engineer is required?
- A. 5 kW
 - B. 4 kW
 - C. 1kW**
 - D. 3kW
39. What is the maximum power allocation for AM broadcast in Metro Manila?
- A. 10 kW
 - B. 25 kW
 - C. 50 kW**
 - D. 100 kW
40. According to the TV broadcast standards, what is the maximum effective radiated power in Metro Manila and Metro Cebu for channels 7 – 13?
- A. 300 kW
 - B. 500 kW
 - C. 1000 kW**
 - D. 1500 kW
41. In Metro Manila, commercial load shall not exceed _____ minutes for one hour program.
- A. 10
 - B. 15**
 - C. 20
 - D. 25
42. KBP Radio Code requires each radio station a minimum of ____ of news per day.
- A. 1 hour
 - B. 45 minutes**
 - C. 2 hours
 - D. 1 hour and 30 minutes

43. Program interruption for the airing of commercial in Metro Manila shall not exceed _ breaks in every program hour.
- A. 8
 - B. 5
 - C. 6**
 - D. 7
44. Program interruption for the airing of commercial outside Metro Manila shall not exceed ____ breaks per program hour.
- A. 5
 - B. 6
 - C. 7**
 - D. 8
45. Outside Metro Manila, commercial load shall not exceed _____ minutes in one hour program.
- A. 12
 - B. 15
 - C. 17**
 - D. 20
46. All stations must promote the Filipino music by playing _____ OPM every hour.
- A. 2
 - B. 4**
 - C. 1
 - D. 3
47. All station must have a minimum of _____ news/day form 5:00 AM to 10:00 PM.
- A. 50 minutes
 - B. 60 minutes
 - C. 30 minutes
 - D. 45 minutes**
48. Newscast is a distinct unit of a program with minimum news content of _____ excluding intro, extro, headline and commercial load.
- A. 1 minute**
 - B. 2 minutes
 - C. 30 seconds
 - D. 1 minute and 30 seconds

49. In Metro Manila, program interruption for the airing of commercial shall not exceed how many breaks in 1 hour?
- A. 5
 - B. 3
 - C. 7
 - D. 6**
50. TV station is required at least ___ newscast (aggregate total including advisories) per day during weekdays.
- A. 20 minutes
 - B. 40 minutes
 - C. 60 minutes
 - D. 30 minutes**
51. Radio station shall allocate at least _____ as a program or programs rendering public service.
- A. 2 hours per day**
 - B. 3 hours per day
 - C. 1 hour per day
 - D. 1.5 hours per day
52. What is the standard IF Sound Carrier for a cable TV system?
- A. 40.25 MHz
 - B. 45.75 MHz
 - C. 43.75MHz
 - D. 41.25 MHz**
53. What is the standard IF Video Carrier for a cable TV system?
- A. 40.25 MHz
 - B. 45.75 MHz**
 - C. 43.75MHz
 - D. 41.25 MHz
54. Which band is allocated to Short Range Radio Service in the country?
- A. ELF
 - B. UHF**
 - C. VHF
 - D. HF

55. The certificate of Authority issued by National Telecommunications Commission to a CATV operator shall have a maximum term of how many years?
- A. 5 years
 - B. 10 years
 - C. 15 years**
 - D. 20 years
56. High speed networks are ICT networks that have a capacity of at least _ Mbps.
- A. 2.048**
 - B. 32
 - C. 64
 - D. 256
57. The authorized transmit frequency range for cordless telephone sets operating in the UHF band is ___ MHz
- A. 1.725 to 1.79**
 - B. 1.275 to 1.975
 - C. 1.925 to 1.975
 - D. 1.575 to 1.975
58. In CATV system, video signal to noise ratio of modulator must be better than ___ dB.
- A. 30
 - B. 34
 - C. 36**
 - D. 38
59. In a CATV system, head end processor as RF input/output terminal match should a minimum loss of _ dB.
- A. 16**
 - B. 18
 - C. 20
 - D. 22

73. What refers to a remuneration paid to a carrier by the interconnecting carriers for accessing the facilities of such carrier which is needed by the interconnecting carriers for the origination and/or termination of all types of traffic derived from the interconnector?
- A. Interconnection charge
 - B. Approach charge
 - C. Access charge**
 - D. Network charge
74. What refers to a permit issued by the NTC authorizing the holder thereof to engage to the acquisition, servicing, maintenance, purchase or sale of transmitters and/or transceivers, parts and accessories thereof?
- A. Radio Communication Equipment Dealer Permit**
 - B. Radio Communication Equipment Manufacture Permit
 - C. Service Center Operation Permit
 - D. Radio Communication Equipment Service Center Point
75. A series whose episodes have had no national network television exhibitions in the Philippines and no regional network exhibition in the relevant market is known in CATV system as _____ .
- A. Off-network
 - B. Cablecasting
 - C. First-Run series**
 - D. First-Run No-series programs
76. The installation or construction of a cable TV head-end station shall be directly supervised by a registered ECE. The statement above is:
- A. True**
 - B. False
 - C. It depends upon the area of coverage
 - D. It depends upon the number of households using the CATV system
77. Which of the following shall be complied by an international ship pursuant to the global maritime distress and safety system implemented last 1999?
- A. A facsimile
 - B. A radio personnel
 - C. A Morse code
 - D. A radio-telegraph operator**

78. Authorized gateway operators shall provide at least one rural exchange line for every _____ urban local exchange lines.
- A. 5
 - B. 10**
 - C. 15
 - D. 20
79. Authorized gateway operators shall provide a minimum of _____ switch termination.
- A. 100 local exchange lines per international
 - B. 200 local exchange lines per international
 - C. 300 local exchange lines per international**
 - D. 500 local exchange lines per international
80. What is the basic qualification of an applicant for public carrier network before a Certificate of Public Convenience or a Provisional Authority is issued?
- A. Franchise**
 - B. B SEC document
 - C. Business Permit
 - D. Radio station license
81. When is Electronics and Communications Engineer supervision required under Department Order No. 88?
- A. FM broadcast station with a carrier power of 1000 watts
 - B. TV translator with an RF carrier power of 0.5 watts
 - C. TV RF power booster with effective radiated power of 2kW
 - D. Standard AM broadcast with a carrier power of 5kW**
82. An entity, sometimes referred to as carriers or national backbone network operator, authorized to install, own and operate facilities which connect local exchanges within the Philippines and to engage in the business of inter-exchange national long distance services is known as _____ .
- A. Local exchange carrier
 - B. International carrier
 - C. Inter-exchange carrier**
 - D. National carrier

83. An entity, relying on the transmission, switching and local distribution facilities of local exchange and inter-exchange operators, and overseas carriers, offers enhanced services beyond those ordinarily provided by such carriers is known as _____ .
- A. International carrier
 - B. Value-added service provider**
 - C. Inter-exchange carrier
 - D. Local exchange carrier
84. What refers to a privilege conferred upon a telecommunications entity by Congress, authorizing an entity to engage in a certain type of telecommunications service?
- A. Authority to Operate
 - B. Certificate of Public Convenience and Necessity
 - C. Franchise**
 - D. Provisional Authority
85. NTC cannot grant one of the following, an authority to operate a cable television system within the same franchise area covered by any provisional Authority or Certificate of Authority previously granted by the Commission.
- A. Prior operator has not complied sufficiently with terms and condition of the authorization.
 - B. New entrant has more financial support**
 - C. Current service is grossly inadequate
 - D. Issuance to new entrant will not cause ruinous competition
86. Which of the following penalties is provided under the existing telecommunication law, should an international carrier unable to comply with its obligation to provide local exchange service in un-served and under-served areas within three years from grant of authority?
- A. Financial penalty in accordance with existing schedule
 - B. Cancellation of its authority**
 - C. Given one year to comply
 - D. Given two years to comply
87. When can telecommunications entity provide value added service in its area?
- A. When it has separated book of account, has technical capability and must be within the franchise area.
 - B. When it is within franchise area, upon submission of required capitalization and upon approval of NTC.
 - C. Upon approval of NTC, with financial capability and technical capability.
 - D. Upon approval of NTC, when other VAS operators are not discriminated in rate and access, and has separated books of account.**

88. What refers to an undertaking the object of which is to transmit audio, video, text, images or other signals or messages for reception of a broad audience in a geographical area via wired or wireless means?

A. Telecommunications

B. Broadcasting

C. Mass media

D. Multi media

89. What refers to a non-exclusive facility which the public may, by the payment of appropriate fees, place as well as receive telephone calls and/or telegrams or other messages?

A Telephone-telegraph calling center

B Telecommunications calling station

C Public toll calling station

D Call center

90. The international carrier shall also comply with its obligation to provide the local exchange service in unserved or underserved areas within _____ years from the grant of the authority as required by existing regulation.

A. 3 years

B. 4 years

C. 2 years

D. 5 years

91. International switch termination refers to a port in the switching international gateway system equivalent to ____ kbps (digital) where international circuit terminates.

A. 56.6

B. 64

C. 128

D. 256

92. Which of the following is designated as the international distress, safety and calling frequency for radio telephony for stations of the maritime mobile service when using frequencies in the authorized bands between 156 MHz and 174 MHz?

A. 165.8 MHz

B. 156.8 MHz

C. 158.6 MHz

D. 168.5 MHz

93. Which conference in the ITU structure does the Telecommunications Development Bureau report?
- A. RRB
 - B. WTDC**
 - C. WRC
 - D. WTSC
94. What is the main principle used by ITU in determining the distribution of the orbit/spectrum resources?
- A. Depending on geographical boundary of a nation
 - B. Efficient use and equitable access**
 - C. Depending on national sovereignty
 - D. Equal distribution
95. Which body in the present ITU structure took the place of CCITT?
- A. ITU-R
 - B. ITU-D
 - C. ITU-T**
 - D. RAG
96. Where does the secretary general in the organizational structure of present ITU report?
- A. WTSC
 - B. TDAB
 - C. WRC
 - D. Council**
97. The International Radio Consultative Committee is referred to in international radio communications as _____.
- A. IRCC
 - B. ITU
 - C. IRR
 - D. CCIR**
98. What agency of the United Nations formulates standards and recommended practices for all civil aviation?
- A. ICAO**
 - B. CAA
 - C. IATA
 - D. ATO

99. What is the executive branch of government –in-charge of policy making in the telecommunication?
- A. National Telecommunications Commission
 - B. Telecommunications Control Bureau
 - C. Department of Transportation and Communications**
 - D. Bureau of Telecommunications
100. What refers to the listing of the date and time events, programs, equipment, test, malfunctions and corrections in communication system?
- A. File
 - B. Documentation
 - C. Reporting
 - D. Log**
101. Which position does a maritime ship main antenna have, when it is connected to the reserve transmitter and receiver?
- A. AA
 - B. Direction finder
 - C. Main transmitter
 - D. Emergency transmitter**
102. One of the major components required under the global maritime distress and safety system is the:
- A. provision of Morse code.
 - B. provision of radiotelegraph operator.**
 - C. provision of facsimile.
 - D. provision of radio personnel.
103. One of the following is NOT the major components required on board ship under the global maritime distress and safety system. Which one?
- A. On board radio facilities
 - B. Radio operator telegraphy onboard**
 - C. Shore base facilities
 - D. Radio personnel onboard

104. At what position does a maritime ship main antenna have, when it is open circuited and that any auxiliary antenna is/are connected to the main receiver?
- A. AA
 - B. Emergency transmitter
 - C. Direction finder**
 - D. Ground
105. What position of maritime ship main antenna, when the radio watch is secured or when the ship is in electrical storm?
- A. AA
 - B. Main transmitter
 - C. Grounded**
 - D. HF
106. What are the two legislative functions of the International Telecommunications Union in its international conference issues on orbital resources?
- A. Assign frequencies and organized conferences.
 - B. Allocates frequency bands for the services and determine the principle of distribution of the orbit/spectrum resources.**
 - C. Determine principles of a spectrum distribution and assignment of frequencies.
 - D. Conduct conferences and allocation of orbital slots.
107. A person or entity intending to register as VoIP service provider is required to post a performance bond of _____ .
- A. P 1 million
 - B. P 3 million
 - C. P 5 million**
 - D. P 10 million
108. What refers to as linkage by wire, radio, satellite or other means, of two or more telecommunications carrier or operators with one another for the purpose of allowing or enabling the subscriber of one carrier or operator to access or reach the subscribers of the other carrier or operator?
- A. Interconnection**
 - B. Toll patching
 - C. Gateway
 - D. Outside plant sharing

109. Which law refers to the “Electronic Commerce Act of 2000”?

- A. R. A. 8927
- B. R. A. 9287
- C. R. A. 8792**
- D. R. A. 8729

110. What is otherwise known as “Electronics Engineering Law of 2004”?

- A. P. D. 223
- B. R. A. 5734
- C. R. A. 9292**
- D. R. A. 7925

111. What is otherwise known as “PRC modernization law”?

- A. R. A. 8891
- B. R. A. 8981**
- C. R. A. 8918
- D. R. A. 8198

112. Professional Regulations Commission was created under _____ .

- A. P. D. 323
- B. P. D. 223**
- C. P. D. 232
- D. P. D. 223

113. When was the effectivity of Presidential Degree No. 223?

- A. June 21, 1973
- B. June 22, 1973**
- C. June 23, 1973
- D. June 24, 1974

114. When was the Electronic Commerce Act of the Philippines approved?

- A. June 21, 2000
- B. October 10, 2000
- C. April 22, 2000
- D. June 14, 2000**

115. When was Republic Act No. 9292 approved by President Gloria Macapagal Arroyo?

- A. April 12, 2004
- B. April 17, 2004**
- C. April 19, 2004
- D. April 27, 2004

116. When was the implementing rules and regulations (IRR) of the R. A. 9292 approved?

- A. August 27, 2007
- B. August 28, 2007
- C. August 29, 2007
- D. August 31, 2007**

117. Under R. A. 9292, who are authorized to render engineering consultation services?

- A. Registered Electronic Technicians
- B. Registered Electronic Engineers
- C. Professional Electronic Engineers**
- D. Choices B and C above

118. Under R. A. 9292, can a Register Electronic Engineer render design services?

- A. Yes**
- B. No
- C. Yes if he has more than 5 years experience
- D. Yes if he has more than 10 years experience

119. Under R. A. 9292, the Professional Electronic Engineer shall _____ the electronics plan designed by a Registered Electronic Engineer?

- A. review
- B. sign
- C. seal
- D. all of the choices**

120. Under R. A. 9292, who are authorized to take charge of or supervise electronics construction and installation?

- A. Professional Electronic Engineers
- B. Registered Electronic Engineers
- C. Professional Electronic Engineers and Registered Electronic Engineers**
- D. Only those engineers who have more than 5 years professional practice experience

121. Under R. A. 9292, the standards on minimum compensation are based on _____ .

- A. current practice
- B. current costumer price index
- C. minimum basic daily wage
- D. all of the above**

122. Under R. A. 9292, the rate of retainers' fee to be charged by the consulting electronics engineer for routine or ordinary consultation will not be less than _____ per month.

A. P 1,500

B. P 2,000

C. P 2,500

D. P3,000

123. The powers and functions of the Board is provided in _____ of the R. A. No. 9292.

A. Section 5

B. Section 6

C. Section 7

D. Section 8

124. R. A. 9292, Section 17 states that the result of the board examination shall be released within _____ days after the examination.

A. 5

B. 10

C. 15

D. 3

125. What is the minimum punishment imposed to any person who shall give any false or fraudulent statement to the Board to obtain a Certificate of registration and/or Professional ID Card as Electronics Engineer?

A. P 100,000 or imprisonment of 6 months

B. P 10,000 or imprisonment of 3 months

C. P 50,000 or imprisonment of 6 months

D. P 100,000 or imprisonment of 1 year

126. The electronic designer will furnish _____ sets of drawing specifications and other contract documents to the client.

A. 5

B. 3

C. 7

D. 2

127. What is the basic monthly salary scale for salaried ECE practitioners with less than 5 years of active service?

A. P 4,000 to P 8,000

B. P 2,000 to P 5,000

C. P 5,000 to P 9,000

D. P 6,000 to P 10,000

128. "To provide technical specifications for electronics equipment and systems" is under what field of ECE practice?

- A. Engineering consultation**
- B. Design Services
- C. Construction and Installation
- D. Inspection and Appraisal

129. "Testing and quality control of electronic products" is under what field of ECE practice?

- A. Education Service
- B. Research and Development
- C. Manufacturing**
- D. Maintenance

130. If the ECE consultant's present is required in another place away from his office, additional compensation of _____ for every hour he is away from his office or if the place more than 50 km away from his office.

- A. P 1,000.00
- B. P 500.00
- C. P 250.00
- D. P 100.00**

131. For professional services rendered by the electronics engineer as consultant for project with definite duration, the minimum recommended hourly rate is _____ for salaried ECEs.

- A. 0.01 of basic monthly salary scale**
- B. 0.02 of basic monthly salary scale
- C. 0.03 of basic monthly salary scale
- D. 0.04 of basic monthly salary scale

132. Aside from compensation, the client will pay for the cost of at least "business class" transportation and accommodation if the meetings are conducted in a place more than _____ km away from the established office of electronic engineer consultant.

- A. 30
- B. 40
- C. 50**
- D. 100

133. For court appearance electronics engineer must charge a minimum fee to the client of not less than _ per hour per appearance regardless whether the hearing is postponed or not.

- A. P 500.00**
- B. P 250.00
- C. P 1,000.00
- D. P 100.00

134. For conference, electronics engineer must not charge fee to the client more than _____ per hour per attendance regardless whether the meeting is postponed or not.

- A. P 500.00**
- B. P 250.00
- C. P 1,000.00
- D. P 750.00

135. All are methods of determining the fees to electronics engineers except:

- A. Constant Percentage Method**
- B. Percent of Cost Method
- C. Cost Plus Reasonable Profit
- D. Percent of Total Project Cost

136. When a project involves alterations, repairs, additions, modifications, etc, which does not involve a whole project, what method is used for computing the professional fee?

- A. Unit Cost Method**
- B. Constant Percentage Method
- C. Per Lot Method
- D. Per Project Method

137. What method of computing fees is where the electronic facilities are divided into classifications which have corresponding unit design rate?

- A. Percent of Cost Method
- B. Unit Cost Method**
- C. Per Lot Method
- D. Per Project Method

138. What is the basic monthly salary scale for salaried ECE practitioner with 5 to 10 years of active service?

- A. P 6,000 to P 20,000
- B. P 5,000 to P 8,000**
- C. P 8,000 to P 12,000
- D. P 10,000 to P 15,000

139. What is the basic monthly salary scale for salaried ECE practitioner with more than 10 years of active service?

- A. P 15,000 – up
- B. P 12,000 – up
- C. P 8,000 – up**
- D. P 10,000 – up

140. According to the manual of professional practice of electronics engineers, the minimum rate of retainer's fee to be charged by the consulting electronics engineer is _____ .

A. P 1,500 per month

B. P 1,000 per month

C. P 2,000 per month

D. P 2,500 per month

141. What refers to the act of putting together parts of a whole in order to build-up; to erect or to form and/or to set or establish electronics equipment, systems or facilities?

A. Construction and/or installation

B. Investigation

C. Appraisal

D. Acceptance

142. What refers to the process of producing, forming or fabricating electronic equipment and/or related components, parts, devices and accessories?

A. Quality control

B. Manufacturing

C. Development

D. System design

143. What refers to the act of conceptualizing, planning and projecting a scheme, system and facility using the arts and science of electronics along with social, economic, financial and technical consideration?

A. Construction service

B. Consultation service

C. Organizing service

D. Design service

144. What is the act of giving advice and information to client in the area of electronics engineering and its related fields in line with current internationally accepted standards and practices?

A. Consultancy design

B. Professional consultation

C. Engineering consultation

D. Consultancy service

145. What is the minimum fine for unauthorized copying of copyrighted works as provided in the E-commerce Act of the Philippines?

- A. P 100,000**
- B. P 500,000
- C. P 100,000
- D. P 50,000

146. What is the minimum penalty for unauthorized copying of copyrighted works as provided in the E-commerce Act of the Philippines?

- A. 6 months imprisonment**
- B. 12 months imprisonment
- C. 2 months imprisonment
- D. 3 months imprisonment

147. A secret code which secures and defends sensitive information that crosses over public channels into a form decipherable only with a matching electronic key is referred to as _____

- A. password
- B. username
- C. encrypted code
- D. electronic key**

148. What is the term of the Chairman of the Professional Regulation Commission?

- A. 5 years
- B. 3 years
- C. 6 years
- D. 7 years**

149. Which one is NOT the basic electrical protection measure in the Philippine Electronic Codes?

- A. Voltage/current limiting and interrupting
- B. Undergrounding**
- C. Grounding and bonding
- D. Shielding

150. What unit measures the dosage ratio of radiation?

- A. roentgens per minute
- B. milliroentgens per hour (mr per hour)**
- C. rebs per hour
- D. rems per minute

151. What unit expresses the amount of radiation actually absorbed in the tissue?

- A. rad**
- B. rbe
- C. rem
- D. reb

152. What refers to radiation other than X-rays which will cause an absorption equal to 1 roentgen?

- A. rbe
- B. reb
- C. rem
- D. rep**

153. What refers to the different sources of radiation have different effects which are related to X-rays by a number?

- A. rbe**
- B. rems
- C. rebs
- D. all of the above

154. Which of the following determines the total dose of radiation?

- A. The total dose is determined by multiplying the dosage rate by the number of hours of exposure.**
- B. The total dose is determined by adding the dosage rate by the number of hours of exposure.
- C. The total dose is determined by dividing the dosage rate by the number of hours of exposure.
- D. The total dose is determined by subtracting the dosage rate by the number of hours of exposure.

155. According to safety standards, what is the maximum allowable radiation from an electronic equipment?

- A. Must not exceed 100 mr per week**
- B. Must not exceed 10 mr per week
- C. Must not exceed 1000 mr per day
- D. Must not exceed 100 mr per day

156. What unit expresses the rbe dose?

- A. rems (roentgen equivalent man)
- B. rebs (roentgen equivalent biological)
- C. Both A & B**
- D. Only A

157. What formula gives the maximum accumulated permissible dose (MPD) in rems to the whole body, with N = person's age?

A. $MPD = 5(N - 18)$

B. $MPD = 3(N - 15)$

C. $MPD = 7(N - 18)$

D. $MPD = 5(N - 15)$

158. What is the rbe of alpha particles and fast neutrons?

A. 10

B. 5

C. 15

D. 7

159. What is the rbe of any radiation produced by a radio transmitter?

A. 2

B. 1

C. 4

D. 3

160. What unit is used to measure the accumulative effects of radiation that can cause genetic and somatic effects?

A. roentgens

B. rems

C. rbes

D. rebs

161. When is coordination with the telephone company needed when an underground service entrance will be used as the most feasible and economical way?

A. Expense of telephone company

B. Expense of subscriber

C. Length of a cable to be used by subscriber

D. Decision of depth of conduit at interconnection point

162. The potential difference between any exposed structure to ground in any electrical installation should not exceed ___ volts RMS.

A. 10

B. 45

C. 0

D. 30

163. Which of the following is the lowest resistance grounding on earth?
- A. Sand
 - B. Clay
 - C. Surface loam soil**
 - D. Limestone
164. Which part of housing of a building cable system has the same function as the slot but circular in shape?
- A. Fitting
 - B. Sleeve**
 - C. Insert
 - D. Header
165. What refers to a terminal where riser cable pairs are terminated to serve a portion or an entire floor of a building?
- A. Floor terminal distribution area
 - B. Raceway terminal
 - C. Floor distribution terminal
 - D. Riser terminal**
166. Which part of the housing system in ECE code is a circular opening through the floor structure to allow the passage of a cable and wire?
- A. Insert
 - B. Sleeve**
 - C. Raceway
 - D. Slot
167. In cable facilities for a building communications service, _____ is referred to as a physical cable within a building or series of buildings which may include both main cable pairs and house cable pairs but not wiring cable.
- A. entrance cable
 - B. floor distribution cable
 - C. house cable
 - D. building cable**
168. A telephone company's cable entering a building from telephone cable feeder to the main cross-connecting a point within the building is called _____.
- A. Telephone cable
 - B. Entrance cable**
 - C. Connecting cable
 - D. Building cable

169. It is a non-combustible tubing which encases the riser cable between enclosed type metallic terminal cabinets or boxes.

- A. Raceway
- B. Riser shaft
- C. Riser conduit**
- D. Entrance cable

170. A series of closets connected by slots or short conduit sleeves between floors or open shaft of the building is called _____ .

- A. Service fitting
- B. Raceway
- C. Riser conduit
- D. Riser shaft**

171. What is the maximum number of lines for any building other than a one or two story residential building to be required a service entrance facility under ECE building code?

- A. Two lines
- B. Five lines
- C. Three lines**
- D. Not required

172. What is the device that diverts high transient voltage to the ground and away from the equipment thus protected?

- A. Alpeh
- B. Anchor
- C. Alarm
- D. Arrester**

173. What is one possible cause for an abrupt frequency variation in one self-excited transmitter oscillator circuits resulting to a poor frequency stability to hold a constant oscillation?

- A. Poor soldered connections.**
- B. Heating of capacitor in the oscillator.
- C. DC and RF ac heating of the resistors which cause change in values.
- D. Aging which cause change condition in parts characteristics.

174. Which of the following does not constitute the foundation of ethics?

- A. Honesty
- B. Justice
- C. Integrity**
- D. Courtesy

175. What is defined as a legally binding agreement or promise to exchange goods or services?

- A. Consideration
- B. Partnership
- C. Contract**
- D. Obligation

176. What is the study of the decisions, policies, and values that are morally desirable in engineering practice and research?

- A. Engineering ethics**
- B. Engineering management
- C. Engineering system
- D. Engineering integrity

177. What consists of the responsibilities and rights that ought to be endorsed by those engaged in engineering, and also of desirable ideals and personal commitments in engineering?

- A. Ethics
- B. Code of ethics
- C. Engineering ethics**
- D. Engineering standards

178. What refers to situations in which moral reasons come into conflict, or in which the application of moral values is problematic?

- A. Silo mentality
- B. Preventive ethics
- C. Ethical issues
- D. Moral dilemmas**

179. What states the moral responsibilities of engineers as seen by the profession, and as represented by a professional society?

- A. Preventive ethics
- B. Work ethics
- C. Code of ethics**
- D. Professional code

180. What is a set of attitudes, which implies a motivational orientation, concerning the value of work?

- A. Preventive ethics
- B. Work ethics**
- C. Code of ethics
- D. Professional code

181. Ethics is synonymous to _____ .

- A. **morality**
- B. money
- C. standards
- D. conduct

182. A contract can be terminated with which of the following reasons?

- A. Death of a party to the contract
- B. Failure of consideration
- C. Mutual agreement of the parties to the contract
- D. **All of the above**

183. Some contracts may be dissolved by which valid reason?

- A. Court order
- B. Passage of new laws
- C. Declaration of war
- D. **All of the above**

184. What is the major advantage of a standard contract?

- A. The meanings of the clauses were established.
- B. The clauses of this contract are to be litigated.
- C. The clauses of this contract are rarely ambiguous.
- D. **All of the above**

185. The general contractor who hires different subcontractors is known as _____ contractor.

- A. real
- B. original
- C. **prime**
- D. legitimate

186. What is the basic requirement in order for a contract to be binding?

- A. There must be a clear, specific and definite offer.
- B. There must be some form of conditional future consideration.
- C. There must be an acceptance of the offer.
- D. **All of the above**

187. What contract document is part of the constructive contracts?

- A. Agreement form
- B. General condition
- C. Drawings and specifications
- D. **All of the above**

188. What refers to a statement of fact made by one party to the other before the contract is made?

- A. A representation**
- B. An offer
- C. A proposal
- D. A consideration

189. What refers to a fundamental obligation under the contract which goes to the root of the contract?

- A. Warranty
- B. Condition**
- C. Injunction
- D. Innominate terms

190. What type of damages is awarded, usually for fraud cases, to punish and make an example of the defendant to deter other from doing the same thing?

- A. Punitive damages**
- B. Nominal damages
- C. Liquidated damages
- D. Consequential damages

191. What is another term for “punitive damages”?

- A. Liquidated damages
- B. Exemplary damages**
- C. Compensatory damages
- D. Nominal damages

192. What is defined as a non-performance that results in the injured party receiving something substantially less than or different from what the contract is intended?

- A. Willful breach
- B. Material breach**
- C. Unintentional breach
- D. Intentional breach

193. What refers to the condition that in a contract between two parties, only the parties to a contract may sue under it and that any third party names in that contract or who benefit from that contract cannot sue or be sued under that contract?

- A. Doctrine of contract
- B. Party policy of contract
- C. Equity of contract
- D. Privity of contract**

194. What is a civil wrong committed by one person causing damage to another person of his property, emotional well-being, or reputation?

- A. Consequential damage
- B. Fraud
- C. Punitive damage
- D. Tort**

195. The tort law is concerned with _____ .

- A. imprisonment
- B. fine
- C. compensation for the injury**
- D. punishment

196. What refers to a statement or oath, often religious in nature, agreed by an individual in ceremonies?

- A. Canon
- B. Code
- C. Creed**
- D. Rule

197. A canon is defined as:

- A. a fundamental belief that usually encompasses several rules.**
- B. a system of nonstatutory, nonmandatory rules on personal conduct.
- C. an oath taken by an individual in a ceremony.
- D. a guide for conduct and action in a certain situation.

198. A rule is defined as:

- A. a fundamental belief that usually encompasses several rules.
- B. a system of nonstatutory, nonmandatory rules on personal conduct.
- C. an oath taken by an individual in a ceremony.
- D. a guide for conduct and action in a certain situation.**

199. A code is defined as:

- A. a fundamental belief that usually encompasses several rules.
- B. a system of nonstatutory, nonmandatory rules on personal conduct.**
- C. an oath taken by an individual in a ceremony.
- D. a guide for conduct and action in a certain situation.

200. What refers to the rendition of service by a dully licensed professional by virtue of his technical education, training, experience and competence?

- A. Professional practice
- B. Professional service**
- C. Legal practice and service
- D. Professional consultation

MULTIPLE CHOICE
QUESTIONS in
THERMODYNAMICS

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1. The term “thermodynamics” comes from Greek words “*therme*” and “*dynamis*” which means _____.

A. Heat power

B. Heat transfer

C. Heat energy

D. Heat motion

2. The term “thermodynamics” was first used in 1849 in the publication of a

A. Rudolph Clausius

B. William Rankine

C. Lord Kelvin

D. Thomas Savery

3. What law asserts that energy is a thermodynamic property?

A. First law of Thermodynamics

B. Second law of Thermodynamics

C. Third law of Thermodynamics

D. Zeroth law of Thermodynamics

4. What law asserts that energy has quality as well as quantity?

A. First law of Thermodynamics

B. Second law of Thermodynamics

C. Third law of Thermodynamics

D. Zeroth law of Thermodynamics

5. The macroscopic approach to the study of thermodynamics does not require a knowledge of the behavior of individual particles is called _____.

A. Dynamic thermodynamics

B. Static thermodynamics

C. Statistical thermodynamics

D. Classical thermodynamics

6. What is the more elaborate approach to the study of thermodynamics and based on the average behavior of large groups of individual particles?
- A. Dynamic thermodynamics
 - B. Static thermodynamics
 - C. Statistical thermodynamics**
 - D. Classical thermodynamics
7. What is defined a region in space chosen for study?
- A. Surroundings
 - B. System**
 - C. Boundary
 - D. Volume
8. The first law of thermodynamics is based on which of the following principles?
- A. Conservation of mass
 - B. Conservation of energy**
 - C. Action and reaction
 - D. The entropy-temperature relationship
9. What is the mass or region outside the system called?
- A. Surroundings**
 - B. Boundary
 - C. Volume
 - D. Environment
10. What is the real or imaginary surface that separates the system from its surroundings?
- A. Division
 - B. Wall
 - C. Boundary**
 - D. Interface

11. A system which consists of fixed amount of mass and no mass can cross its boundary called _____.

- A. Equilibrium system
- B. Thermal equilibrium system
- C. Open system
- D. Closed system**

12. A system in which even energy is not allowed to cross the boundary is called _____.

- A. Closed system
- B. Exclusive system
- C. Isolated system**
- D. Special system

13. A system in which there is a flow of mass is known as _____.

- A. Equilibrium system
- B. Isolated system
- C. Open system**
- D. Closed system

14. Open system usually encloses which of the following devices?

- A. Compressor
- B. Turbine
- C. Nozzle
- D. All of the above**

15. The boundaries of a control volume, which may either real or imaginary is called _____.

- A. Control boundary
- B. Control system
- C. Interface
- D. Control surface**

16. Any characteristic of a thermodynamics system is called a _____.

A. Property

B. Process

C. Phase

D. Cycle

17. How are thermodynamic properties classified?

A. Physical and chemical

B. Intensive and extensive

C. Real and imaginary

D. Homogeneous and heterogeneous

18. The thermodynamic properties that are independent on the size of the system is called _____.

A. Extensive property

B. Intensive property

C. Open property

D. Closed property

19. The thermodynamic properties that are dependent on the size or extent of the system is called _____.

A. Extensive property

B. Intensive property

C. Open property

D. Closed property

20. Which is NOT an intensive property of thermodynamics?

A. Temperature

B. Mass

C. Pressure

D. Density

21. Which is NOT an extensive property of thermodynamics?

A. Density

B. Mass

C. Volume

D. Energy

22. Extensive properties per unit mass are called _____.

A. Specific properties

B. Relative properties

C. Unit properties

D. Phase properties

23. A system is in _____ equilibrium if the temperature is the same throughout the entire system.

A. Static

B. Thermal

C. Mechanical

D. Phase

24. A system is in _____ equilibrium if there is no change in pressure at any point of the system with time.

A. Pressure

B. Thermal

C. Mechanical

D. Phase

25. If a system involves two phases, it is in _____ equilibrium when the mass of each phase reaches an equilibrium level and stays there.

A. Chemical

B. Thermal

C. Mechanical

D. Phase

26. A system is in _____ equilibrium if its chemical composition does not change with time, i.e., no chemical reaction occurs.

A. Chemical

B. Thermal

C. Mechanical

D. Phase

27. "The state of a simple compressible system is completely specified by two independent, intensive properties". This is known as _____.

A. Equilibrium postulate

B. State postulate

C. Environment postulate

D. Compressible system postulate

28. What is the unit of the total energy of the system?

A. K_j

B. K_j/K_g

C. K_g

D. g

29. Without electrical, mechanical, gravitational, surface tension and motion effects, a system is called _____ system.

A. Simple

B. Simple compressible

C. Compressible

D. Independent

30. What refers to any change that a system undergoes from one equilibrium state to another equilibrium state?

A. Process

B. Path

C. Phase

D. Cycle

31. What refers to the series of state through which a system passes during a process?

- A. Path**
- B. Phase
- C. Cycle
- D. Direction

32. How many independent properties are required to completely fix the equilibrium state of a pure gaseous compound?

- A. 4
- B. 3
- C. 2**
- D. 1

33. What is a process in which the system remains infinitesimally closed to an equilibrium state at all times?

- A. Path equilibrium process
- B. Cycle equilibrium process
- C. Phase equilibrium process
- D. Quasi-state or quasi- equilibrium process**

34. A closed system may refer to _____.

- A. Control mass**
- B. Control volume
- C. Control energy
- D. Control temperature

35. An open system may refer to _____.

- A. Control mass
- B. Control volume**
- C. Control energy
- D. Control temperature

36. A system is said to be in thermodynamic equilibrium if it maintains _____ equilibrium.

- A. Mechanical and phase
- B. Thermal and chemical
- C. Thermal, mechanical and chemical
- D. Thermal, phase, mechanical and chemical**

37. What is a process with identical end states called?

- A. Cycle**
- B. Path
- C. Phase
- D. Either path or phase

38. What is a process during which the temperature remains constant?

- A. Isobaric process
- B. Isothermal process**
- C. Isochoric process
- D. Isometric process

39. What is a process during which the pressure remains constant?

- A. Isobaric process**
- B. Isothermal process
- C. Isochoric process
- D. Isometric process

40. What is a process during which the specific volume remains constant?

- A. Isobaric process
- B. Isothermal process
- C. Isochoric or isometric process**
- D. Isovolumetric process

41. The prefix “iso” used to designate a process means _____.

- A. Cannot be interchanged
- B. Remains constant**
- C. Approximately equal
- D. Slight difference

42. What does the term “steady” implies?

- A. No change with volume
- B. No change with time**
- C. No change with location
- D. No change with mass

43. What does the tem “uniform” implies?

- A. No change with volume
- B. No change with time
- C. No change with location**
- D. No change with mass

44. What is defined as a process during which a fluid flows through a control volume steadily?

- A. Transient-flow process
- B. Steady and uniform process
- C. Uniform-flow process
- D. Steady-flow process**

45. The sum of all the microscopic form of energy is called _____.

- A. Total energy
- B. Internal energy**
- C. System energy
- D. Phase energy

46. What type of system energy is related to the molecular structure of a system?

- A. Macroscopic form of energy
- B. Microscopic form of energy**
- C. Internal energy
- D. External energy

47. What form of energy refers to those a system possesses as a whole with respect to some outside reference frame, such as potential and kinetic energies?

A. Macroscopic form of energy

B. Microscopic form of energy

C. Internal energy

D. External energy

48. Who coined the word “energy” in 1807?

A. William Rankine

B. Rudolph Clausius

C. Lord Kelvin

D. Thomas Young

49. The molecules of a gas moving through space with some velocity possesses what kind of energy?

A. Translational energy

B. Spin energy

C. Rotational kinetic energy

D. Sensible energy

50. The electrons in an atom which rotate about the nucleus possess what kind of energy?

A. Translational energy

B. Spin energy

C. Rotational kinetic energy

D. Sensible energy

51. The electrons which spins about its axis will possess what kind of energy?

A. Translational energy

B. Spin energy

C. Rotational kinetic energy

D. Sensible energy

52. What refers to the portion of the internal energy of a system associated with the kinetic energies of the molecules?
- A. Translational energy
 - B. Spin energy
 - C. Rotational kinetic energy
 - D. Sensible energy**
53. What is the internal energy associated with the phase of a system called?
- A. Chemical energy
 - B. Latent energy**
 - C. Phase energy
 - D. Thermal energy
54. What is the internal energy associated with the atomic bonds in a molecule called?
- A. Chemical energy**
 - B. Latent energy
 - C. Phase energy
 - D. State energy
55. What is the extremely large amount of energy associated with the strong bonds within the nucleus of the atom itself called?
- A. Chemical energy
 - B. Latent energy
 - C. Phase energy
 - D. Nuclear energy**
56. What are the only two forms of energy interactions associated with a closed system?
- A. Kinetic energy and heat
 - B. Heat transfer and work**
 - C. Thermal energy and chemical energy
 - D. Latent energy and thermal energy

57. What states that if two bodies are in thermal equilibrium with a third body, they are also in equilibrium with each other?

A. Zeroth law of thermodynamics

B. First law of thermodynamics

C. Second law of thermodynamics

D. Third law of thermodynamics

58. Who formulated the zeroth law of thermodynamics in 1931?

A. A. Celsius

B. A. Einstein

C. R.H. Fowler

D. G. Fahrenheit

59. What is the thermodynamic temperature scale in the SI system?

A. Kelvin scale

B. Celsius scale

C. Fahrenheit scale

D. Rankine scale

60. What is the thermodynamic temperature scale in the English system?

A. Kelvin scale

B. Celsius scale

C. Fahrenheit scale

D. Rankine scale

61. What temperature scale is identical to the Kelvin scale?

A. Ideal gas temperature scale

B. Ideal temperature scale

C. Absolute gas temperature scale

D. Triple point temperature scale

62. The temperatures of the ideal gas temperature scale are measured by using a _____.
- A. Constant-volume gas thermometer**
 - B. Constant-mass gas thermometer
 - C. Constant-temperature gas thermometer
 - D. Constant-pressure gas thermometer
63. What refers to the strong repulsion between the positively charged nuclei which makes fusion reaction difficult to attain?
- A. Atomic repulsion
 - B. Nuclear repulsion
 - C. Coulomb repulsion**
 - D. Charge repulsion
64. What gas thermometer is based on the principle that at low pressure, the temperature of a gas is proportional to its pressure at constant volume?
- A. Constant-pressure gas thermometer
 - B. Isobaric gas thermometer
 - C. Isometric gas thermometer
 - D. Constant-volume gas thermometer**
65. What is the state at which all three phases of water coexist in equilibrium?
- A. Tripoint of water
 - B. Triple point of water**
 - C. Triple phase point of water
 - D. Phase point of water
66. What is defined as the force per unit area?
- A. Pressure**
 - B. Energy
 - C. Work
 - D. Power

67. The unit “pascal” is equivalent to _____.

- A. N/m^2**
- B. N/m
- C. $\text{N}\cdot\text{m}$
- D. $\text{N}\cdot\text{m}^2$

68. Which of the following is NOT a value of the standard atmospheric pressure?

- A. 1 bar
- B. 1 atm
- C. 1 kgf/cm^2
- D. 14.223 psi**

69. What is the SI unit of pressure?

- A. Atm
- B. Bar
- C. Pa**
- D. Psi

70. 1 bar is equivalent to how many pascals?

- A. 10^3
- B. 10^4
- C. 10^5**
- D. 10^6

71. 1 atm is equivalent to how many pascals?

- A. 101,325**
- B. 101,689
- C. 101,102
- D. 101,812

72. What is considered as the actual pressure at a given position and is measured relative to absolute vacuum?

- A. Gage pressure
- B. Absolute pressure**
- C. Atmospheric pressure
- D. Vacuum pressure

73. What is the pressure below atmospheric pressure called?

- A. Gage pressure
- B. Absolute pressure
- C. Atmospheric pressure
- D. Vacuum pressure**

74. The difference between the absolute pressure and the atmospheric pressure is called the _____ pressure.

- A. Gage**
- B. Normal
- C. Standard
- D. Vacuum

75. Which of the following is NOT an instrument used to measure pressure?

- A. Bourdon tube
- B. Pitot tube**
- C. Aneroid
- D. Manometer

76. What instrument is used to measure atmospheric pressure?

- A. Pitot tube
- B. Wind vane
- C. Barometer**
- D. Manometer

77. Another unit used to measure atmospheric pressure is the “torr”. This is named after the Italian physicist, Evangelista Torrecelli. An average atmospheric pressure is how many torr?
- A. 740
 - B. 750
 - C. 760**
 - D. 770
78. What states that for a confined fluid, the pressure at a point has the same magnitude in all directions?
- A. Avogadro’s Law
 - B. Amagat Law
 - C. Pascal’s Law**
 - D. Bernoulli’s Theorem
79. What pressure measuring device consists of a coiled hollow tube that tends to straighten out when the tube is subjected to an internal pressure?
- A. Aneroid
 - B. Manometer
 - C. Bourdon pressure gage**
 - D. Barometer
80. What is an energy that can be transferred from one object to another causing a change in temperature of each object?
- A. Power
 - B. Heat transfer
 - C. Heat**
 - D. Work
81. What is the SI unit of energy?
- A. Newton
 - B. Btu
 - C. Calorie
 - D. Joule**

82. One joule is equivalent to one _____.

- A. $\text{Kg} \cdot \text{m} / \text{s}^2$
- B. $\text{Kg} \cdot \text{m}^2 / \text{s}^2$**
- C. $\text{Kg} \cdot \text{m}^2 / \text{s}$
- D. $\text{Kg} \cdot \text{m} / \text{s}$

83. One calorie is equivalent to how many joules?

- A. 4.448
- B. 4.184**
- C. 4.418
- D. 4.814

84. One erg is equivalent to how many joules?

- A. 10^{-8}
- B. 10^{-7}**
- C. 10^{-6}
- D. 10^{-5}

85. The first law of thermodynamics is the:

- A. Law of conservation of momentum
- B. Law of conservation of mass
- C. Law of conservation of power
- D. Law of conservation of energy**

86. What is the study of energy and its transformations?

- A. Thermostatics
- B. Thermophysics
- C. Thermochemistry
- D. Thermodynamics**

87. What is considered as the heat content of a system?

- A. Enthalpy**
- B. Entropy
- C. Internal heat
- D. Molar heat

88. What refers to the amount of heat needed to raise the temperature of an object by one degree Celsius or 1K?

A. Heat capacity

B. Specific heat

C. Latent heat

D. Molar heat

89. What is the heat capacity of one mole of substance?

A. Molecular heat

B. Specific heat

C. Latent heat

D. Molar heat

90. What is the heat capacity of one gram of a substance?

A. Molecular heat

B. Specific heat

C. Latent heat

D. Molar heat

91. "The enthalpy change for any chemical reaction is independent of the intermediate stages, provided the initial and final conditions are the same for each route." This statement is known as:

A. Dulong's Law

B. Dalton's Law

C. Hess's Law

D. Petit Law

92. What refers to the measure of the disorder present in a given substance or system?

A. Enthalpy

B. Entropy

C. Heat capacity

D. Molar heat

93. Entropy is measured in _____.

A. Joule/Kelvin

B. Joule-Meter/Kelvin

C. Meter/Kelvin

D. Newton/Kelvin

94. What is the energy absorbed during chemical reaction under constant volume conditions?

A. Entropy

B. Ion exchange

C. Enthalpy

D. Enthalpy of reaction

95. When water exists in the liquid phase and is not about to vaporize, it is considered as _____ liquid.

A. Saturated

B. Compressed or subcooled

C. Superheated

D. Unsaturated

96. A liquid that is about to vaporize is called _____ liquid.

A. Saturated

B. Compressed or subcooled

C. Superheated

D. Unsaturated

97. A vapor that is about to condense is called _____ vapor.

A. Saturated

B. Compressed or subcooled

C. Superheated

D. Unsaturated

98. A vapor that is not about to condense is called _____ vapor.
- A. Saturated
 - B. Compressed or subcooled
 - C. Superheated**
 - D. Unsaturated
99. A substance that has a fixed chemical composition is known as _____ substance.
- A. Monoatomic
 - B. Heterogeneous
 - C. Homogeneous
 - D. Pure**
100. What refers to the temperature at which a pure substance changes phase at a given pressure?
- A. Equilibrium temperature
 - B. Saturation temperature**
 - C. Superheated temperature
 - D. Subcooled temperature
101. What refers to the pressure at which a pure substance changes phase at a given temperature?
- A. Equilibrium pressure
 - B. Saturation pressure**
 - C. Superheated pressure
 - D. Subcooled pressure
102. What is the amount of heat needed to turn 1 kg of the substance at its melting point from the solid to liquid state?
- A. Heat of fusion**
 - B. Heat of vaporation
 - C. Heat of condensation
 - D. Heat of fission

103. What is the amount of heat needed to turn 1kg of the substance at its boiling point from the liquid to the gaseous state?

- A. Heat of fusion
- B. Heat of vaporation**
- C. Heat of condensation
- D. Heat of fission

104. What refers to the amount of energy absorbed or released during a phase-change process?

- A. Molar heat
- B. Latent heat**
- C. Vaporization heat
- D. Condensation heat

105. What is the latent heat of fusion of water at 1 atm?

- A. 331.1 kJ/kg
- B. 332.6 kJ/kg
- C. 333.7 kJ/kg**
- D. 330.7 kJ/kg

106. What is the latent heat of vaporization of water at 1 atm?

- A. 2314.8 kJ/kg
- B. 2257.1 kJ/kg**
- C. 2511.7 kJ/kg
- D. 2429.8 kJ/kg

107. What refers to the point at which the saturated liquid and saturated vapor states are the same or identical?

- A. Triple point
- B. Inflection point
- C. Maximum point**
- D. Critical point

108. What is defined as the direct conversion of a substance from the solid to the vapor state or vice versa without passing the liquid state?

- A. Condensation
- B. Vaporization
- C. Sublimation**
- D. Cryogenation

109. The amount of heat required to raise the temperature of 1kg of water through 1 °C is called _____.

- A. Calorie
- B. Joule
- C. BTU
- D. Kilocalorie**

110. The amount of heat required to raise the temperature of 1 pound of water by 1°F is called _____.

- A. Calorie
- B. Joule
- C. BTU**
- D. Kilocalorie

111. 1 British thermal unit (BTU) is equivalent to how many joules?

- A. 1016
- B. 1043
- C. 1023
- D. 1054**

112. The term “enthalpy” comes from Greek “enthalpen” which means _____.

- A. Warm
- B. Hot
- C. Heat**
- D. Cold

113. The ratio of the mass of vapor to the total mass of the mixture is called _____.

- A. Vapor ratio
- B. Vapor content
- C. Vapor index
- D. Quality**

114. The “equation of state” refers to any equation that relates the _____ of the substance.

- A. Pressure and temperature
- B. Pressure, temperature and specific weight
- C. Temperature and specific weight
- D. Pressure, temperature and specific volume**

115. In the equation $Pv = RT$, the constant of proportionality R is known as _____.

- A. Universal gas constant
- B. Gas constant**
- C. Ideal gas factor
- D. Gas index

116. The gas constant of a certain gas is the ratio of:

- A. Universal gas constant to molar mass**
- B. Universal gas constant to atomic weight
- C. Universal gas constant to atomic number
- D. Universal gas constant to number of moles

117. What is the value of the universal gas constant in $\text{kJ/kmol} \cdot \text{K}$?

- A. 10.73
- B. 1.986
- C. 8.314**
- D. 1545

118. The mass of one mole of a substance in grams is known as _____.

- A. Molar weight
- B. Molar mass**
- C. Molar volume
- D. Molar constant

119. What is defined as the energy required to raise the temperature of a unit mass of a substance by one degree?

- A. Latent heat of fusion
- B. Molar heat
- C. Specific heat capacity
- D. Specific heat**

120. The _____ of a substance is the amount of heat that must be added or removed from a unit mass of the substance to change its temperature by one degree.

- A. Latent heat of fusion
- B. Molar heat
- C. Specific heat capacity**
- D. Specific heat

121. What is the specific heat capacity of water in $\text{J/kg} \cdot ^\circ\text{C}$?

- A. 4581
- B. 4185**
- C. 4518
- D. 4815

122. What is the SI unit of specific heat capacity?

- A. J/kg
- B. $\text{J/kg} \cdot ^\circ\text{F}$
- C. $\text{J/kg} \cdot ^\circ\text{C}$**
- D. $\text{J}/^\circ\text{C}$

123. What is constant for a substance that is considered “incompressible”?

- A. Specific volume of density**
- B. Pressure
- C. Temperature
- D. All of the above

124. If there is no heat transferred during the process, it is called a _____ process.

- A. Static
- B. Isobaric
- C. Polytropic
- D. Adiabatic**

125. The term “adiabatic” comes from Greek “adiabatos” which means _____.

- A. No heat
- B. No transfer
- C. Not to be passed**
- D. No transformation

126. How is heat transferred?

- A. By conduction
- B. By convection
- C. By radiation
- D. All of the above**

127. What refers to the transfer of energy due to the emission of electromagnetic waves or photons?

- A. Conduction
- B. Convection
- C. Radiation**
- D. Electrification

128. What refers to the transfer of energy between a solid surface and the adjacent fluid that is in motion?

- A. Conduction
- B. Convection**
- C. Radiation
- D. Electrification

129. What refers to the transfer of energy from the more energetic particles of a substance to the adjacent less energetic ones as a result of interaction between particles?

A. Conduction

B. Convection

C. Radiation

D. Electrification

130. What states that the net mass transfer to or from a system during a process is equal to the net change in the total mass of the system during that process?

A. Third law of thermodynamics

B. Conservation of energy principle

C. Second law of thermodynamic

D. Conservation of mass principle

131. Which of the following statements is TRUE for an ideal gas, but not for a real gas?

A. $PV = nRT$

B. An increase in temperature causes an increase in the kinetic energy of the gas

C. The total volume of molecules on a gas is nearly the same as the volume of the gas as a whole

D. No attractive forces exists between the molecule of a gas

132. How does an adiabatic process compare to an isentropic process?

A. Adiabatic heat transfer is not equal to zero; isentropic heat transfer is zero

B. Both heat transfer = 0; isentropic: reversible

C. Adiabatic heat transfer = 0; isentropic: heat transfer is not equal to zero

D. Both heat transfer is not equal to zero; isentropic: irreversible

133. Which of the following is the Ideal gas law (equation)?

A. $V/T = K$

B. $V = k*(1/P)$

C. $P_1/T_1 = P_2/T_2$

D. $PV = nRT$

134. What is a measure of the ability of a material to conduct heat?

- A. Specific heat capacity
- B. Coefficient of thermal expansion
- C. Coefficient of thermal conductivity
- D. Thermal conductivity**

135. What refers to the heating of the earth's atmosphere not caused by direct sunlight but by infrared light radiated by the surface and absorbed mainly by atmospheric carbon dioxide?

- A. Greenhouse effect**
- B. Global warming
- C. Thermal rise effect
- D. Ozone effect

136. What is a form of mechanical work which is related with the expansion and compression of substances?

- A. Boundary work**
- B. Thermodynamic work
- C. Phase work
- D. System work

137. Thermal radiation is an electromagnetic radiation with wavelengths in _____ range.

- A. 1 to 100 μm
- B. 0.1 to 100 μm**
- C. 0.1 to 10 μm
- D. 10 to 100 μm

138. What refers to the rate of thermal radiation emitter per unit area of a body?

- A. Thermal conductivity
- B. Absorptivity
- C. Emissivity
- D. Emissive power**

139. What states that for any two bodies in thermal equilibrium, the ratios of emissive power to the absorptivity are equal?

A. Kirchhoff's radiation law

B. Newton's law of cooling

C. Stefan-Boltzmann law

D. Hess's law

140. What is considered as a perfect absorber as well as a perfect emitter?

A. Gray body

B. Black body

C. Real body

D. White body

141. What is a body that emits a constant emissivity regardless of the wavelength?

A. Gray body

B. Black body

C. Real body

D. White body

142. At same temperatures, the radiation emitted by all real surfaces is _____ the radiation emitted by a black body.

A. Less than

B. Greater than

C. Equal to

D. Either less than or greater than

143. Which is NOT a characteristic of emissivity?

A. It is high with most nonmetals

B. It is directly proportional to temperature

C. It is independent with the surface condition of the material

D. It is low with highly polished metals

144. What is the emissivity of a black body?

- A. 0
- B. 1**
- C. 0.5
- D. 0.25

145. What is the absorptivity of a black body?

- A. 0
- B. 1**
- C. 0.5
- D. 0.25

146. What is sometimes known as the “Fourth-power law”?

- A. Kirchhoff’s radiation law
- B. Newton’s law of cooling
- C. Stefan-Boltzmann law**
- D. Hess’s law

147. What states that the net change in the total energy of the system during a process is equal to the difference between the total energy entering and the total energy leaving the system during that process?

- A. Third law of thermodynamics
- B. Conservation of energy principle**
- C. Second law of thermodynamics
- D. Conservation of mass principle

148. The equation $E_{in} - E_{out} = \Delta E_{system}$ is known as _____.

- A. Energy conservation
- B. Energy equation
- C. Energy balance**
- D. Energy conversion equation

149. What remains constant during a steady-flow process?

- A. Mass
- B. Energy content of the control volume
- C. Temperature
- D. Mass and energy content of the control volume**

150. Thermal efficiency is the ratio of:

- A. Net work input to total heat input
- B. Net work output to total heat output
- C. Net work output to total heat input**
- D. Net work input to total heat output

151. What law states that it is impossible to operate an engine operating in a cycle that will have no other effect than to extract heat from a reservoir and turn it into an equivalent amount of work?

- A. Zeroth law of thermodynamics
- B. First law of thermodynamics
- C. Second law of thermodynamics**
- D. Third law of thermodynamics

152. Which statement of the second law of thermodynamics states that no heat engine can have a thermal efficiency of 100 percent?

- A. Kelvin-Planck statement**
- B. Clausius statement
- C. Kevin statement
- D. Rankine statement

153. What is the ratio of the useful heat extracted to heating value?

- A. Combustion efficiency**
- B. Phase efficiency
- C. Heat efficiency
- D. Work efficiency

154. What is defined as the ratio of the net electrical power output to the rate of fuel energy input?
- A. Combustion efficiency
 - B. Thermal efficiency
 - C. Overall efficiency**
 - D. Furnace efficiency
155. What refers to the amount of heat removed from the cooled space in BTS's for 1 watt-hour of electricity consumed?
- A. Cost efficiency rating
 - B. Energy efficiency rating**
 - C. Coefficient of performance
 - D. Cost of performance
156. What law states that it is impossible to build a device that operates in a cycle and produces no effect other than the transfer of heat from a lower-temperature body to a higher-temperature body?
- A. Zeroth law of thermodynamics
 - B. First law of thermodynamics
 - C. Second law of thermodynamics**
 - D. Third law of thermodynamics
157. What statement of the second law of thermodynamics states that it is impossible to build a device that operates in a cycle and produces no effect other than the transfer of heat from a lower-temperature body to a higher-temperature body?
- A. Kelvin-Planck statement
 - B. Clausius statement**
 - C. Kelvin statement
 - D. Rankine statement
158. A device that violates either the first law of thermodynamics or the second law of thermodynamics is known as _____.
- A. Ambiguous machine
 - B. Universal machine
 - C. Perpetual-motion machine**
 - D. Unique machine

159. A device that violates the first law of thermodynamics is called a _____.

- A. Perpetual-motion machine of the first kind**
- B. Universal machine of the first kind
- C. Ambiguous machine of the first kind
- D. Unique machine of the first kind

160. A device that violates the second law of thermodynamics is called a _____.

- A. Perpetual motion machine of the second kind**
- B. Universal machine of the second kind
- C. Ambiguous machine of the second kind
- D. Unique machine of the second kind

161. Carnot cycle is the best known reversible cycle which was first proposed in what year?

- A. 1842
- B. 1824**
- C. 1832
- D. 1834

162. Who proposed the Carnot cycle?

- A. Sammy Carnot
- B. Sonny Carnot
- C. Sadi Carnot**
- D. Suri Carnot

163. The Carnot cycle is composed of how many reversible processes?

- A. 2
- B. 3
- C. 4**
- D. 5

164. The Carnot cycle is composed of _____ processes.

- A. One isothermal and one adiabatic
- B. One isothermal and two adiabatic
- C. Two isothermal and one adiabatic
- D. Two isothermal and two adiabatic**

165. What is the highest efficiency of heat engine operating between the two thermal energy reservoirs at temperature limits?

- A. Ericson efficiency
- B. Otto efficiency
- C. Carnot efficiency**
- D. Stirling efficiency

166. What is a heat engine that operates on the reversible Carnot cycle called?

- A. Carnot heat engine**
- B. Ideal heat engine
- C. Most efficient heat engine
- D. Best heat engine

167. What states that thermal efficiencies of all reversible heat engines operating between the same two reservoirs are the same and that no heat engine is more efficient than a reversible one operating between the same two reservoirs?

- A. Ericson principle
- B. Carnot principle**
- C. Otto principle
- D. Stirling principle

168. Who discovered the thermodynamic property “Entropy” in 1865?

- A. Zeroth law of thermodynamics
- B. First law of thermodynamics
- C. Second law of thermodynamics**
- D. Third law of thermodynamics

169. A process during which entropy remains constant is called _____ process

- A. Isometric
- B. Isochoric
- C. Isobaric
- D. Isentropic**

170. "A reversible adiabatic process is necessarily isentropic but an isentropic process is not necessarily reversible adiabatic process." This statement is:

- A. True**
- B. False
- C. May be true and may be false
- D. Absurd

171. The term "isentropic process" used in thermodynamics implies what?

- A. Reversible adiabatic process
- B. Externally reversible, adiabatic process
- C. Internally reversible, adiabatic process**
- D. Irreversible adiabatic process

172. What states that the entropy of a pure crystalline substance at absolute zero temperature is zero?

- A. Zeroth law of thermodynamics
- B. First law of thermodynamics
- C. Second law of thermodynamics
- D. Third law of thermodynamics**

173. What law provides an absolute reference point for the determination of entropy?

- A. Zeroth law of thermodynamics
- B. First law of thermodynamics
- C. Second law of thermodynamics
- D. Third law of thermodynamics**

174. "The entropy change of a system during a process is equal to the net entropy transfer through the system boundary and the entropy generated within the system". This statement is known as:

- A. Entropy generation
- B. Entropy change of a system
- C. Entropy balance relation**
- D. Third law of thermodynamics

175. What law states that entropy can be created but it cannot be destroyed?

- A. Zeroth law of thermodynamics
- B. First law of thermodynamics
- C. Second law of thermodynamics**
- D. Third law of thermodynamics

176. Entropy is transferred by _____.

- A. Work
- B. Heat**
- C. Energy
- D. Work and heat

177. During adiabatic, internally reversible process, what is true about the change in entropy?

- A. It is temperature-dependent
- B. It is always greater than zero
- C. It is always zero**
- D. It is always less than zero

178. Water boils when:

- A. Its saturated vapor pressure equals to the atmospheric pressure**
- B. Its vapor pressure equals 76cm of mercury
- C. Its temperature reaches 212 degree Celsius
- D. Its vapor pressure is 1 gram per sq. cm

179. Which of the following is standard temperature and pressure (STP)?

- A. 0 degree Celsius and one atmosphere**
- B. 32 degree Fahrenheit and zero pressure
- C. 0 degree Kelvin and one atmosphere
- D. 0 degree Fahrenheit and zero pressure

180. What is the value of the work done for a closed, reversible isometric system?

- A. Zero**
- B. Positive
- C. Negative
- D. Positive or negative

181. "At constant pressure, the volume of a gas is inversely proportional to the pressure". This is known as _____.

A. Boyle's Law

B. Charles's Law

C. Gay-Lussac Law

D. Ideal gas law

182. Which of the following is the mathematical representation of the Charles's law?

A. $V_1/V_2 = P_2/P_1$

B. $V_1/T_1 = V_2/T_2$

C. $V_1/T_2 = V_2/T_1$

D. $V_1/V_2 = \sqrt{P_2}/\sqrt{P_1}$

183. Which of the following is the formula for thermal resistance?

A. Thickness of material/ thermal conductivity of material

B. 2(thickness of material)/thermal conductivity of material

C. Thickness of material/ 2(thermal conductivity of material)

D. Thickness of material x thermal conductivity of material

184. In the process of radiation, energy is carried by electromagnetic waves. What is the speed of electromagnetic waves?

A. 182,000 miles/second

B. 184,000 miles/second

C. 186,000 miles/second

D. 188,000 miles/second

185. For heat engine operating between two temperatures ($T_1 > T_2$), what is the maximum efficiency attainable?

A. $\text{Eff} = 1 - (T_2/T_1)$

B. $\text{Eff} = 1 - (T_1/T_2)$

C. $\text{Eff} = T_1 - T_2$

D. $\text{Eff} = 1 - (T_2/T_1)^2$

186. Which one is the correct relation between energy efficiency ratio (EER) and coefficient of performance (COP)?

- A. $EER = 2.34COP$
- B. $EER = 3.24COP$
- C. $EER = 3.42COP$**
- D. $EER = 4.23COP$

187. The coefficient of performance (COP) is the ratio between the:

- A. Power consumption in watts and heat absorbed per hour
- B. Heat absorbed per hour and the power consumption in watts
- C. Work required and the absorbed heat
- D. Absorbed heat and work required**

188. What predicts the approximate molar specific heat at high temperatures from the atomic weight?

- A. Third law of thermodynamics
- B. Law of Dulong and Petit**
- C. Mollier diagram
- D. Pressure-enthalpy diagram

189. Considering one mole of any gas, the equation of state of ideal gases is simply the _____ law.

- A. Gay-Lussac law
- B. Dulong and Petit
- C. Avogadro's**
- D. Henry's

190. An ideal gas whose specific heats are constant is called _____.

- A. Perfect gas**
- B. Natural gas
- C. Artificial gas
- D. Refined gas

191. What are the assumptions of the kinetic gas theory?

- A. Gas molecules do not attract each other
- B. The volume of the gas molecules is negligible compared to the volume of the gas
- C. The molecules behave like hard spheres
- D. All of the above**

192. "The total volume of a mixture of non-reacting gases is equal to the sum of the partial volumes." This statement is known as _____.

- A. Law of Dulong and Petit
- B. Maxwell-Boltzmann law
- C. Amagat's law**
- D. Avogadro's law

193. An adiabatic process in which there is no change in system enthalpy but for which there is a significant decrease in pressure is called _____.

- A. Isochoric process
- B. Isobaric process
- C. Throttling process**
- D. Quasistatic process

194. What is defined as the ratio of the change in temperature to the change in pressure when a real gas is throttled?

- A. Rankine coefficient
- B. Kelvin coefficient
- C. Maxwell-Boltzmann coefficient
- D. Joule-Thomson coefficient**

195. The low temperature reservoir of the heat reservoirs is known as _____.

- A. Source reservoir
- B. Heel reservoir
- C. Toe reservoir
- D. Sink reservoir**

196. A _____ is a flow in which the gas flow is adiabatic and frictionless and entropy change is zero.

A. Isentropic flow

B. Isobaric flow

C. Steady flow

D. Uniform flow

197. What refers to the minimum temperature at which combustion can be sustained?

A. Burn temperature

B. Kindle temperature

C. Spark temperature

D. Ignition temperature

198. What law predicts the dew point of moisture in the fuel gas?

A. Dalton's law

B. Law of Dulong and Petit

C. Ringelman law

D. Amagat's law

199. What law states that one energy form can be converted without loss into another form?

A. Amagat's law

B. Joule's law

C. Lussac's law

D. Henry's law

200. Which is NOT a correct statement?

A. A superheated vapor will not condense when small amount of heat is removed

B. An ideal gas is a gas that is not a superheated vapor

C. A saturated liquid can absorb as much heat as it can without vaporizing

D. Water at 1 atm and room temperature is subcooled

MULTIPLE CHOICE
QUESTIONS in
PHYSICS

Encoded by:

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1. What is the standard unit of mass?

- A. Kilogram**
- B. Pound
- C. Gram
- D. Newton

2. What is defined as the distance the light travels in a vacuum in $1/299,792,458$ second?

- A. Yard
- B. Feet
- C. Meter**
- D. Inch

3. What is the SI unit of work?

- A. Newton
- B. Watt
- C. Newton-Second
- D. Joule**

4. What is the SI unit of power?

- A. Newton
- B. Watt**
- C. Newton-Second
- D. Joule

5. What is the SI unit of temperature?

- A. Fahrenheit
- B. Kelvin**
- C. Celsius
- D. Rankine

6. What is the SI unit of luminous intensity?

- A. Candela**
- B. Lumens
- C. Lux
- D. Candlepower

7. What is the unit of relative intensity?

- A. Pa
- B. N-m
- C. C.N-m/s
- D. Unitless**

8. What is the SI unit of pressure?

- A. Pa**
- B. N-m
- C. N/m
- D. N-m/s

9. Which one is equivalent of the unit "Pascal"?

- A. N/nm²
- B. N/m²**
- C. N/m
- D. D.N/nm

10. The pressure of 1 bar is equivalent to how many pascals?

- A. 1,000,000
- B. 100,000**
- C. 10,000
- D. D.1000

11. What is the SI unit of intensity?

- A. Joule/m²
- B. kg/m²
- C. N/m²
- D. watt/m²**

12. What is the unit of potential difference?

- A. Watt
- B. Coulomb
- C. Volt**
- D. Weber

13. Which of the following is equivalent to a volt?

- A. watt/coulomb
- B. joule/coulomb**
- C. joule/watt
- D. watt/joule

14. One electron volt is equivalent to _____ joules.

- A. 1.6×10^{-17}
- B. 1.6×10^{-18}
- C. 1.6×10^{-19}**
- D. 1.6×10^{-20}

15. What is the unit of capacitance?

- A. Farad**
- B. Weber
- C. Coulomb
- D. Gauss

16. Which of the following is equivalent to the unit “farad”?

- A. coulomb/volt**
- B. joule/volt
- C. joule/coulomb
- D. coulomb/joule

17. What is the unit of electric current?

- A. Volt
- B. Watt
- C. Ampere**
- D. Coulomb

18. Which of the following is equivalent to the unit “ampere”?

- A. joule/second
- B. volt/second
- C. coulomb/second**
- D. watt/second

19. What is the unit of resistance?

- A. Ohm**
- B. Watt
- C. Volt
- D. Ampere

20. Ohm is equivalent to which of the following?

- A. coulomb/ampere
- B. watt/ampere
- C. volt/ampere**
- D. joule/ampere

21. What is the unit of luminous intensity?

- A. Footcandle
- B. Lumen
- C. Candela**
- D. Lux

22. What is the unit of luminous flux?

- A. Candela
- B. Lumen**
- C. Lux
- D. Footcandle

23. Which of the following is equivalent to the unit “candela”?

- A. lumen/m²
- B. footcandle/steradian
- C. lux/steradian
- D. lumen/steradian**

24. What is the unit of luminous efficiency?

- A. lumen/watt**
- B. lumen/volt
- C. lumen/ampere
- D. lumen/coulomb

25. What is the unit of illumination?

- A. Lux**
- B. Lumen
- C. Candela
- D. Lumen/watt

26. Lux is equivalent to which combination of units?

- A. lumen/cm²
- B. lumen/ft²
- C. lumen/m²**
- D. lumen/in²

27. Footcandle is equivalent to which combination of units?

- A. lumen/cm²
- B. lumen/ft²**
- C. lumen/m²
- D. lumen/in²

28. How many dynes are there in one newton?

- A. 10,000
- B. 100,000**
- C. 1,000,000
- D. D.1000

29. What is an elemental unit of energy?

- A. Quartz
- B. Quark
- C. Photon
- D. Quantum**

30. What refers to the mass which is accelerated at the rate of one foot per second when acted on by a force of one pound?

- A. Slug**
- B. Erg
- C. Dyne
- D. BTU

31. The size of some bacteria and living cells is in the order of _____.

- A. centimetre
- B. millimetre
- C. nanometer
- D. micrometer**

32. The size of the largest atom is in the order of _____.

- A. centimeter
- B. millimeter
- C. nanometer**
- D. micrometer

33. The mass of a grain of salt is in the order of _____.

- A. milligram**
- B. gram
- C. microgram
- D. nanogram

34. Which one is equivalent to the unit 'joule'?

- A. Newton-second
- B. Newton-meter**
- C. Newton-meter per second
- D. Newton-meter per second squared

35. Which one is equivalent to the unit "watt"?

- A. Newton-second
- B. Newton-meter
- C. Newton-meter per second**
- D. Newton-meter per second squared

36. One horsepower is equivalent to how many watts?

- A. 550
- B. 746**
- C. 33,000
- D. 250

37. The “kilowatt-hour” is a unit of _____.

- A. work
- B. energy
- C. power
- D. work or energy**

38. The “kilowatt-hour” is a unit of _____.

- A. work
- B. energy
- C. power
- D. work or energy**

39. The English unit “slug” is a unit of _____.

- A. mass**
- B. weight
- C. force
- D. energy

40. How is sound intensity measured?

- A. In beats
- B. In decibels**
- C. In phons
- D. In sones

41. An electron volt is the energy required by an electron that has been accelerated by a potential difference of how many volts?

- A. 1 volt**
- B. 0.1 volts
- C. 10 volts
- D. 0.01 volts

42. What is a vector with a magnitude of one and with no unit?

- A. Single vector
- B. Unit vector**
- C. Dot vector
- D. Scalar vector

43. What is the purpose of a unit vector?

- A. To describe the direction in space**
- B. To indicate a magnitude without reference to direction
- C. To serve as comparison with other vectors
- D. To set a standard among vectors

44. What is another term for a scalar product of two vectors?

- A. Cross product
- B. Vector product
- C. Dot product**
- D. Plus product

45. What is another term for vector product of two vectors?

- A. Cross product**
- B. Vector product
- C. Dot product
- D. Plus product

46. The scalar product of two perpendicular vectors is always _____.

- A. equal to 1
- B. greater than 1
- C. less than 1
- D. equal to 0**

47. The vector product of two parallel or antiparallel vectors is always _____.

- A. equal 1
- B. greater than 1
- C. less than 1
- D. equal to 0**

48. The vector product of any vector with itself is _____.

- A. equal to 1
- B. greater than 1
- C. less than 1
- D. equal to 0**

49. What refers to physical quantities that are completely specified by just a number and a unit or physical quantities that have magnitudes only?

- A. Scalar quantities**
- B. Vector product
- C. Dot product
- D. Vector quantities

50. What refers to physical quantities that have a magnitude and a direction?

- A. Scalar quantities
- B. Vector quantities
- C. Dot product
- D. Vector quantities**

51. Which is NOT a vector quantity?

- A. Displacement
- B. Velocity
- C. Acceleration
- D. Time**

52. Which is NOT a fundamental physical quantity of mechanics?

- A. Length
- B. Mass
- C. Volume**
- D. Time

53. What is an arrowed line whose length is proportional to the magnitude of some vector quantity and whose direction is that of the quantity?

- A. Vector diagram
- B. Vector**
- C. Component
- D. Resultant

54. What is scaled drawing of the various forces, velocities or other vector quantities involved in the motion of a body?

- A. Vector diagram**
- B. Vector
- C. Component
- D. Resultant

55. The _____ of a moving object is the distance it covers in a time interval divided by the time interval.

- A. acceleration
- B. instantaneous speed
- C. average speed**
- D. instantaneous velocity

56. The rate at which velocity changes with time is known as _____.

- A. acceleration**
- B. instantaneous speed
- C. average speed
- D. instantaneous velocity

57. "The work done by the net force on a particle equals the change in the particle's kinetic energy." This statement is known as _____.

- A. Law of conservation of energy
- B. Work-energy theorem**
- C. Law of conservation of work
- D. Total work theorem

58. The _____ of a particle is equal to the total work that particle can do in the process of being brought to rest.

- A. kinetic energy**
- B. potential energy
- C. total energy
- D. mechanical energy

59. Work is defined as the product of:

- A. Force and displacement**
- B. Force and time
- C. Displacement and time
- D. Power and time

60. What is defined as the time rate at which work is done?

- A. impulse
- B. Momentum
- C. Power**
- D. Energy

61. What is defined as any influence that can change the velocity of an object?
- A. Impulse
 - B. Force**
 - C. Energy
 - D. Work
62. What is a measure of the inertia of an object?
- A. Density
 - B. Weight
 - C. Mass**
 - D. Force
63. What is the property of matter which is the reluctance to change its state of rest or of uniform motion?
- A. Impulse
 - B. Momentum
 - C. Inertia**
 - D. Equilibrium
64. "If no net force acts on it, an object at rest will remain at rest and an object in motion will remain in motion at constant velocity". This statement is the _____.
- A. first law of motion**
 - B. second law of motion
 - C. third law of motion
 - D. d'Alembert's principle
65. "The net force acting on an object equals the product of the mass and the acceleration of the object. The direction of the force is the same as that of the acceleration". This statement is the _____.
- A. first law of motion
 - B. second law of motion**
 - C. third law of motion
 - D. d' Alembert's principle
66. "When an object exerts a force on another object, the second object exerts on the first a force of the same magnitude but in the opposite direction". This statement is the _____.
- A. first law of motion
 - B. second law of motion
 - C. third law of motion**
 - D. d'Alembert's principle

67. What refers to the force with which the earth attracts an object?
- A. Gravitational pull
 - B. Mass
 - C. Weight**
 - D. All of the above
68. How many kilograms are there in 1 slug?
- A. 11.9
 - B. 12.5
 - C. 13.2
 - D. D.14.6**
69. What refers to an actual force that arises to oppose relative motion between contacting surfaces?
- A. Action force
 - B. Reaction force
 - C. Friction**
 - D. Drag
70. What refers to the force between two stationary surfaces in contact that prevents motion between them?
- A. kinetic friction
 - B. sliding friction
 - C. starting friction
 - D. static friction**
71. What is the maximum value of the static friction?
- A. Starting friction**
 - B. Sliding friction
 - C. Kinetic friction
 - D. Dynamic friction
72. What is TRUE between kinetic friction and static friction?
- A. Kinetic friction is always to static friction
 - B. Kinetic friction is always less than static friction**
 - C. Kinetic friction is always greater than static friction
 - D. Kinetic friction is equal to or greater than static friction

73. What is another term for kinetic friction?

- A. Dynamic friction
- B. Starting friction
- C. Sliding friction**
- D. All of the above

74. For the same materials in contact, what is TRUE between coefficient of static friction and coefficient of kinetic friction?

- A. Coefficient of static friction is always less than the coefficient of kinetic friction
- B. Coefficient of static friction is always equal to the coefficient of kinetic friction
- C. Coefficient of static friction is always greater than the coefficient of kinetic friction.**
- D. Coefficient of static friction may be greater than or less than the coefficient of kinetic friction.

75. Efficiency of a machine is the ratio of:

- A. power output to power input**
- B. power input to power output
- C. total work done to total energy
- D. total energy to total power

76. What is the energy something possesses by virtue of its motion?

- A. Kinetic energy**
- B. Potential energy
- C. Rest energy
- D. Mechanical energy

77. What is the energy something possesses by virtue of its mass?

- A. Kinetic energy
- B. Potential energy
- C. Rest energy**
- D. Mechanical energy

78. What is the energy something possesses by virtue of its position?

- A. Kinetic energy
- B. Potential energy**
- C. Rest energy
- D. Mechanical energy

79. When the vector sum of the external forces acting on the system of particles equals zero, the total linear momentum of the system _____.

- A. becomes zero
- B. maximizes
- C. changes abruptly
- D. remains constant**

80. What is conserved in an elastic collision?

- A. Kinetic energy**
- B. Potential energy
- C. Rest energy
- D. Mechanical energy

81. In elastic collision, kinetic energy is conserved. This statement is:

- A. true
- B. false**
- C. is either true or false, depending upon the colliding bodies
- D. is either true or false, depending on the impact of two colliding bodies

82. When can we say that a collision is a completely inelastic collision?

- A. When the kinetic energy lost is minimum.
- B. When the kinetic energy is conserved.
- C. When the two colliding objects stick together after impact.**
- D. When the two colliding objects will separate after impact.

83. What will happen to the kinetic energy if it is a completely inelastic collision?

- A. It is conserved.
- B. It is lost to maximum value.**
- C. It is gained from the loss of potential energy.
- D. It is lost to minimum value.

84. Coefficient of restitution is the ratio of:

- A. relative speed after collision to relative speed before collision**
- B. relative speed before collision to relative speed after collision
- C. relative speed to absolute speed
- D. absolute speed to relative speed

85. What is the coefficient of restitution for a perfectly elastic collision?

- A. 0
- B. 1**
- C. Less than 1
- D. Greater than 1

86. What is the coefficient of restitution for a perfectly inelastic collision?

- A. 0**
- B. 1
- C. Less than 1
- D. Greater than 1

87. The coefficient of restitution always applies _____.

- A. to only one of the colliding objects
- B. to neither of the colliding objects
- C. jointly to the colliding objects**
- D. to the bigger colliding object

88. "When the vector sum of the external forces acting on a system of particles equals zero, the total linear momentum of the system remaining constant." This statement is known as:

- A. Law of universal gravitation
- B. Law of conservation of impulse
- C. Law of conservation of momentum**
- D. Law of conservation of energy

89. What refers to the product of the force and the time during which a force acts?

- A. Impulse**
- B. Momentum
- C. Power
- D. Energy

90. Momentum is the product of:

- A. mass and time
- B. velocity and mass**
- C. force and time
- D. force and mass

91. The coefficient of restitution always applies _____.
- A. to only one of the colliding objects
 - B. to neither of the colliding
 - C. jointly to the colliding objects**
 - D. to the bigger colliding object
92. What refers to the force perpendicular to the velocity of an object moving along a curve path?
- A. Centrifugal force**
 - B. Centripetal force
 - C. Reverse-effective force
 - D. Gravitational force
93. The centripetal force is:
- A. directed away from the center of the curvature of the path
 - B. directed toward the center of curvature of the path**
 - C. tangent to the curvature of the path
 - D. either directed away or toward the center of curvature of the path
94. What refers to the time needed by an object in uniform circular motion to complete an orbit?
- A. path time
 - B. orbit time
 - C. revolution
 - D. period**
95. The centripetal acceleration of a particle in uniform motion is _____ to the radius of its path.
- A. directly proportional
 - B. inversely proportional**
 - C. equal
 - D. not related in any way
96. Gravitation occurs between all objects in the universe by virtue of their _____.
- A. mass**
 - B. density
 - C. weight
 - D. volume

97. "Every object in the universe attracts every other object with a force directly proportional to the product of their masses and inversely proportional to the square of the distance separating them". This statement is known as:
- A. Law of conservation of energy
 - B. Law of universal gravitation**
 - C. Law of conservation of momentum
 - D. Law of conservation of impulse
98. The gravitational force of the earth on an object varies of the _____ the distance of the object from the center of the earth.
- A. inversely as
 - B. inversely as the square of**
 - C. directly as
 - D. directly as the square of
99. A rotating body has kinetic energy. This statement is _____.
- A. sometimes true
 - B. sometimes false
 - C. always true**
 - D. always false
100. What type of energy is usually transmitted by rotary motion?
- A. Kinetic energy
 - B. Potential energy
 - C. Mechanical energy**
 - D. Rest energy
101. Angular momentum is the product of _____.
- A. moment of inertia and linear speed
 - B. moment of area and angular speed
 - C. moment of inertia and angular speed**
 - D. moment of area and angular speed
102. "When the sum of the external torques acting on a system of particles is zero, the total angular momentum of the system remains constant ". This statement is known as:
- A. Conservation of energy
 - B. Conservation of impulse
 - C. Conservation of linear momentum
 - D. Conservation of angular momentum**

103. What particles will experience tangential acceleration?

- A. Those particles whose angular speed changes**
- B. Those particles whose angular speed remains constant
- C. All particles
- D. Those particles whose angular speed is zero.

104. The _____ of a body about a given axis is the rotational analog of mass of the body is distributed about the axis.

- A. moment of mass
- B. moment of area
- C. moment of inertia**
- D. torque

105. The _____ of a force about a particular axis is the product of the magnitude of the force and the perpendicular distance from the line of action of the force to the axis.

- A. inertia
- B. mass moment
- C. torque**
- D. moment

106. When the forces that act on an object have a vector sum of zero, the object is said to be in _____.

- A. unstable equilibrium
- B. stable equilibrium
- C. rotational equilibrium
- D. translational equilibrium**

107. Which of the following is an example of a neutral equilibrium?

- A. A cone balanced on its apex.
- B. A cone balanced on its base.
- C. A cone on its side.**
- D. A cone balanced on the circumference of its base.

108. Which of the following is an example of a stable equilibrium?

- A. A cone balanced on its apex.
- B. A cone balanced on its base.**
- C. A cone on its side.
- D. A cone balanced on the circumference of its base.

109. A device that transmits force or torque is called _____.

- A. mechanical tool
- B. machine**
- C. axle
- D. wedge

110. If a cone is balanced on its apex, it illustrates what type of equilibrium?

- A. stable equilibrium
- B. neutral equilibrium
- C. unstable equilibrium**
- D. translational equilibrium

111. When the net torque acting on an object is zero, the object is in _____.

- A. unstable equilibrium
- B. stable equilibrium
- C. rotational equilibrium**
- D. translational equilibrium

112. Which of the following is NOT a basic machine?

- A. lever
- B. incline plane
- C. hydraulic press**
- D. wedge

113. Where is the center of gravity of an object located?

- A. It is always inside the object.
- B. It is always outside the object.
- C. It is always at its geometric center.
- D. It may sometimes be inside the object and sometimes outside the object.**

114. What is defined as the mass per unit volume?

- A. Density**
- B. Weight density
- C. Relative density
- D. Specific density

115. What is defined as the weight per unit volume?

- A. Density
- B. Weight density**
- C. Relative density
- D. Specific density

116. All are values of the density of water except one. Which one?

- A. 1000 kg/m³
- B. 62.4 lb/ft³
- C. 10 g/cm³**
- D. 9.81 kN/m³

117. The _____ of a substance is its density relative to that of water?

- A. density
- B. weight density
- C. viscosity
- D. specific gravity**

118. What is another term for specific gravity?

- A. Density
- B. Weight density
- C. Relative density**
- D. Viscosity

119. What is the average pressure of the earth's atmosphere at sea level?

- A. 1.042 bar
- B. 1.021 bar
- C. 1.013 bar**
- D. 1.037 bar

120. "An external pressure exerted on a fluid is transmitted uniformly throughout the volume of the fluid". This statement is known as _____.

- A. Bernoulli's energy theorem
- B. Pascal's principle**
- C. Archimedes principle
- D. Torricelli's theorem

121. The hydraulic press is an instrument which uses one of the following theorems. Which one?

- A. Bernoulli's energy theorem
- B. Pascal's principle**
- C. Archimedes principle
- D. Reynold's principle

122. The hydrometer is an instrument which uses one of the following theorems. Which one?

- A. Bernoulli's energy theorem
- B. Pascal's principle
- C. Archimedes principle**
- D. Reynold's principle

123. The hydrometer is an instrument used to measure _____.

- A. pressure of a liquid
- B. density of a liquid**
- C. Reynold's number
- D. viscosity of liquid

124. The maximum displacement of an object undergoing harmonic motion on either side of its equilibrium position is called the _____ of the motion.

- A. frequency
- B. oscillation
- C. period
- D. amplitude**

125. What quantity is often used in describing harmonic motion?

- A. Amplitude
- B. Frequency**
- C. Period
- D. Oscillation

126. The period of the simple harmonic motion is _____ its amplitude.

- A. directly proportional to
- B. inversely proportional to
- C. equal to
- D. independent of**

127. What refers to an oscillatory motion that occurs whenever a restoring force acts on a body in the opposite direction to its displacement from its equilibrium position, with the magnitude of the restoring force proportional to the magnitude of the displacement?
- A. Damped harmonic motion
 - B. Pendulum
 - C. Simple harmonic motion**
 - D. Damped harmonic oscillation
128. In a damped harmonic oscillator, what reduces the amplitude of the vibrations?
- A. Force
 - B. Period
 - C. Frequency
 - D. Friction**
129. The _____ of a pivotal object is that point at which it can be struck without producing a reaction force on its pivot.
- A. center of gravity
 - B. center of oscillation**
 - C. axis of oscillation
 - D. center of mass
130. What is a longitudinal wave phenomenon that results in periodic pressure variations?
- A. Sound**
 - B. Resonance
 - C. Wave
 - D. Beat
131. What occurs when periodic impulses are applied to a system and frequency equal to one of its natural frequencies of oscillation?
- A. Beat
 - B. Resonance**
 - C. Doppler effect
 - D. Shock wave
132. What refers to a shell of high pressure produced by the motion of an object whose speed exceeds that of sound?
- A. Shock wave**
 - B. Mach wave
 - C. Beat wave
 - D. Sonic wave

133. What refers to the change in frequency of a wave when there is relative motion between its source and an observer?

- A. Superposition principle
- B. Shock effect
- C. Doppler effect**
- D. Wave motion

134. What occur when the individual particles of a medium vibrate back and forth in the direction in which the waves travel?

- A. Longitudinal waves**
- B. Transverse waves
- C. Wave motions
- D. Shock waves

135. Infrasound refers to sounds whose frequencies are below _____.

- A. 20 Hz**
- B. 30 Hz
- C. 40 Hz
- D. 50 Hz

136. Ultrasound refers to sounds whose frequencies are above _____.

- A. 10,000 Hz
- B. 20,000 Hz**
- C. 30,000 Hz
- D. 40,000 Hz

137. What occur when the individual particles of a medium vibrate from side to side perpendicular to the direction in which the waves travel?

- A. Longitudinal waves
- B. Transverse waves**
- C. Wave motions
- D. Shock waves

138. "When two or more waves of the same nature travel past a given point at the same time, the amplitude at the point is the sum of the amplitude of the individual waves". This statement is known as _____.

- A. Mach principle
- B. Doppler principle
- C. Principle of superposition**
- D. Wave motion principle

139. What occurs when the resulting composite wave has amplitude greater than that of either of the original waves?
- A. Local interference
 - B. Ordinary interference
 - C. Constructive interference**
 - D. Destructive interference
140. What occurs when the resulting composite wave has amplitude less than that of either of the original waves?
- A. Local interference
 - B. Ordinary interference
 - C. Constructive interference
 - D. Destructive interference**
141. The rate at which a wave of any kind carries energy per unit cross-sectional area is called _____.
- A. beats
 - B. frequency
 - C. gain
 - D. intensity**
142. At what intensity will sound wave starts to damage the ear of humans.
- A. 10 W/m^2
 - B. 0.1 W/m^2
 - C. 1 W/m^2**
 - D. 0.01 W/m^2
143. For a 1kHz sound wave to be audible, it must have a minimum intensity of _____ W/m^2 ?
- A. 10^{-10}
 - B. 10^{-11}
 - C. 10^{-12}**
 - D. 10^{-13}
144. How many decibels should a sound to be barely audible?
- A. 0**
 - B. 1
 - C. 0.1
 - D. 1.5

145. The ratio of a speed of an object and the speed of sound is called the _____.
- A. Wave factor
 - B. Supersonic number
 - C. Sonic number
 - D. Mach number**
146. “The net electric charge in an isolated system remains constant”. This statement is known as _____.
- A. Principle of conservation of attraction
 - B. Principle of conservation of charge**
 - C. Coulomb’s law
 - D. Principle of superconductivity
147. “The force one charge exerts on another is directly proportional to the magnitudes of the charges and inversely proportional to the square of the distance between them”. This statement is known as _____.
- A. Coulomb’s law**
 - B. Kirchhoff’s law
 - C. Lenz’s law
 - D. Faraday’s law
148. What refers to a region of space at every point of which an appropriate test object would experience a force?
- A. Energy field
 - B. Electric field
 - C. magnetic field
 - D. Force field**
149. The _____ of an electric field is the electric potential energy per unit volume associated with it.
- A. capacitance
 - B. polar energy
 - C. energy density**
 - D. dielectric distance

150. What is the ratio between the charge on either plates of a capacitor and the potential difference between the plates?
- A. Resistance
 - B. Inductance
 - C. Capacitance**
 - D. Potential difference
151. What refers to the measure of how effective a material is in reducing an electric field set up across a sample of it?
- A. Electronegativity
 - B. Potential difference
 - C. Dielectric constant**
 - D. Energy density
152. The potential difference across a battery, a generator or other source of electric energy when it is not connected to any external circuit is called its _____.
- A. electromechanical force
 - B. electrostatic force
 - C. electromotive force**
 - D. internal resistance
153. What is defined as the luminous flux per unit area?
- A. Luminous intensity
 - B. Luminous efficiency
 - C. Illumination**
 - D. Lumen
154. What refers to the brightness of a light source?
- A. Luminous intensity**
 - B. Illumination
 - C. Luminous flux
 - D. Luminous efficiency
155. What is the approximate luminous intensity of a candle?
- A. 1 candela**
 - B. 1 flux
 - C. 1 lumen
 - D. All of the above

156. What unit is defined in terms of the light emitted by a small pool of platinum at its melting point?

- A. Footcandle
- B. Candela**
- C. Lux
- D. Lumen

157. What refers to the total amount of visible light given off by a light source?

- A. Luminous intensity
- B. Luminous flux**
- C. Luminous efficiency
- D. Illumination

158. Lumen is defined as the luminous flux that falls on each square meter of a sphere 1 meter in radius at whose center is a _____ light source that radiates equally well in all directions.

- A. 0.1 candela
- B. 1.0 candela**
- C. 10 candela
- D. 100 candela

159. What is the total luminous flux radiated by a 1 candela source?

- A. 2π lm
- B. 4π lm**
- C. 8π lm
- D. π lm

160. What refers to the luminous flux emitted by a light source per watt of power input?

- A. Luminous factor
- B. Luminous efficiency**
- C. Luminous intensity
- D. Illumination

161. What coating material is used in the inside of the fluorescent lamp which emits visible light when it is excited by an ultraviolet radiation?

- A. Mercury
- B. Inert gas
- C. Phosphor**
- D. Argon

162. What refers to the ratio between the speed of light in free space and its speed in a particular medium?

- A. Index of refraction
- B. Total internal reflection
- C. Index of dispersion
- D. Index of refraction**

163. "The ratio of the sines of the angles of incidence and refraction is equal to the ratio of the speeds of light in the two media". This statement is known as _____.

- A. Huygen's principle
- B. Snell's law**
- C. Maxwell's hypothesis
- D. Doppler's effect

164. Light ray that passes at an angle from one medium to another is deflected at the surface between the two media. What is this phenomenon called?

- A. Dispersion
- B. Reflection
- C. Refraction**
- D. Incidence

165. "Every point on the wavefront can be considered as a source of secondary wavelets that spread out in all directions with the wave speed of the medium. The wavefront at any time is the envelope of these wavelets". This statement is known as _____.

- A. Huygen's principle**
- B. Snell's law
- C. Maxwell's hypothesis
- D. Doppler's effect

166. What is an imaginary surface the joins points where all the waves from a source are in the same phase of oscillation?

- A. Gamma ray
- B. Wavefront**
- C. Electromagnetic wave
- D. Microwave

167. What refers to the effect when a beam containing more than one frequency is split into a corresponding number of different beams when it is refracted?

- A. Flux
- B. Refraction
- C. Reflection
- D. Dispersion**

168. What refers to the band of colors that emerges from the prism?

- A. Spectrum**
- B. Luminance
- C. Facet
- D. Reflection

169. What is the index of refraction of air?

- A. 1.3
- B. 1.03
- C. 1.003
- D. 1.0003**

170. What is the index of refraction of water?

- A. 1.33**
- B. 1.63
- C. 1.43
- D. 1.53

171. What type of lens deviates parallel light outward as though it originated at a single virtual focal point?

- A. Magnifying lens
- B. Convergent lens
- C. Divergent lens**
- D. Microscopic lens

172. What type of lens bring parallel light to a single real focal point?

- A. Magnifying lens
- B. Convergent lens**
- C. Divergent lens
- D. Microscopic lens

173. Which one best describes the meniscus lens?

- A. It has only concave surfaces.
- B. It has only convex surfaces.
- C. it has no concave surface and no convex surface.
- D. It has one concave surface and one convex surface**

174. What is the distance from a lens to its focal point called?

- A. Focal index
- B. Focal factor
- C. Focal length**
- D. All of the above

175. In optical system, what refers to the ratio of the image height to the object height?

- A. Linear magnification**
- B. Object magnification
- C. Image magnification
- D. Height magnification

176. If the linear magnification of an optical system is less than one, it means that:

- A. the image and the object are of the same size
- B. the image is larger than the object
- C. the image is smaller than the object**
- D. the image may be larger or smaller than the object

177. A camera usually uses what type of lens to form an image on a light-sensitive photographic film?

- A. Magnifying lens
- B. Convergent lens**
- C. Divergent lens
- D. Microscopic lens

178. One of the common defects of vision is _____ commonly known as nearsightedness.

- A. hyporopia
- B. hyperopia
- C. myopia**
- D. minorpia

179. One of the common defects of vision is _____ commonly known as farsightedness.

- A. hyporopia
- B. hyperopia**
- C. myopia
- D. minorpia

180. What lens is commonly used to correct nearsightedness?

- A. Magnifying lens
- B. Convergent lens
- C. Divergent lens**
- D. Microscopic lens

181. What lens is commonly used to correct farsightedness?

- A. Magnifying lens
- B. Convergent lens**
- C. Divergent lens
- D. Microscopic lens

182. What is a defect of vision caused by the cornea having different curvatures in different planes?

- A. Astigmatism**
- B. Myopia
- C. Hyperopia
- D. Presbyopia

183. In telescopes, what refers to the ratio between the angles subtended at the eye by the image and the angle subtended at the eye by the object seen directly?

- A. Magnifying power
- B. Linear magnification
- C. Angular magnification**
- D. Object magnification

184. What type of mirror that curves inward its center and converges parallel light to a single real focal point?

- A. Convex mirror
- B. Concave mirror**
- C. Spherical mirror
- D. Chromatic mirror

185. What type of mirror that curves outward toward its center and diverges parallel light as though the reflected light came from a single virtual focal point behind the mirror?

- A. Convex mirror**
- B. Concave mirror
- C. Spherical mirror
- D. Chromatic mirror

186. What refers to an artificially made polarizing material that transmits light with only a single plane of polarization?

- A. Quartz
- B. Fiber optic
- C. Polaroid**
- D. Tounnaline

187. In optical system, what refers to its ability to produce separate images of nearby objects?

- A. Coherent power
- B. Brewster's power
- C. Polarization power
- D. Resolving power**

188. The resolving power of an equal system is _____ the objective lens of the optical system?

- A. directly proportional**
- B. inversely proportional
- C. equal
- D. not related to

189. What refers to the ability of waves to bend around the edges of obstacles in their paths?

- A. Coherence
- B. Reflection
- C. Refraction
- D. Diffraction**

190. What refers to a series of parallel slits that produces a spectrum through the interference of light that is diffracted?

- A. Diffraction grating**
- B. Polarization
- C. Coherent waves
- D. Reflection

191. The emission of electrons from a metal surface when light shines on it is called _____.

- A. Absorption effect
- B. Spectrum emission
- C. Quantum effect
- D. Photoelectric effect**

192. What are high-frequency electromagnetic waves emitted when fast electrons impinge on matter?

- A. Beta rays
- B. Alpha rays
- C. X-rays**
- D. De Broglie waves

193. What refers to the increase in the measured mass of an object when it is moving relative to an observer?

- A. Exclusion principle
- B. Quantum theory of mass
- C. State of mass
- D. Relativity of mass**

194. What device is used for producing a narrow, monochromatic, coherent beam of light?

- A. Spectral device
- B. Prism
- C. Fiber optic
- D. Laser**

195. What consists of various wavelengths of light emitted by an excited substance?

- A. Excited spectrum
- B. Light spectrum
- C. Absorption spectrum
- D. Emission spectrum**

196. What consists of various wavelengths of light absorbed by a substance when white light is passed through it?

- A. Excited spectrum
- B. Light spectrum
- C. Absorption spectrum**
- D. Emission spectrum

197. Every electron has a certain amount of angular momentum called its _____.

- A. spin**
- B. shell
- C. state
- D. quantum number

198. What is the distance from a lens to its focal point called?

- A. Focal index
- B. Focal factor
- C. Focal length**
- D. All of the above

199. What does LASER stands for?

- A. Light amplification by spectral emission of radiation
- B. Light amplification by state emission of radiation
- C. Light amplification by stimulated emission of radiation**
- D. Light amplification by saturated emission of radiation

200. A free falling object is acted upon by which of the following?

- A. Weight of the body
- B. Air resistance and gravitational pull**
- C. Gravitational pull
- D. Air resistance

201. If the forces acting on a falling body balance one another, the body continues to fall at a constant velocity. What is this constant velocity called?

- A. Instantaneous velocity
- B. Free-falling body
- C. Gravitational velocity
- D. Terminal velocity**

202. The first law of motion is also known as _____.

- A. Law of acceleration
- B. Law of inertia**
- C. Law of interaction
- D. Law of momentum

203. The second law of motion is also known as _____.

- A. Law of acceleration**
- B. Law of inertia
- C. Law of interaction
- D. Law of momentum

204. The third law of motion is also known as _____.

- A. Law of acceleration
- B. Law of inertia
- C. Law of interaction**
- D. Law of momentum

205. Air exerts force that is opposite to the car's motion. What is this force called?

- A. Reverse effective force
- B. Terminal force
- C. Drag force**
- D. Aerodynamic force

206. What instrument is used to measure blood pressure of human beings?

- A. Stropomanometer
- B. Pumpmanometer
- C. Electromanometer
- D. Sphygmomanometer**

207. What do light, radiowaves, microwaves and X-rays have in common?

- A. These waves were predicted by only one person, James Maxwell.
- B. These do not need a medium to travel in.**
- C. These waves are all mechanical waves.
- D. These waves are all serendipitous discoveries.

208. Who predicted the existence of electromagnetic waves in 1865?

- A. Roentgen
- B. Maxwell**
- C. Tesla
- D. Doppler

209. What is the velocity of light in meters per second?

- A. 3×10^6
- B. 3×10^9
- C. 3×10^7
- D. 3×10^8**

210. What is the sound level of the threshold of pain?

- A. 100 dB
- B. 110 dB
- C. 120 dB**
- D. 130 dB

211. What is the intensity in W/m^2 of the threshold of pain?

- A. 1**
- B. 10
- C. 0.1
- D. 0.01

212. What is the intensity of the threshold of hearing in W/m^2 ?

- A. 10^{-12}**
- B. 10^{-10}
- C. 10^{-8}
- D. 10^{-6}

213. What refers to a measure of the energy of sound?

- A. Intensity**
- B. Loudness
- C. Pitch
- D. Sone

214. What refers to the sensation in the ear which depends on the energy in the sound wave?

- A. Pitch
- B. Intensity
- C. Loudness**
- D. Timbre

215. How can loudness of sound be increased?

- A. By increasing the energy of sound
- B. By preventing sound waves to spread in different directions.
- C. By collecting and focusing sound waves at the receiving end.
- D. All of the choices.**

216. Which of the following is dependent upon the frequency of sound vibrations?

- A. Timbre
- B. Loudness
- C. Intensity
- D. Pitch**

217. The “Doppler effect” is named after which scientist?

- A. Christopher Jacques Doppler
- B. Christian Jacques Doppler
- C. Christopher Jason Doppler
- D. Christian Johann Doppler**

218. When a person tells you that the pitch of your voice is high, he is referring to _____.

- A. the intensity of your voice
- B. the number of sound waves you are sending out per second**
- C. the loudness of your voice
- D. the equality of your voice

219. At what intensity level will a noise be considered pollutant in the environment?

- A. Above 50 dB
- B. Above 100 dB
- C. Above 120 dB**
- D. Above 150 dB

220. The velocity of sound in air increases by how many m/s for every 1°C increase in temperature?

- A. 0.2
- B. 0.4
- C. 0.6**
- D. 0.8

221. Why is sound wave travel faster in water than in air?

- A. Because water has greater density than air.
- B. Because water has greater bulk modulus than air.**
- C. Because water has more in terms of number of molecules than air.
- D. Because water has more in volume than air.

222. What will happen to the wavelength if the velocity and frequency of a wave are both reduced to one-half?

- A. It will double.
- B. It will reduce in half.
- C. It will quadruple.
- D. It will remain the same.**

223. Which of the following statements is TRUE?

- A. A high-frequency sound has high pitch.**
- B. A high-frequency sound has low pitch.
- C. A high-frequency sound has low energy.
- D. A high-frequency sound has low pitch and low energy.

224. What part of the human ear where sound energy is converted into electrical energy?

- A. Ear drum
- B. Cochlea**
- C. Tympanum
- D. Ear canal

225. In which medium do sound waves travel the faster?

- A. Liquids
- B. Solids**
- C. Gases
- D. Vacuum

226. Who provide evidence that light and electromagnetic waves have the same nature and that they travel at the same speed and exhibit the same properties such as refraction, reflection and interference?

- A. Townes
- B. Maxwell
- C. Hertz**
- D. Huygens

227. Which of the following has the smallest wavelength band?

- A. Blue
- B. Indigo**
- C. Green
- D. Yellow

228. What color has the longest wavelength?

- A. Orange
- B. Red**
- C. Yellow
- D. Green

229. What color has the shortest wavelength?

- A. Indigo
- B. Violet**
- C. Blue
- D. Green

230. What is the wavelength band of orange?

- A. 550 nm – 600 nm
- B. 600 nm – 650 nm**
- C. 650 nm – 700 nm
- D. 500 nm – 550 nm

231. What is the wavelength band in nanometer of visible light?

- A. 350 – 700**
- B. 350 – 800
- C. 300 – 700
- D. 300 – 800

232. What terms is used to describe the angular opening of a sphere that encloses the mirror?

- A. Angle of curvature
- B. Focal point
- C. Aperture**
- D. Vertex

233. What makes the sun visible even before it is in the line with the horizon?

- A. Diffraction
- B. Reflection
- C. Refraction**
- D. Diffusion

234. When the white light is passed through a prism, the different lights are bent to varying degrees and are dispersed into different colors. Which of these colors bends the most?

- A. Violet**
- B. Red
- C. Orange
- D. Green

235. When the white light is passed through a prism, the different lights are bent to varying degrees and are dispersed into different colors. Which of these colors bends the least?

- A. Violet
- B. Red**
- C. Orange
- D. Green

236. The formation of rainbow in the sky is due to _____.

- A. diffraction
- B. reflection
- C. refraction**
- D. diffusion

237. What refers to the defect in lenses which causes unequal refraction of the different colors?

- A. Chromatic diffraction
- B. Chromatic polarization
- C. Chromatic aberration**
- D. Chromatic dispersion

238. What property of a light wave is determined by its wavelength?

- A. Color**
- B. Shape
- C. Size
- D. Density

239. What is diffraction?

- A. It is the scattering of white light behind an obstruction.**
- B. It is the separation of white light into its component colors.
- C. It is the merging of component colors into white light.
- D. It is the absorption of white light in the atmosphere.

240. What is dispersion?

- A. It is the scattering of white light behind an obstruction.
- B. It is the separation of white light into its component colors.**
- C. It is the merging of component colors into white light.
- D. It is the absorption of white light in the atmosphere

241. What are primary colors?

- A. Blue, Red and White
- B. Light colors
- C. Colors which when combined produce white light**
- D. Blue, Red and Green

242. What device used to measure atmospheric pressure and is consists of a glass tube sealed at one end filled with mercury and a slide with a vernier scale?

- A. Bourdon gage
- B. Aneroid barometer
- C. Mercury barometer**
- D. Manometer

243. A wave that needs a material medium through which it can travel as it transfers energy?

- A. Electromagnetic wave
- B. Radiowave
- C. Microwave
- D. Mechanical wave**

244. What refers to the band of colors produced when sunlight passes through a prism?

- A. Light spectrum
- B. Solar spectrum**
- C. White spectrum
- D. Visible spectrum

245. What refers to the property of some media to transmit light wave in a diffused matter to make objects behind them undistinguishable?

- A. Lucidity
- B. Limpidity
- C. Transparent
- D. Translucent**

246. What refers to the invisible electromagnetic waves shorter than the visible violet wave but longer than the Roentgen ray?

- A. Beta ray
- B. Ultraviolet light**
- C. Alpha ray
- D. X-ray

247. What refers to the part of the shadow from which all light is excluded?

- A. Footprint
- B. Lumbra
- C. Umbra**
- D. Sunspot

248. The range of the projectile is:

- A. directly proportional to the gravitational acceleration
- B. directly proportional to the square of the velocity**
- C. directly proportional to the velocity
- D. inversely proportional to the velocity

249. What instrument is used to measure humidity of air?

- A. Hydrometer
- B. Hygrometer**
- C. Lactometer
- D. Radiometer

263. At what temperature reading do the Celsius scale and the Fahrenheit scale have the same temperature?

- A. - 40**
- B. - 30
- C. - 20
- D. - 25

264. The _____ of the source is the luminous flux per unit area of the source.

- A. luminous emittance**
- B. luminous efficiency
- C. luminous intensity
- D. illumination

265. Brightness is the same as _____.

- A. luminous emittance**
- B. luminous efficiency
- C. luminous intensity
- D. illumination

266. What is a monochromatic light?

- A. Light with only one color
- B. Light with only one wavelength
- C. Light with only one color and one wavelength**
- D. Light with many colors

267. What is a three-dimensional image of an object illuminated by a broad band of coherent light?

- A. Hologram**
- B. Polygram
- C. Opaque image
- D. Translucent image

268. In opaque material,

- A. light is able to pass through
- B. the reflected energy is absorbed within a very thin layer and converted to heat**
- C. light is partially absorbed
- D. the refracted energy is absorbed within a thick layer and converted to heat

269. In translucent material,

- A. light is able to pass through
- B. the refracted energy is absorbed within a very thin layer and converted to heat
- C. light is partially absorbed**
- D. the reflected energy is absorbed within a thick layer and converted to heat

270. In transparent material,

A. light is able to pass through

B. the refracted energy is absorbed within a very thin layer and converted to heat

C. light is partially absorbed

D. the refracted energy is absorbed within a thick layer and converted to heat

271. The ratio of the speeds of light in two different media is known as _____.

A. index of refraction

B. index of diffraction

C. relative index of refraction

D. index of diffusion

272. What occurs when two waves combine so that one subtracts from the other?

A. Interference

B. Superposition

C. Reinforcement

D. Polarization

273. What type of waves is produced in the stem when tuning fork?

A. Transverse wave

B. Longitudinal wave

C. Neither transverse wave nor longitudinal wave

D. Both transverse wave and longitudinal wave

274. The moment of inertia of an object is dependent on which of the following?

A. The object's size and shape

B. The object's mass

C. The location of the axis of rotation

D. All of the above

275. Which of the following statements about center of gravity is TRUE?

A. It may be outside the object

B. It is always at its geometrical center

C. It is always in the interior of the object

D. It is sometimes arbitrary

276. A diatonic scale is a musical scale build up of how many major chords?

- A. 2
- B. 3**
- C. 4
- D. 5

277. A chromatic scale is a diatonic scale with how many added half tones?

- A. 2
- B. 3
- C. 4
- D. 5**

278. What refers to two colors which combine to form white light?

- A. Complementary colors**
- B. Secondary colors
- C. Primary colors
- D. Elementary colors

279. A spectrum consisting of a wide range of unseparated wavelength is called _____.

- A. visible spectrum
- B. continuous spectrum**
- C. emission spectrum
- D. discontinuous spectrum

280. What refers to the emission of electrons from a heated metal in a vacuum?

- A. Geiger effect
- B. Edison effect**
- C. Eddy current
- D. Fraunhofer effect

281. The six colors of which sunlight is composed are called _____.

- A. secondary colors
- B. primary colors
- C. complementary colors
- D. elementary colors**

282. A spectrum formed by the dispersion of light from an incandescent solid, liquid and gas is called _____.
- A. visible spectrum
 - B. continuous spectrum
 - C. emission spectrum**
 - D. discontinuous spectrum
283. What is the type of force which binds the protons and neutrons together in the nucleus of an atom?
- A. Drag force
 - B. Bind force
 - C. Exchange force**
 - D. Intact force
284. The “f” number of the lens is the ration of the:
- A. focal length of the lens to the effective aperture**
 - B. effective aperture to the focal length of the lens
 - C. magnifying power of lens to effective aperture
 - D. effective aperture to magnifying power of the lens
285. What refers to the length of time during which half of a given number of radioactive nuclei will disintegrate?
- A. active life
 - B. half cycle
 - C. half life**
 - D. half period
286. What refers to the lowest pitch produced by a musical tone source?
- A. Treble
 - B. Bass
 - C. Octave
 - D. Fundamental**
287. What is an electromagnetic radiation of very short wavelength emitted from the nucleus of a radioactive atom?
- A. Beta ray
 - B. Alpha ray
 - C. Gamma ray**
 - D. X-ray

288. What is an instrumental used to detect and measure radioactivity?

- A. Edison counter
- B. Radioactive counter
- C. Fraunhofer counter
- D. Geiger effect**

289. What refers to the fundamentals and the tones whose frequencies are whole number multiples of the fundamentals?

- A. Harmony
- B. Beats
- C. Treble and bass
- D. Harmonics**

290. A spectrum consisting of monochromatic slit images having wavelengths characteristic of the atoms parent is called _____.

- A. line spectrum**
- B. continuous spectrum
- C. slit spectrum
- D. image spectrum

291. What is an instrument used to determine the mass of atomic particles?

- A. Mass indicator
- B. Mass spectrograph**
- C. Mass counter
- D. Mass technograph

292. What is a nucleon?

- A. A proton in the nucleus of an atom.
- B. An electron in the nucleus of an atom.
- C. A neutron in the nucleus of an atom.
- D. A proton or a neutron of an atom.**

293. What is a glass bottle used to determine the specific gravity of liquids?

- A. Beaker
- B. Flask
- C. Pyonometer**
- D. Graduated cylinder

294. What is an instrument used to determine the angle of rotation of the plane of polarized light?

A. Polariscopes

B. Polarimeter

C. Polargraph

D. Polagraph

295. What refers to the property of sound waves which depends on the number of harmonics present and on their prominence?

A. Pitch

B. Quality

C. Harmonic

D. Fundamental

296. What refers to the failure of one set of color receptors in the eye to be stimulated?

A. Retinal failure

B. Retinal fatigue

C. Pupil imperfection

D. Astigmatism

297. The theory that the retina of the eye is provided with three sets of receptors, each of which is sensitive to one of the three primary colors is known as _____.

A. True color vision theory

B. Young – Helmholtz color vision theory

C. Primary vision theory

D. Young – Huygen primary vision theory

298. What is a probable explanation for observe phenomena which is supported by abundant data?

A. Theory

B. Hypothesis

C. Axiom

D. Conclusion

299. A tempered scale is a musical scale with _____ equal frequency ratio intervals between the successive notes of an octave.

A. 9

B. 10

C. 11

D. 12

300. What is unifying theory applicable to the divergent phenomena of light which assumes that the transfer of energy between light and matter occurs only in discrete quantities proportional to the frequency of the energy transferred?

A. Quantum theory

B. Radioactive theory

C. Nuclear energy

D. Quark energy

301. The wavelength of a source wave in a certain material as measured is 18 cm. The frequency of the wave is 1900 Hz. Compute the speed of sound wave?

A. 342 m/s

B. 400 m/s

C. 542 m/s

D. 300 m/s

302. A horizontal cord 5 m long has a mass of 2.5 grams. What must be the tension in the cord if the wavelength of a 120 Hz wave on it is to be 50 cm?

A. 1.50 N

B. 1.80 N

C. 2.50 N

D. 4.30 N

303. A 3-m string is driven by a 240 Hz vibrator at its end. Determine the speed of transverse waves on the string if it resonates four segments?

A. 340 m/s

B. 360 m/s

C. 430 m/s

D. 420 m/

304. A guitar string 30 cm long resonates in its fundamental to a frequency of 250 Hz. What is the tension in the string if 80 cm of the string “weighs” 0.80 grams?

A. 20 N

B. 30 N

C. 10 N

D. 40 N

305. A piano string with a length of 1.17 m and a mass of 21.0 g is under tension of 6.4×10^3 N, what is the fundamental frequency?

- A. 225 Hz
- B. 187 Hz
- C. 255 Hz**
- D. 290 Hz

306. A rope 4 ft long weighs 0.7 lb. A blow on the rope produces a transverse wave. Determine the velocity of the wave considering that the tension is 40 lb.

- A. 75.8 ft/s
- B. 95.7 ft/s
- C. 78.5 ft/s
- D. 85.8 ft/s**

307. What is the relative intensity level of sound in decibels if its intensity is 3×10^{-7} W/cm²?

- A. 94.8**
- B. 78.7
- C. 80.5
- D. 75.4

308. A wave has pressure amplitude of 5 dynes/cm² and a velocity of 35.7 m/s, what is the absolute intensity considering that 0.001293 gm/cm³?

- A. 1.27×10^{-8} W/cm²
- B. 1.47×10^{-8} W/cm²
- C. 3.27×10^{-8} W/cm²
- D. 2.71×10^{-8} W/cm²**

309. A train blowing its whistle at 750 Hz approaches a station at the rate of 35 mph. What frequency is heard by a man standing at the station considering the velocity of sound in air 1100 ft/s?

- A. 739.7 Hz
- B. 857.4 Hz
- C. 716.4 Hz
- D. 786.7 Hz**

310. Two cars A and B are traveling toward each other at speeds of 45 km/hr and 70 km/hr respectively. If A blowing its horn, what is the relative pitch heard by a passenger in B, considering that the velocity of sound is 344 m/s?

- A. 1.043
- B. 1.021
- C. 1.096**
- D. 1.078

311. An explosion occurs at a distance of 5 km from the observer. How long after the explosion does a person hear if the temperature is 18°C? Note: the speed of sound at STP (standard temperature and pressure) is 332 m/s and changes by 0.6 m/s for every 1 °C change in temperature.

A. 14.58 s

B. 12.45 s

C. 11.87 s

D. 17.54 s

312. What is the speed of sound in neon gas at temperature of 25°C considering that the molecular mass if this gas is 20.18 kg/mol? Neon is monoatomic. Use $k = 1.67$

A. 543.7 m/s

B. 478.6 m/s

C. 321.7 m/s

D. 447.5 m/s

313. What is the wavelength of yellow light whose frequency is 5×10^{14} Hz?

A. 800 mm

B. 200 mm

C. 600 mm

D. 700 mm

314. What is the angle of refraction of light as a beam of parallel light enters a block of ice at angle of incidence of 30°? The index of refraction of ice is 1.31 and that of air is 1.0.

A. 45°

B. 30°

C. 22°

D. 26°

315. A light ray is incident at an angle of 45° on one side of a glass plate of index of refraction 1.6. Find the angle at which the ray emerges from the other side of the plate.

A. 26°

B. 20°

C. 22°

D. 28°

316. It was found out that the speed of light in water is 75% of its speed in vacuum. What is the index of refraction of water?

- A. 1.46
- B. 1.33**
- C. 1.26
- D. 1.67

317. A glass plate is 0.6 cm thick and has a refractive index of 1.55. Compute how long will it take for a pulse of light to pass through the plate?

- A. 4.41×10^{-12} s
- B. 3.11×10^{-11} s**
- C. 1.34×10^{-12} s
- D. 2.34×10^{-11} s

318. A light passes from glass to water. If the index of refraction for glass is 1.54 and for water is 1.33, compute the critical angle for this light to pass the glass.

- A. 59.7°**
- B. 45.8°
- C. 67.4°
- D. 50.9°

319. A light source emits a total luminous flux of 1000 lumens and distributed uniformly over 25% of a sphere. What is the luminous intensity at 2.5-meter distance?

- A. 413 cd
- B. 243 cd
- C. 134 cd
- D. 318 cd**

320. A light bulb emits a total luminous flux of 1700 lumens, distributed uniformly over a hemisphere. What is the illuminance at a distance of 2 meters?

- A. 67.65 lm/m^2**
- B. 35.70 lm/m^2
- C. 59.87 lm/m^2
- D. 23.56 lm/m^2

321. A light bulb is used to light a bunker 10 ft below. A chair sits on the floor of the bunker 3 feet from a spot directly below the bulb. What is the illumination on the floor around the chair if the luminous intensity is 150 candles?
- A. 2.38 footcandles
 - B. 2.43 footcandles
 - C. 3.87 footcandles
 - D. 1.38 footcandles**
322. A light ray passing through air and strikes a glass surface at an angle of 55° from the normal surface. What is the angle between the reflected light and the surface?
- A. 55°
 - B. 25°
 - C. 35°**
 - D. 45°
323. A converging lens of focal length 20 cm is placed 37 cm in front of a screen. At what distance that the object be placed so that its image appears on the screen?
- A. 43.5 cm**
 - B. 35.7 cm
 - C. 27.6 cm
 - D. 50.7 cm
324. In what positions will a converging lens of focal length 10 cm form an image of luminous object on a screen located 50 cm from the object?
- A. 11.52 cm and 38.48 cm from the object
 - B. 10 cm and 40 cm from the object
 - C. 13.82 cm and 36.18 cm from the object**
 - D. 12.56 cm and 37.44 cm from the object
325. A lens has a convex surface of radius 17 cm and a concave surface of radius 38 cm and is made of glass of refractive index 1.55. Calculate the focal length of the lens and classify the type of lens whether diverging or converging?
- A. 55.93 cm converging lens**
 - B. 57.45 cm diverging lens
 - C. 55.93 cm diverging lens
 - D. 57.45 cm converging lens

326. A double convex lens has faces of radii 16 and 18 cm. When an object is 20 cm from the lens, a real image is formed 30 cm from the lens. What is the focal length of the lens?

- A. 11 cm
- B. 10 cm
- C. 12 cm**
- D. 14 cm

327. A double convex lens has faces of radii 22 and 24 cm. When an object is 30 cm from the lens, a real image is formed 45 cm from the lens. Compute the refractive index of the lens material

- A. 1.64**
- B. 1.32
- C. 1.21
- D. 1.76

328. A 50 watt incandescent lamp has a mean spherical luminous intensity of 66.5 candelas. Compute the total luminous flux radiated by the lamp?

- A. 842 lm**
- B. 457 lm
- C. 786 lm
- D. 987 lm

329. A 250 W light source has a mean spherical luminous intensity of 87.5 candelas. Compute the luminous intensity of the lamp?

- A. 4.7 lm/s
- B. 4.4 lm/s**
- C. 2.0 lm/s
- D. 1.7 lm/s

330. Compute the illumination on a surface 5 ft distance from a 100-cd source if the surface makes an angle of 18° with the rays?

- A. 1.67 lm/ft²
- B. 1.50 lm/ft²
- C. 1.24 lm/ft²**
- D. 2.13 lm/ft²

331. Estimate the distance for which a 30-cd lamp provide the same illumination as a standard lamp of 80-cd placed 17 ft from the screen?

- A. 9.76 ft
- B. 8.5 ft
- C. 12.7 ft
- D. 10.41 ft**

332. A Plano-convex lens has a focal length of 35 cm and an index of refraction 1.53. Find the radius of the convex surface.

- A. 18.55 cm**
- B. 15.78 cm
- C. 20.78 cm
- D. 17.55 cm

333. If a beam of polarized light has one-twelfth of its initial intensity after passing through an analyzer, what is the angle between the axis of the analyzer and the initial amplitude of the beam?

- A. 65.73°
- B. 76.27°
- C. 73.22°**
- D. 67.54°

334. An observer sees a spaceship, measured 100 m long when at rest. He passed by in uniform motion with the speed of $0.5c$. While the observer is watching the spaceship, a time of 2 s elapses on a clock on board the ship, what is the length of the moving spaceship?

- A. 82 m
- B. 85 m
- C. 83 m
- D. 87 m**

335. The captain of a spacecraft send a pulse of light towards earth and then exactly 1 min. later (as measured by the clock on the spacecraft), sends a second pulse. An observer on earth sees the second pulse arrive 4 minutes after the first. What is the velocity of the spacecraft relative to the earth?

- A. $0.987c$
- B. $0.968c$**
- C. $0.954c$
- D. $0.953c$

336. What is the rest energy of electron equivalent to its rest mass? $1\text{MeV} = 1.60 \times 10^{-13} \text{ J}$ and mass of electron is $9.11 \times 10^{-31} \text{ kg}$.

- A. 0.512 MeV**
- B. 0.987 MeV
- C. 0.345 MeV
- D. 0.675 MeV

337. What is the frequency of photon having energy of 2 eV?

- A. 560 THz
- B. 300 THz
- C. 250 THz
- D. 480 THz**

338. A red light passes an empty space. What is the momentum of a single photon of red light whose frequency is $400 \times 10^{12} \text{ Hz}$?

- A. $8.8 \times 10^{-28} \text{ kg m/s}$**
- B. $7.6 \times 10^{-28} \text{ kg m/s}$
- C. $5.4 \times 10^{-28} \text{ kg m/s}$
- D. $6.5 \times 10^{-28} \text{ kg m/s}$

339. The eye can detect as little as $1 \times 10^{-18} \text{ J}$ of electromagnetic energy. How many photons of orange light whose wavelength is 600 nm present in the energy?

- A. 5
- B. 4
- C. 3**
- D. 1

340. What is the speed of sound through compressed water (100 kPa) if its volume decreased by 0.005% of its original volume?

- A. 1414 m/s**
- B. 1250 m/s
- C. 1130 m/s
- D. 1200 m/s

341. What is the bulk modulus of steel if the sound waves traveled at approximately 5900 m/s? Note: the density of steel is 7900 kg/m^3

- A. $2.75 \times 10^{11} \text{ Pa}$**
- B. $1.25 \times 10^{11} \text{ Pa}$
- C. $1.15 \times 10^{11} \text{ Pa}$
- D. $2.45 \times 10^{11} \text{ Pa}$

342. A certain loud speaker has a circular opening with a diameter of 15 cm. Assume that the sound it emits is uniform and outward through this entire opening. How much power is being radiated by the loudspeaker if the sound intensity at opening is $150\mu\text{W}/\text{m}^2$?

- A. $1.77\ \mu\text{W}$
- B. $1.87\ \mu\text{W}$
- C. $2.65\ \mu\text{W}$**
- D. $3.41\ \mu\text{W}$

343. Sound intensity that reaches $1.2\ \text{W}/\text{m}^2$ is painful to human ear. How many decibels is $1.2\ \text{W}/\text{m}^2$?

- A. 240.5 dB
- B. 170.4 dB
- C. 120.8 dB**
- D. 134.5 dB

344. Compute the ratio of the intensities of sounds if one is 12 times louder than the other?

- A. 13.47 dB
- B. 15.85 dB**
- C. 18.76 dB
- D. 14.54 dB

345. An automobile moving at 30 m/s is approaching a building whistle with a frequency of 500 Hz. If the speed of sound in air is 340 m/s what is the apparent frequency of the whistle heard by the driver?

- A. 459 Hz
- B. 458 Hz
- C. 457 Hz
- D. 456 Hz**

346. What is the mass of electron traveling at half the speed of light?

- A. $1.05 \times 10^{-30}\ \text{kg}$**
- B. $2.31 \times 10^{-30}\ \text{kg}$
- C. $1.56 \times 10^{-31}\ \text{kg}$
- D. $1.61 \times 10^{-31}\ \text{kg}$

347. A medium unshaded lamp hangs 8 m directly above the table. To what distance should it be lowered to increase the illumination to 4.45 times its former value?

- A. 4.02 m
- B. 3.86 m
- C. 3.79 m**
- D. 4.21 m

348. A floodlight emitting 25,000 candelas in the center of its beam is aimed at 50° to a point on the ground 20 meters away. The illumination of the point in flux is:

- A. 54.12
- B. 62.5
- C. 31.25**
- D. 625

349. Compute the speed of sound in neon gas at 27°C of molecular mass 20.18 kg/kmol and k of 1.67.

- A. 454 m/s**
- B. 564 m/s
- C. 356 m/s
- D. 434 m/s

350. A magnifying glass has a lens with an index of refraction 1.5 and radii of curvature of 2.95 feet and 4.27 feet for the two faces. What is the magnification of the lens when it is held 2.36 inches from an object being viewed?

- A. 1.6
- B. 2.78
- C. 2.16
- D. 1.98**

MULTIPLE CHOICE
QUESTIONS in
ENGINEERING MANAGEMENT

Encoded by:

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1. Management is:
 - A. An art**
 - B. Both science and art
 - C. A science
 - D. Neither art nor science
2. Engineering is:
 - A. An art
 - B. Both science and art
 - C. A science**
 - D. Neither art nor science
3. Engineers can become good managers only through _____.
 - A. Experience
 - B. Taking master degree in management
 - C. Effective career planning**
 - D. Trainings
4. If you are an engineer wanting to become a manager, what will you do?
 - A. Develop new talents
 - B. Acquire new values
 - C. Broaden your point of view
 - D. All of the above**
5. When engineer enters management, what is the most likely problem he finds difficult to acquire?
 - A. Learning to trust others
 - B. Learning how to work through others
 - C. Learning how to take satisfaction in the work of others
 - D. All of the above**
6. What management functions refers to the process of anticipating problems, analyzing them, estimating their likely impact and determining actions that will lead to the desired outcomes and goals?
 - A. Planning**
 - B. Leading
 - C. Controlling
 - D. Organizing

7. What refers to the establishing interrelationships between people and things in such a way that human and materials resources are effectively focused toward achieving the goal of the company?

- A. Planning
- B. Leading
- C. Controlling
- D. Organizing**

8. What management function involves selecting candidates and training personnel?

- A. Organizing
- B. Staffing**
- C. Motivating
- D. Controlling

9. What management function involves orienting personnel in the most effective way and channeling resources?

- A. Directing**
- B. Planning
- C. Organizing
- D. Leading

10. Actual performance normally is the same as the original plan and therefore it is necessary to check for deviation and to take corrective action. This action refers to what management function?

- A. Organizing
- B. Planning
- C. Controlling**
- D. Staffing

11. What refers to management function which is to encourage others to follow the example set for them, with great commitment and conviction?

- A. Staffing
- B. Motivating
- C. Controlling
- D. Leading**

12. What refers to a principal function of lower management which is to instill in the workforce a commitment and enthusiasm for pursuing the goals of the organization?

- A. Directing
- B. Motivating**
- C. Staffing
- D. Controlling

13. What refers to the collection of the tools and techniques that are used on a predefined set of inputs to produce a predefined set of outputs?

A. Project Management

B. Engineering Management

C. Management

D. Planning

14. Which is NOT an element of project management process?

A. Data and information

B. Research and development

C. Decision making

D. Implementation and action

15. What is the most essential attribute of a project manager?

A. Leadership

B. Charisma

C. Communication skill

D. Knowledge

16. In project management, what provides a simple yet effective means of monitoring and controlling a project at each stage of its development?

A. R & D model

B. Project feasibility

C. Life cycle model

D. All of the above

17. What project life cycle model is the most relevant for information technology project?

A. Morris model

B. Waterfall model

C. Incremental release model

D. Prototype model

18. In project management, "R & D" stands for:

A. Retail Distribution

B. Research and Development

C. Repair and Develop

D. Reduce and Deduce

19. In project management O & M stands for:

A. Operation and Manpower

B. Operation and Maintenance

C. Operation and Management

D. Operation and Mission

20. A project management must be very good in which of the following skills?
- A. Communication skills
 - B. Human relationship skills
 - C. Leadership skills
 - D. All of the above**
21. Project integration management involves which of the following processes?
- A. Project plan development
 - B. Project plan execution
 - C. Integrated change control
 - D. Quality planning**
22. Project quality management involves all of the following processes except:
- A. Quality planning
 - B. Quality assurance
 - C. Quality Control
 - D. Quality feature**
23. What is defined as an organized method of providing past, present, and projected information on internal operations and external intelligence for use in decision-making?
- A. Electronic Data Processing Systems
 - B. Management Information System**
 - C. Central Processing System
 - D. Data Management System
24. Middle management level undertakes what planning activity?
- A. Intermediate planning**
 - B. Strategic planning
 - C. Operational planning
 - D. Direct planning
25. Strategic planning is undertaken in which management level?
- A. Lower management level
 - B. Middle management level
 - C. Top management level**
 - D. Lowest management level
26. What is the advantage of free-rein style of leadership?
- A. Little managerial control and high degree of risk**
 - B. Time consuming and cost ineffective
 - C. Little ideas from subordinate in decision- making
 - D. All of the above

27. If you are appointed as a division manager, your first task is most likely to
- A. Set goals**
 - B. Determine the resources needed
 - C. Set a standard
 - D. Develop strategies and tactics
28. What is defined as the process of planning, organizing, and controlling operations to reach objective efficiently and effectively?
- A. General Management
 - B. Engineering Management
 - C. Production Management
 - D. Operations Management**
29. For a project manager to achieve his given set of goals through other people, he must have a good _____.
- A. Interpersonal skills**
 - B. Communication skills
 - C. Leadership
 - D. Decision- making skills
30. What type of conflict do managers encounter when there is disagreement on issues of territorial power or hidden agenda?
- A. Technical opinion conflict
 - B. Politics**
 - C. Ambiguous roles
 - D. Managerial procedure conflict
31. The process of partitioning an organization into subunits to improve efficiency is known as _____.
- A. Division of labor
 - B. Segmentation
 - C. Departmentalization**
 - D. Territorialization
32. By departmentalization of an organization, it decentralizes _____?
- A. Authority
 - B. Responsibility
 - C. Accountability
 - D. All of the above**

33. What type of committee companies or corporations created for a short term purpose only?
- A. Interim committee
 - B. Temporary committee
 - C. Standing committee
 - D. Ad hoc committee**
34. What refers to a description of whether the objectives are accomplished?
- A. Efficiency
 - B. Effectiveness**
 - C. Ability to manage
 - D. Decision- making ability
35. An engineering is required to finish a certain engineering job in 20 days. He is said to be _____ if he finished the job within the required period of 20 days
- A. Efficient
 - B. Effective**
 - C. Reliable
 - D. Qualified
36. If an engineer provides less input (labor and materials) to his project and still come out with the same output, he is said to be more _____.
- A. Managerial skill
 - B. Economical
 - C. Effective
 - D. Efficient**
37. To determine a qualified applicant, the engineer manager will subject the applicant to a test that is used to measure a person's current knowledge of a subject?
- A. Interest test
 - B. Aptitude test
 - C. Performance test**
 - D. Personality test
38. What type of training is a combination of on-the-job training and experience with classroom instruction in particular subject?
- A. On-the-job training
 - B. Vestibule school
 - C. Apprenticeship program**
 - D. In-basket

39. What type of authority refers to a specialist's right to oversee lower level personnel involved in the project regardless of the personnel's assignment in the organization?

- A. Top authority
- B. Line authority
- C. Staff authority
- D. Functional authority**

40. When a consultant or specialist gives advice to his superior, he is using what type of authority?

- A. Top authority
- B. Line authority
- C. Staff authority**
- D. Functional authority

41. When structuring an organization, the engineer manager must be concerned with the determining the scope of words and how it is combined in a job. This refers to _____.

- A. Division of labor**
- B. Delegation of authority
- C. Departmentation
- D. Span of control

42. When structuring an organization, the engineer must be concerned with the grouping of related jobs, activities, or processes into major organizational subunits. This refers to:

- A. Division of labor
- B. Delegation of authority
- C. Departmentation**
- D. Span of control

43. Which technique will the manager use when evaluating alternative using qualitative evaluation?

- A. Comparison technique
- B. Intuition and subjective judgment**
- C. Rational technique
- D. Analytical technique

44. Which technique will the manager use when evaluating alternative using quantitative evaluation?

- A. Rational and analytical techniques**
- B. Intuition and subjective judgment
- C. Comparison in number technique
- D. Cost analysis

45. What refers to the strategic statement that identifies why an organization exists, its philosophy of management, and its purpose as distinguished from other similar organizations in terms of products, services and markets?

A. Corporate mission

- B. Corporate vision
- C. Corporate character
- D. Corporate identity

46. What refers to a process of influencing and supporting others to work enthusiastically toward achieving objectives?

A. Power

- B. Leadership
- C. Teamwork
- D. Charisma

47. What describes how to determine the number of service units that will minimize both customer's waiting time and cost of service?

A. Queuing theory

- B. Network model
- C. Sampling theory
- D. Simulation

48. What refers to the rational way to conceptualize, analyze and solve problems in situations involving limited or partial information about the decision environment?

- A. Sampling theory
- B. Linear programming

C. Decision theory

- D. Simulation

49. What is quantitative technique where samples of populations are statistically determined to be used for a number of processes, such as quality control and marketing research?

A. Sampling theory

- B. Linear programming
- C. Statistical decision theory
- D. Simulation

50. The engineer manager must be concern with the needs of his human resources. What refers to the need of the employees for food, drinks, and rest?

A. Physiological need

- B. Security need
- C. Esteem need
- D. Self- actualization need

51. What refers to the learning that is provided in order to improve performance on the present job?

A. Training

B. Development

C. Vestibule

D. Specialized courses

52. What technique is best suited for projects that contain many repetitions of some standard activities?

A. Benchmark job technique

B. Parametric technique

C. Modular technique

D. Non- modular technique

53. What organizational structure is based on the assumption that each unit should specialize in a specific functional area and perform all of the tasks that require its expertise?

A. Functional organization

B. Territorial organization

C. Process organization

D. Product organization

54. What type of organization structure in which each project is assigned to a single organizational unit and the various functions are performed by personnel within the unit?

A. Functional organization

B. Territorial organization

C. Process organization

D. Product organization

55. What organizational structure provides a sound basis for balancing the use of human resources and skills?

A. Functional organization

B. Matrix organization

C. Process organization

D. Product organization

56. In which type of organization where the structure can lead to a “dual boss” phenomenon?

A. Functional organization

B. Matrix organization

C. Process organization

D. Product organization

57. Which one is an advantage of a matrix organization?
- A. Rapid reaction organization**
 - B. Adaptation to changing environment
 - C. State-of-the-art technology
 - D. Better utilization of resources
58. Which one is a disadvantage of a matrix organization?
- A. Dual accountability of personnel
 - B. Conflicts between project and functional managers
 - C. Profit-and-loss accountability difficult
 - D. Inefficient use of specialist**
59. Which one is an advantage projectized organization?
- A. Efficient use of technical personnel**
 - B. Good project schedule and cost control
 - C. Single point for customer contact
 - D. Rapid reaction time possible
60. Which one is a disadvantage of a projectized organization?
- A. Uncertain technical direction
 - B. Inefficient use of specialist
 - C. Insecurity regarding future job assignments
 - D. Slower work flow**
61. Which one is an advantage of a functional organization?
- A. Efficient use of technical personnel
 - B. Rapid reaction time possible**
 - C. Career continuity and growth of technical personnel
 - D. Good technology transfer between projects
62. Which one is disadvantage of a functional organization?
- A. Weak customer interface
 - B. Weak project authority
 - C. Inefficient use of specialist**
 - D. Slower work flow
63. In what type of organization where a project manager is held responsible for completion of the project and is often assigned a budget?
- A. Functional organization
 - B. Matrix organization**
 - C. Projectized organization
 - D. Project coordinated organization

64. In selecting an organizational structure, which of the following is not a criterion?
- A. Finance and accounting
 - B. Customer relation
 - C. Location**
 - D. Technology
65. What is NOT a factor to be taken into consideration when selecting an organizational structure for managing projects?
- A. Overhead cost
 - B. Type of technology used
 - C. Location of the project**
 - D. Level of uncertainty in projects
66. If a project have multidimensional goals, the project manager often use his _____ to reach a compromise solution.
- A. Leadership
 - B. Tradeoff analysis skill**
 - C. Authority
 - D. Decision-making skill
67. Who is responsible for ensuring that the project is completed successfully as measured by time, cost, performance and stakeholder satisfaction?
- A. Functional manager
 - B. Project manager**
 - C. Chief engineer
 - D. Department supervisor
68. Who is responsible for running a department so that all his customers are served efficiently and effectively?
- A. Area manager
 - B. Sales manager
 - C. Functional manager**
 - D. Project manager
69. What is the major activity of the project support office?
- A. Administrative support for projects**
 - B. Support for tools and techniques
 - C. Overall project management support
 - D. Project management via the internet

70. What is the major activity of the project office?
- A. Administrative support for projects
 - B. Support for tools and techniques
 - C. Overall project management support**
 - D. Project management via internet
71. What is an important tool for the design and implementation of the project's work content?
- A. Linear responsibility chart**
 - B. Gantt chart
 - C. Life cycle model
 - D. Project design chart
72. What chart summarizes the relationships between project stakeholders and their responsibilities in each project element?
- A. Linear responsibility chart
 - B. Matrix responsibility chart
 - C. Responsibility interface matrix
 - D. All of the above**
73. What network model enables engineer managers to schedule, monitor, and control large and complex projects by using only one time factor per activity?
- A. Forecasting
 - B. Critical path method**
 - C. Program evaluation review technique
 - D. Simulation
74. What network model enables engineer managers to schedule, monitor, and control large and complex projects by employing three time estimate for each activity?
- A. Forecasting
 - B. Critical path method
 - C. Program evaluation review technique**
 - D. Simulation
75. For a project manager to have an effective means of identifying and communicating the planned activities and their interrelationships, he must use a network technique. One of the network techniques is commonly known as CPM. What does CPM stands for?
- A. Critical plan method
 - B. Critical path method**
 - C. Critical project method
 - D. Coordinated plan method

76. For a project manager to have an efficient means of identifying and communicating the planned activities and their interrelationships, he must use a network technique. One of the network techniques is commonly known as PERT. What does Pert stands for?

- A. Project evaluation review technique
- B. Program evaluation review technique**
- C. Path evaluation review technique
- D. Program execution review technique

77. What is the benefit of using PERT/CPM network as integral component of project management?

- A. They furnish a consistent framework for planning, scheduling, monitoring and controlling project.
- B. They illustrate the interdependencies of all tasks
- C. They can be used to estimate the expected project completion dates as well as the probability that the project will be completed by a specific date
- D. All of the above**

78. The CPM was developed by Rand and Walker in what year?

- A. 1957**
- B. 1958
- C. 1959
- D. 1960

79. In what year was PERT developed?

- A. 1957
- B. 1958**
- C. 1959
- D. 1960

80. In Morris life cycle model, a project is divided into how many stages to be performed in sequence?

- A. 3
- B. 4**
- C. 5
- D. 6

81. What is the first stage in the life cycle of a project using Morris model?

- A. Planning and design
- B. Feasibility**
- C. Production
- D. Turnover and startup

82. Risk management is:
- A. Risk avoidance
 - B. Controlling risk**
 - C. To gain opportunities
 - D. All of the above
83. What technique a manager must use if he decides to absorb the risk in the project?
- A. Create buffer in the form of management reserve or extra time in schedule**
 - B. Use a different technology
 - C. Use a different supplier
 - D. Buying insurance
84. Buying insurance is a form of:
- A. Risk elimination
 - B. Risk reduction
 - C. Risk sharing**
 - D. Risk absorption
85. What refers to any technique used either to minimize the probability of an accident or to mitigate its consequences?
- A. Reliability management
 - B. Risk management**
 - C. Quality assurance management
 - D. Project assurance management
86. What refers to the techniques that encompass risk assignment and the inclusive evaluation of risk, costs and benefits of alternative projects or policies?
- A. Risk management
 - B. Risk-benefit analysis**
 - C. Benefit management
 - D. Uncertainty analysis
87. What is measured by the amount of resources that a manager can allocate without the need to get an approval from his or her manager?
- A. Responsibility
 - B. Leadership
 - C. Authority**
 - D. Tradeoff skill

88. What is defined as a course of action aimed at ensuring that the organization will achieve its objectives?

- A. Goal
- B. Strategy**
- C. Program
- D. Plan

89. When there is a degradation of service provided by the company to clients, it is a sign that the engineer manager in-charge:

- A. Lacks leadership skill
- B. Has inadequate control**
- C. Has poor organization
- D. Has no proper planning

90. What principal element of uncertainty refers to a measure of the relevance of available information to the problem at hand?

- A. Statistical confidence
- B. Tolerance**
- C. Incompleteness of the data
- D. Ambiguity in modeling the problem

91. One of the mnemonic management tool used is the SMEAC. What does the acronym SMEAC stands for?

- A. Situation, Mission, Execution, Administration, Coordination
- B. Situation, Mission, Execution, Application, Communication
- C. Situation, Mission, Execution, Administration, Communication**
- D. Strategy, Mission, Execution, Administration, Communication

92. In the management tools, SMEAC, where A stands for administration, which is the appropriate question will the manager ask?

- A. What do we need to get it done?**
- B. What are we aiming to do?
- C. How are we going to do it?
- D. What is the operation environment?

93. In project management, what is usually the first step underlying in the process of performing a project?

- A. Select appropriate performance measures
- B. Define the goals of the project and their relative importance
- C. Identify a need for a product or service**
- D. Develop a technological concept

94. In the process of performing a project, after the need for a product or service is identified, what is usually the next step?

A. Define the goals of the project and their relative importance

- B. Develop a budget
- C. Develop a schedule
- D. Develop the technological concept

95. What is usually the last step in the process of performing a project?

- A. Select appropriate performance measures
- B. Implement a plan
- C. Monitor and control the project

D. Evaluate project success

96. To consider the consequence of uncertainty on project management, laws on project management are developed. One of which is “A careless planned project will take _____ times longer to complete than expected”.

A. Three

- B. Four
- C. Two
- D. Two and a half

97. In the typical functional organization hierarchy, the chief engineer is under the _____.

- A. Finance manager
- B. Manufacturing manager

C. General manager

- D. Marketing manager

98. What is a diagram of the organization’s official positions and formal lines of authority called?

A. Organization chart

- B. Authority chart
- C. Policy chart
- D. Control chart

99. What is defined as the process of identifying and choosing alternative courses of action in a manner appropriate to the demands of the situations?

- A. Sampling theory
- B. Alternative-analysis
- C. Problem-solving

D. Decision-making

100. What refers to the activity of incorporating the technical know how with the ability to organize and coordinate workforce, materials, equipment and all other resources including money?

- A. Engineering management**
- B. Engineering technology
- C. Technical manger
- D. General management

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1. First Benchmark Publishing's gross margin is 50% of sales. The operating costs of the publishing are estimated at 15% of sales. If the company is within the 40% tax bracket, determine the percent of sales is their profit after taxes?

- A. 21%**
- B. 20%
- C. 19%
- D. 18%

2. A farmer selling eggs at 50 pesos a dozen gains 20%. If he sells the eggs at the same price after the costs of the eggs rises by 12.5%, how much will be his new gain in percent?

- A. 6.89%
- B. 6.65%**
- C. 6.58%
- D. 6.12%

3. A feasibility study shows that a fixed capital investment of P10,000,000 is required for a proposed construction firm and an estimated working capital of P2,000,000. Annual depreciation is estimated to be 10% of the fixed capital investment. Determine the rate of return on the total investment if the annual profit is P3,500,000.

- A. 28.33%
- B. 29.17%**
- C. 30.12%
- D. 30.78%

4. The monthly demand for ice cans being manufactured by Mr. Camus is 3200 pieces. With a manual operated guillotine, the unit cutting cost is P25.00. An electrically operated hydraulic guillotine was offered to Mr. Camus at a price of P275,000.00 and which cuts by 30% the unit cutting cost. Disregarding the cost of money, how many months will Mr. Camus be able to recover the cost of the machine if he decides to buy now?

- A. 10 months
- B. 11 months
- C. 12 months**
- D. 13 months

5. Engr. Trinidad loans from a loan firm an amount of P100,000 with a rate of simple interest of 20% but the interest was deducted from the loan at the time the money was borrowed. If at the end of one year, she has to pay the full amount of P100,000, what is the actual rate of interest?

- A. 23.5%
- B. 24.7%
- C. 25.0%**
- D. 25.8%

6. A loan of P5,000 is made for a period of 15 months, at a simple interest rate of 15%, what future amount is due at the end of the loan period?

A. P5,937.50

B. 5,873.20

C. 5,712.40

D. 5,690.12

7. Mr. Bacani borrowed money from the bank. He received from the bank P1,842 and promised to repay P2,000 at the end of 10 months. Determine the rate of simple interest.

A. 12.19%

B. 12.03%

C. 11.54%

D. 10.29%

8. A college freshman borrowed P2,000 from a bank for his tuition fee and promised to pay the amount for one year. He received only the amount of P1,920 after the bank collected the advance interest of P80.00. What was the rate of discount?

A. 3.67%

B. 4.00%

C. 4.15%

D. 4.25%

9. It is the practice of almost all banks in the Philippines that when they grant a loan, the interest for one year is automatically deducted from the principal amount upon release of money to a borrower. Let us therefore assume that you applied for a loan with a bank and the P80,000 was approved at an interest rate of 14% of which P11,200 was deducted and you were given a check of P68,800. Since you have to pay the amount of P80,000 one year after, what then will be the effective interest rate?

A. 16.02%

B. 16.28%

C. 16.32%

D. 16.47%

10. A man invested P110,000 for 31 days. The net interest after deducting 20% withholding tax is P890.36. Find the rate of return annually.

A. 11.50%

B. 11.75%

C. 11.95%

D. 12.32%

11. A investor wishes to earn 7% on his capital after payment of taxes. If the income from an available investment will be taxed at an average rate of 42%, what minimum rate of return, before payment of taxes, must the investment offer to be justified?

- A. 12.07%**
- B. 12.34%
- C. 12.67%
- D. 12.87%

12. Mr. Jun Ramos was granted a loan of P20,000 by his employer Excel First Review and Training Center, Inc. with an interest of 6% for 180 days on the principal collected in advance. The corporation would accept a promissory note for P20,000 non-interest for 180 days. If discounted at once, find the proceeds of the note.

- A. P18,000**
- B. P18,900
- C. P19,000
- D. P19,100

13. Miss Evilla borrowed money from a bank. She receives from the bank P1,340.00 and promised to pay P1,500.00 at the end of 9 months. Determine the corresponding discount rate or often referred to as the “banker’s discount”.

- A. 13.15%
- B. 13.32%
- C. 13.46%
- D. 13.73%**

14. The exact simple interest of P5,000 invested from June 21, 1995 to December 25, 1995 is P100. What is the rate of interest?

- A. 3.90%**
- B. 3.92%
- C. 3.95%
- D. 3.98%

15. What is the ordinary interest on P1,500.50 for 182 days at 5.2%?

- A. P39.01
- B. P39.82
- C. P39.45**
- D. P39.99

16. A loan for P50,000 is to be paid in 3 years at the amount of P65,000. What is the effective rate of money?

- A. 9.01%
- B. 9.14%**
- C. 9.31%
- D. 9.41%

17. What is the effective rate corresponding to 18% compounded daily? Take 1 year is equal to 360 days.

- A. 19.61%
- B. 19.44%
- C. 19.31%
- D. 19.72%**

18. What rate of interest compounded annually is the same as the rate of interest of 8% compounded quarterly?

- A. 8.07%
- B. 8.12%
- C. 8.16%
- D. 8.24%**

19. Which of these gives the lowest effective rate of interest?

- A. 12.35% compounded annually
- B. 11.90% compounded annually
- C. 12.20% compounded annually
- D. 11.60% compounded annually**

20. An amount of P1,000 becomes P1,608.44 after 4 years compounded bimonthly. Find the nominal interest.

- A. 11.89%
- B. 12.00%**
- C. 12.08%
- D. 12.32%

21. How long will it take money to double itself if invested at 5% compounded annually?

- A. 13.7 years
- B. 14.7 years
- C. 14.2 years**
- D. 15.3 years

22. By the condition of a will, the sum of P20,000 is left to a girl to be held in trust fund by her guardian until it amounts to P50,000. When will the girl receive the money if fund invested at 8% compounded quarterly?

- A. 11.23 years
- B. 11.46 years
- C. 11.57 years**
- D. 11.87 years

23. A sum of P1,000 is invested now and left for eight years, at which time the principal is withdrawn. The interest has accrued is left for another eight years. If the effective annual interest rate is 5%, what will be the withdrawal amount at the end of the 16th year?

- A. P693.12
- B. P700.12
- C. P702.15
- D. P705.42**

24. Mandarin Bank advertises 9.5% account that yields 9.84% annually. Find how often the interest is compounded.

- A. Monthly
- B. Bimonthly
- C. Quarterly**
- D. Annually

25. A student plans to deposit P1,500 in the bank now and another P3,000 for the next 2 years. If he plans to withdraw P5,000 three years from after his last deposit for the purpose of buying shoes, what will be the amount of money left in the bank after one year of his withdrawal? Effective annual interest rate is 10%.

- A. P1,549.64**
- B. P1,459.64
- C. P1,345.98
- D. P1,945.64

26. You borrow P3,500.00 for one year from a friend at an interest rate of 1.5% per month instead of taking a loan from a bank at a rate of 18% per year. How much lesser you will pay by borrowing the money from the bank?

- A. P 62.44
- B. P44.55
- C. P54.66**
- D. P37.56

27. What is the present worth of two P 100 payments at the end of the third year and fourth year? The annual interest rate is 8%.

- A. P 150.56
- B. P 152.88**
- C. P 153.89
- D. P 151.09

28. A firm borrows P2,000 for 6 years at 8%. At the end of 6 years, it renews the loan for the amount due plus P2,000 more for 2 years at 8%. What is the lump sum due?

- A. P 3,260.34**
- B. P 3,280.34
- C. P 3,270.34
- D. P 3,250.34

29. In year zero, you invest P 10,000.00 in a 15% security for 5 years. During that time, the average annual inflation is 6%. How much in terms of year zero pesos will be in the account at maturity?

- A. P 15,030.03**
- B. P 20,113.57
- C. P 18,289.05
- D. P 16,892.34

30. The institute of Electronics and Communications Engineers of the Philippines (IECEP) is planning to put up its own building. Two proposals being considered are:

- A. The construction of the building now to cost P 400,000
- B. The construction of a smaller building now to cost P300,000 and at the end of 5 years, an extension to be added to cost P 200,000.

By how much is proposal B more economical than proposal A if interest rate is 20% and depreciation to be neglected?

- A. P 19,122.15
- B. P 19,423.69
- C. P 19,518.03
- D. P 19,624.49**

31. What is the present worth of a P500 annuity starting at the end of the third year and continuing to the end of the fourth year, if the annual interest rate is 10 %?

- A. P 727.17
- B. P 717.17**
- C. P 714.71
- D. P 731.17

32. What annuity is required over 12 years to equate with a future amount of P 20,000? Assume $i = 6\%$ annually.

- A. P 1,290.34
- B. P 1,185.54**
- C. P 1,107.34
- D. P 1,205.74

33. A factory operator bought a diesel generator set for P 10,000.00 and agreed to pay the dealer uniform sum at the end of each year for 5 years at 8% interest compounded annually, that the final payment will cancel the debt for principal and interest. What is the annual payment?

- A. P 2,500.57
- B. P 2,544.45
- C. P 2,540.56
- D. P 2,504.57**

34. What is the present worth of a year annuity paying P 3,000.00 at the end of each year, with interest at 8% compounded annually?

- A. P 7,654.04
- B. P 7,731.29**
- C. P 7,420.89
- D. P 7,590.12

35. A man loans P 187,400 from a bank with interest at 5% compounded annually. He agrees to pay his obligations by paying 8 equal annual payments, the first being due at the end of 10 years. Find the annual payments.

- A. P 43,600.10
- B. P 43,489.47
- C. P 43,263.91
- D. P 43,763.20**

36. A person buys a piece of lot for P 100,000 downpayment and 10 deferred semi-annual payments of P 8,000 each, starting three years from now. What is the present value of the investment if the rate of interest is 12% compounded semi-annually?

- A. P 142,999.08
- B. P 143,104.89
- C. P 142,189.67
- D. P 143,999.08**

37. A young engineer borrowed P 10,000 at 12% interest and paid P 2,000 per annum for the last 4 years. What does he have to pay at the end of the fifth year in order to pay off his loan?

- A. P 6,999.39
- B. P 6,292.93
- C. P 6,222.39
- D. P 6,922.93**

38. Miss Calledo deposited P 1,000, P 1,500 and P 2,000 at the end of the 2nd year, 3rd year and 4th year, respectively in a savings account which earned 10% per annum. How much is in the account at the end of the 4th year?

- A. P 4,880.00
- B. P 4,820.00
- C. P 4,860.00**
- D. P 4,840.00

39. A P 1,000,000 issue of 3%, 15-year bond was sold at 95%. What is the rate of interest of this investment?

- A. 3.0%**
- B. 3.4%
- C. 3.7%
- D. 4.0%

40. A P 1,000, 6% bond pays dividend semiannually and will be redeemed at 110% on June 21, 204. It is bought on June 21, 2001 to yield 4% interest. Find the price of the bond.

- A. P 1,122.70
- B. P 1,144.81**
- C. P 1,133.78
- D. P 1,155.06

41. A VOM has a selling price of P 400. If its selling price is expected to decline at a rate of 10% per annum due to obsolescence, what will be its selling price after 5 years?

- A. P 222.67
- B. P 212.90
- C. P 236.20**
- D. P 231.56

42. A machine costs of P 8,000 and an estimated life of 10 years with a salvage value of P 500. What is its book value after 8 years using straight line method?

- A. P 2,000.00**
- B. P 2,100.00
- C. P 2,200.00
- D. P 2,300.00

43. ABC Corporation makes it a policy that for any new equipment purchased, the annual depreciation cost should not exceed 20% of the first cost at any time with no salvage value. Determine the length of service life necessary if the depreciation used is the SYD method.

- A. 7 years
- B. 8 years
- C. 9 years**
- D. 10 years

44. An asset is purchased for P 9,000.00. Its estimated economic life is 10 years after which it will be sold for P 1,000.00. Find the depreciation in the first three years using sum-of-years digit method

- A. P 3,279.27
- B. P 3,927.27**
- C. P 3,729.27
- D. P 3,792.72

45. Shell Philippines, a multinational company, has a total gross income for a particular year of P 50,000,000. The taxable income after taking all deductions except for depletion is P 18,500,000. What is the allowable depletion allowance for that particular year? Take percentage of gross income for oil as 22%.

- A. P 9,358.41
- B. P 9,228.45
- C. P 9,250.00**
- D. P 9,308.45

46. The Saudi Arabian Oil Refinery developed an oil well which is estimated to contain 5,000,000 barrels of oil at an initial cost of \$ 50,000,000. What is the depletion charge during the year where it produces half million barrels of oil? Use Unit or Factor method in computing depletion.

- A. \$ 5,000,000.00**
- B. \$ 5,010,000.00
- C. \$ 5,025,000.00
- D. \$ 5,050,000.00

47. A manufacturer produces certain items at a labor cost of P 115 each, material cost of P 76 each and variable cost of P 2.32 each. If the item has a unit price of P 600, how many units must be manufactured each month for the manufacturer to break even if the monthly overhead is P428,000

- A. 1,033
- B. 1,037
- C. 1,043
- D. 1,053**

48. A manufacturing firm maintains one product assembly line to produce signal generators. Weekly demand for the generators is 35 units. The line operates for 7 hours per day, 5 days per week. What is the maximum production time per unit in hours required of the line to meet the demand?

- A. 1.0 hour per unit**
- B. 1.2 hours per unit
- C. 1.4 hours per unit
- D. 1.6 hours per unit

49. A telephone switchboard 100 pair cable can be made up with either enameled wire or tinned wire. There will be 400 soldered connections. The cost of soldering a connection on the enameled wire will be P 1.65 on the tinned wire, it will be P 1.15. A 100- pair cable made up with enameled wire cost P 0.55 per linear foot and those made up of tinned wire cost P 0.75 per linear foot. Determine the length of cable run in feet so that the cost of each installation would be the same.

- A. 1,000 feet**
- B. 1,040 feet
- C. 1,100 feet
- D. 1,120 feet

50. A leading shoe manufacturer produces a pair of LeBron James signature shoes at a labor cost of P 900.00 a pair and a material cost of P 800.00 a pair. The fixed charges on the business are P 5,000,000 a month and the variable costs are P 400.00 a pair. Royalty to LeBron James is P 1,000 per pair of shoes sold. If the shoes sell at P 5,000 a pair, how many pairs must be produced each month for the manufacturer to break-even?

- A. 2,590
- B. 2,632**
- C. 2,712
- D. 2,890

51. What is defines as the analysis and evaluation of the monetary consequences by using the theories and principles of economics to engineering applications, designs and projects?

- A. Economic Analysis**
- B. Engineering cost analysis
- C. Engineering economy
- D. Design cost analysis

52. What is considered as the standard unit which forms the basis of a country's domestic money supply?

- A. Monetary unit
- B. Currency
- C. Foreign exchange**
- D. Cash or check

53. What is defined as any tangible economic product that contributes directly or indirectly to the satisfaction of human want?
- A. Services
 - B. Goods
 - C. Commodities
 - D. Goods or commodities**
54. What is defined as any tangible economic activity that contributes directly or indirectly to the satisfaction of human want?
- A. Services**
 - B. Goods
 - C. Commodities
 - D. Goods or commodities
55. What are the two classifications of goods and services?
- A. Local and imported
 - B. Raw and finished
 - C. Consumer and producer**
 - D. Ready-made and made-to-order
56. What refers to the goods and services that are required to support human life, needs and activities?
- A. Producer products
 - B. Consumer products
 - C. Luxury
 - D. Necessity**
57. What refers to the goods and services that are desired by human and will be acquired only after all the needs have been satisfied?
- A. Producer products
 - B. Consumer products
 - C. Luxury
 - D. Necessity**
58. What refers to the exchange mechanism that brings together the sellers and the buyers of a product, factor of production or financial security?
- A. Mall
 - B. Market**
 - C. Store
 - D. Office

59. What is considered as the basic consuming or demanding unit of a commodity?
- A. Seller
 - B. Manufacturer
 - C. Producer
 - D. Buyer or consumer**
60. What is defined as an entity which makes product, good or services available to buyer or consumer in exchange of monetary consideration?
- A. Seller
 - B. Manufacturer
 - C. Producer**
 - D. Buyer or consumer
61. What is a market situation whereby there is only one buyer of an item for which there is no goods substitute?
- A. Monopsony**
 - B. Monopoly
 - C. Oligopoly
 - D. Oligopsony
62. What market situation exists where there are few sellers and few buyers?
- A. Oligopoly
 - B. Oligopsony
 - C. Bilateral oligopoly**
 - D. Bilateral Oligopsony
63. What market situation exists where there is only one buyer and only one seller?
- A. Monopsony
 - B. Monopoly
 - C. Bilateral monopsony
 - D. Bilateral monopoly**
64. What is the market situation exist when there are many buyers and many sellers?
- A. Perfect competition**
 - B. Oligopoly
 - C. Oligopsony
 - D. Monopoly

65. If there is only one seller and many buyers, the market situation is _____ .

- A. Duopsony
- B. Oligopoly
- C. Oligopsony
- D. Monopoly**

66. If there are many sellers and few buyers, the market situation is _____ .

- A. Duopsony
- B. Oligopoly
- C. Oligopsony**
- D. Monopoly

67. Oligopoly exists when there is/are:

- A. Few sellers and few buyers
- B. Few sellers and many buyers**
- C. Many sellers and few buyers
- D. One seller and few buyers

68. Duopsony is a market situation where there is/are:

- A. Few sellers and few buyers
- B. Few sellers and many buyers
- C. Many sellers and few buyers**
- D. One seller and few buyers

69. Duopoly is a market situation where there is/are:

- A. Few sellers and few buyers
- B. Few sellers and many buyers**
- C. Many sellers and few buyers
- D. One seller and few buyers

70. What is another term for “perfect competition”?

- A. Atomistic competition**
- B. No-limit competition
- C. Free-for-all competition
- D. Heterogeneous market

71. What refers to the market situation in which any given product is supplied by a very large number of vendors and there is no restriction against additional vendors from entering the market?

A. Perfect competition

B. Oligopoly

C. Oligopsony

D. Monopoly

72. Aside from many sellers and many buyers, which one is a characteristic of perfect competition?

A. Homogeneous product

B. Free market entry and exit

C. Perfect information and absence of all economic friction

D. All of the above

73. What is the opposite of perfect competition?

A. Monopsony

B. Oligopoly

C. Oligopsony

D. Monopoly

74. Perfect monopoly exists only if:

A. the single vendor can prevent the entry of all other vendors in the market

B. the single vendor gets the absolute franchise of the product

C. the single vendor is the only one who has the permit to sell

D. the single vendor is the only one who has the knowledge of the product

75. A _____ is a market situation where economies of scale are so significant that cost are only minimized when the entire output of an industry is supplied by a single producer so that the supply costs are lower under monopoly than under perfect competition.

A. Perfect monopoly

B. Bilateral monopoly

C. Natural monopoly

D. Ordinary monopoly

76. “When one of the factors of production is fixed in quantity or is difficult to increase, increasing the other factors of production will result in a less than proportionate increase in output”. This statement is known as the:

A. Law of diminishing return

B. Law of supply

C. Law of demand

D. Law of supply and demand

77. What refers to the need, want or desire for a product backed by the money to purchase it?

A. Supply

B. Demand

C. Product

D. Good

78. What refers to the amount of a product made available for sale?

A. Supply

B. Demand

C. Product

D. Good

79. “Under conditions of perfect competition, the price at which any given product will be supplied and purchased is the price that will result in the supply and the demand being equal.” This statement is known as the:

A. Law of diminishing return

B. Law of supply

C. Law of demand

D. Law of supply and demand

80. What do you call any particular raw material or primary product such as cloth, wool, flour, coffee, etc.?

A. Utility

B. Necessity

C. Commodity

D. Stock

81. What is defined as the interest on a loan or principal that is based only on the original amount of the loan or principal?

- A. Effective rate of interest
- B. Nominal rate of interest
- C. Compound interest
- D. Simple interest**

82. Under ordinary simple interest, how many days in one year?

- A. 300
- B. 360**
- C. 365
- D. 366

83. One banker's year is equivalent to _____ days.

- A. 300
- B. 360**
- C. 365
- D. 366

84. What refers to the cumulative effect of elapsed time on the money value of an event, based on the earning power of equivalent invested funds capital should or will earn?

- A. Present worth factor
- B. Interest rate
- C. Time value of money**
- D. Yield

85. The difference between the present and future worth of money at some time in the future is called _____.

- A. Discount**
- B. Deduction
- C. Inflation
- D. Depletion

86. What refers to the present worth of the probable future net earnings?

- A. Total fair value
- B. Total market value
- C. Going concern value
- D. Earning value**

87. What refers to the amount of money paid for the use of borrowed capital?
- A. Interest**
 - B. Rate of interest
 - C. Simple interest
 - D. Principal
88. What refers to the ratio of the interest payment to the principal for a given unit of time and usually expressed as a percentage of the principal?
- A. Return of investment
 - B. Interest rate**
 - C. Yield
 - D. Rate of return
89. What is defined as the investment of loan or principal which is based not only on the original amount of the loan or principal but the amount of loaned or principal plus the previous accumulated interest?
- A. Effective rate of interest
 - B. Nominal rate of interest
 - C. Compound interest**
 - D. Simple interest
90. What refers to the cost of borrowing money or the amount earned by a unit principal per unit time?
- A. Yield rate
 - B. Rate of return
 - C. Rate of interest**
 - D. Economic return
91. A uniform series of payment occurring at equal interval of time is called _____.
- A. Annuity**
 - B. Amortization
 - C. Depreciation
 - D. Bond
92. What is the term for an annuity with a fixed time span?
- A. Ordinary annuity
 - B. Perpetuity
 - C. Annuity certain**
 - D. Annuity due

93. What is the type of annuity where the payments are made at the end of each period starting from the first period?
- A. Ordinary annuity**
 - B. Perpetuity
 - C. Annuity due
 - D. Deferred annuity
94. What is the type of annuity where the payments are made at the beginning of the each period starting from the first period?
- A. Ordinary annuity
 - B. Perpetuity
 - C. Annuity due**
 - D. Deferred annuity
95. What is the type of annuity that does not have a fixed time span but continues indefinitely or forever?
- A. Ordinary annuity
 - B. Perpetuity**
 - C. Annuity due
 - D. Deferred annuity
96. What is the type of annuity where the first payment does not begin until some later date in the cash flow?
- A. Ordinary annuity
 - B. Perpetuity
 - C. Annuity due
 - D. Deferred annuity**
97. Which is NOT an essential element of an ordinary annuity?
- A. The amounts of all payments are equal.
 - B. The payments are made at equal interval of time.
 - C. The first payment is made at the beginning of the first period.**
 - D. Compound interest is paid on all amounts in the annuity.
98. What is defined as a financial security note issued by business or corporation and by the government as a means of borrowing long-term fund?
- A. T-bills
 - B. Securities
 - C. Bond**
 - D. Bank notes

99. What refers to the present worth of all the amount the bondholder will receive through his possession of the bond?

- A. Par value of bond
- B. Face value of bond
- C. Redeemed value of bond
- D. Value of bond**

100. What is defined as the certificate of indebtedness of corporation usually for a period not less than 10 years and guaranteed by a mortgage on certain assets of a corporation?

- A. Bond**
- B. T-bills
- C. Stock
- D. Promissory note

101. What refers to a document that shows proof of legal ownership of a financial security?

- A. Bond
- B. Bank note
- C. Coupon**
- D. Check

102. What type of bond is issued jointly by two or more corporations?

- A. Mortgage bond
- B. Joint bond**
- C. Tie-up bond
- D. Trust bond

103. What type of bond whose guaranty is in lien on railroad equipment, such as freight and passenger cars, locomotives, etc.?

- A. Railroad bond
- B. Equipment obligation bond**
- C. Equipment bond
- D. Equipment trust bond

104. A type of bond to which are attached coupons indicating the interest due and the date when such interest is to be paid is called _____.

- A. Registered bond
- B. Coupon bond**
- C. Mortgage bond
- D. Collateral trust bond

105. What bond whose security is a mortgage on certain specified assets of the corporation?

- A. Registered bond
- B. Collateral trust bond
- C. Mortgage bond**
- D. Debenture bond

106. A bond without any security behind them except a promise to pay by the issuing corporation is called _____.

- A. Joint bond
- B. Debenture bond**
- C. Trust bond
- D. Common bond

107. A type of bond where the corporation pledges securities which it owns such as the stock or bonds of one of its subsidiaries.

- A. Mortgage bond
- B. Joint bond
- C. Security bond
- D. Collateral trust bond**

108. What type of bond where the corporation's owner name are recorded and the interest is paid periodically to the owners with their asking for it?

- A. Preferred bond
- B. Registered bond**
- C. Incorporators bond
- D. Callable bond

109. What type of bond which can be redeemed before maturity date?

- A. Preferred bond
- B. Registered bond
- C. Incorporators bond
- D. Callable bond**

110. What is the feature of some bonds whereby the issuer can redeem it before it matures?

- A. Return clause
- B. Callability**
- C. Recall clause
- D. Call calss

111. The price at which the callable bond will be redeemed from the bondholder is called _____.

- A. Par value
- B. Call value**
- C. Face value
- D. Redemption value

112. What is defined as the reduction or fall of the value of an asset due to constant use and passage of time?

- A. Depletion
- B. Inflation
- C. Depreciation**
- D. Deflation

113. In what method of computing depreciation where it assumes that the loss in value is directly proportional to the age of the equipment or asset?

- A. Straight line method**
- B. Sinking fund method
- C. Sum-of-year digit method
- D. Declining balance method

114. In what method of computing depreciation where it assumes that a sinking fund is established in which funds will accumulate for replacement purposes?

- A. Straight line method
- B. Sinking fund method**
- C. Sum-of-year digit method
- D. Declining balance method

115. In what method of computing depreciation where it assumes that the annual cost of depreciation is a fixed percentage of the book value at the beginning of the year?

- A. Straight line method
- B. Sinking fund method
- C. Sum-of-year digit method
- D. Declining balance method**

116. In SYD method of computing depreciation, which of the following is the formula in finding the sum of years' digits?

- A. $n(n - 1)$
- B. $[n(n + 2)]/2$
- C. $[n(n - 1)]/2$
- D. $[n(n + 1)]/2$**

117. The declining balance method is also known as _____.

- A. Double percentage method
- B. Constant percentage method**
- C. Modified sinking fund method
- D. Modified SYD method

118. What type of depreciation is due to the reduction in the demand for the function that the equipment or asset was designed to render?

- A. Functional depreciation**
- B. Design depreciation
- C. Physical depreciation
- D. Demand depreciation

119. What type of depreciation is due to the reduction of the physical ability of an equipment or asset to produce results?

- A. Functional depreciation
- B. Design depreciation
- C. Physical depreciation**
- D. Demand depreciation

120. The functional depreciation is sometimes called _____.

- A. Demand depreciation
- B. Adolescence**
- C. Life depreciation
- D. Failure depreciation

121. What is defined as the reduction of the value of certain natural resources such as mines, oil, timber, quarries, etc. due to the gradual extraction of its contents?

- A. Depletion**
- B. Inflation
- C. Depreciation
- D. Deflation

122. What are the common methods of computing depletion charge?
- A. Rational method and irrational method
 - B. Conservative method and conventional method
 - C. Unit method and percentage method**
 - D. Discrete method and depletion allowance method
123. Under the depletion allowance method in computing depreciation, the depletion charge is equal to either _____ whichever is smaller.
- A. Fixed percentage of gross income or the net taxable income
 - B. Fixed percentage of gross income or 50% of the net taxable income**
 - C. 50% of the fixed percentage of gross income or 50% of the net taxable income
 - D. 50% of the fixed percentage of gross income or the net taxable income
124. The depletion allowance method of computing depletion is commonly known as _____.
- A. Unit method
 - B. Percentage method**
 - C. Factor method
 - D. Sinking fund method
125. What is another term for “unit method” for computing depletion?
- A. Initial cost method
 - B. Percentage method
 - C. Factor method**
 - D. Sinking fund method
126. Using factor method, the depletion at any given year is equal to:
- A. Initial cost of property times number of unit sold during the year divided by the total units in property**
 - B. Initial cost of property divided by the number of units sold during the year
 - C. Initial cost of property times number of units sold during the year
 - D. Initial cost of property divided by the total units in property
127. What do you call the after-tax present worth of all depreciation effects over the depreciation period of the asset?
- A. Asset recovery
 - B. Depreciation recovery**
 - C. Period recovery
 - D. After-tax recovery

128. A mathematical expression also known as the present value of annuity of one is called _____.

- A. Load factor
- B. Demand factor
- C. Sinking fund factor
- D. Present worth factor**

129. The amount of property in which a willing buyer to a willing seller for the property when neither one is under the compulsion to buy nor to sell is called _____.

- A. Fair value
- B. Market value**
- C. Good will value
- D. Book value

130. Salvage value is sometimes known as _____.

- A. Scrap value
- B. Going value
- C. Junk value
- D. Second-hand value**

131. What refers to the value of an asset which a disinterested third party, different from the buyer and seller, will determine in order to establish a price acceptable to both parties?

- A. Book value
- B. Market value
- C. Fair value**
- D. Franchise value

132. What refers to the value of an intangible item which arises from the exclusive right of a company to provide a specified product and service in a certain region of the country?

- A. Company value
- B. Going value
- C. Goodwill value
- D. Franchise value**

133. The first cost to be incurred if the piece of equipment now in place had been bought for a second hand dealer or some other business is called _____.

- A. Material cost
- B. Fixed cost
- C. First cost
- D. In-place value**

134. In computing depreciation of an equipment, which of the following represents the first cost?

- A. The original purchase price and freight charges
- B. Installation expenses
- C. Initial taxes and permit fees
- D. All of the above**

135. The process of determining the value or worth of a physical property for specific reason is called _____.

- A. Investment
- B. Valuation**
- C. Economy
- D. Depletion

136. The unrecovered depreciation which results due to poor estimates as to the life of the equipment is called _____.

- A. Sunk cost**
- B. Economic life
- C. In-place value
- D. Annuity

137. What refers to the present worth of cost associated with an asset for an infinite period of time?

- A. Annual cost
- B. Increment cost
- C. Capitalized cost**
- D. Operating cost

138. Capitalized cost of a project is also known as _____.

- A. Infinite cost
- B. Life cycle cost**
- C. Life cost
- D. Project cost

139. What is normally used to compare alternatives that accomplish the same purpose but have unequal lives?

- A. Capitalized cost method
- B. Present worth method
- C. Annual cost method**
- D. MARR

140. What method is often used in municipal project evaluations where benefits and costs accrue to different segments of the community?

- A. Annual cost method
- B. Benefit-cost ratio**
- C. Rate of return method
- D. EUAC

141. What refers to an imaginary cost representing what will not be received if a particular strategy is rejected?

- A. Opportunity cost**
- B. Ghost cost
- C. Horizon cost
- D. Null cost

142. What is the main reason why the sinking fund method of computing depreciation is seldom used in the industry?

- A. Unstable economy
- B. Rate of interest cannot be exactly determined
- C. The initial depreciation is high
- D. The initial depreciation is low**

143. What is the factor name of the formula $(1+i)^{-n}$?

- A. Uniform gradient future worth
- B. Capital recovery
- C. Single payment present worth**
- D. Single payment compound amount

144. What is the factor name of the formula $[i(1+i)^n]/[(1+i)^n-1]$?

- A. Uniform series sinking fund
- B. Capital recovery**
- C. Single payment present worth
- D. Uniform gradient future worth

145. A form of business organization in which a person conducts his business alone and entirely for his own profit, being solely responsible for all its activities and liabilities.

- A. Sole proprietorship**
- B. Entrepreneurship
- C. Partnership
- D. Corporation

146. Is an artificial being created by operation of law, having the right of succession and the process, attributes and properties expressly authorized by the law or incident to its existence.

A. Corporation

B. Property

C. Partnership

D. Organization

147. What is the simplest form of business organization?

A. Sole proprietorship

B. Partnership

C. Enterprise

D. Corporation

148. Double taxation is a disadvantage of which business organization?

A. Sole proprietorship

B. Partnership

C. Corporation

D. Enterprise

149. In case of bankruptcy of a partnership,

A. The partners are not liable for the liabilities of the partnership

B. The partnership assets (excluding the partners personal assets) only will be used to pay the liabilities

C. The partners personal assets are attached to the debt of the partnership

D. The partners may sell stock to generate additional capital

150. Which is true about partnership?

A. It has a perpetual life.

B. It will be dissolved if one of the partners ceases to be connected with the partnership.

C. It can be handed down from one generation of partners to another.

D. Its capitalization must be equal for each partner.

151. Which is true about corporation?

A. It is worse type of business organization.

B. The minimum number of incorporators to start a corporation is three.

C. Its life is dependent on the lives of the incorporators.

D. The stock holders of the corporation are only liable to the extent of their investments.

152. Aggregation of individuals formed for the purpose of conducting a business and recognized by law as a fictitious person is called _____.

- A. Partnership
- B. Investors
- C. Corporation**
- D. Stockholders

153. An association of two or more persons for the purpose of engaging into a business for profit is called _____.

- A. Entrepreneurship
- B. Partnership**
- C. Proprietorship
- D. Corporation

154. What represents the ownership of stockholders who have a residual claim on the assets of the corporation after all other claims have been settled?

- A. Authorized capital stock
- B. Preferred stock
- C. Incorporator stock
- D. Common stock**

155. What stock represents ownership and enjoys certain preferences than ordinary stock?

- A. Authorized stock
- B. Preferred stock**
- C. Incorporator's stock
- D. Presidential stock

156. The amount of company's profit that the board of directors of the corporation decides to distribute to ordinary shareholders is called _____.

- A. Dividend**
- B. Return
- C. Share of stock
- D. Equity

157. What refers to the residual value of a company's assets after all outside liabilities (shareholders excluded) have been allowed for?

- A. Dividend
- B. Equity**
- C. Return
- D. Par value

158. What refers to the claim of anyone to ownership?

- A. Proprietorship
- B. Assets
- C. Equity**
- D. Liability

159. Cash money and credit necessary to establish and operate an enterprise are generally called _____.

- A. Capital**
- B. Funds
- C. Assets
- D. Liabilities

160. What represents the share of participation in business organizations?

- A. Franchise
- B. Partnership
- C. Stock**
- D. Corporation

161. The profit derived from a project or business enterprise without consideration of obligations to financial contributors and claims of others based on profit is known as _____.

- A. Yield
- B. Economic return**
- C. Earning value
- D. Gain

162. _____ is the element of value which a business has earned through the favorable consideration and patronage of its costumers arising from its well known and well conducted policies and operations.

- A. Status company
- B. Big income
- C. Known owners
- D. Goodwill**

163. Which of the following is an example of intangible asset?

- A. Cash
- B. Investment in subsidiary companies
- C. Furnitures
- D. Patents**

164. Lands, buildings, plants and machineries are example of what type of asset?

- A. Current asset
- B. Trade investment asset
- C. Fixed asset**
- D. Intangible asset

165. What refers to the interest rate at which the present work of the cash flow on a project is zero of the interest earned by an investment?

- A. Economic return
- B. Yield
- C. Rate of return**
- D. Return of investment

166. What is another term for “current assets”?

- A. Fixed assets
- B. Non-liquid assets
- C. Liquid assets**
- D. Ccash

167. What is an accounting term that represents an inventory account adjustment?

- A. Cost of goods sold**
- B. Cost accounting
- C. Standard cost
- D. Overhead cost

168. What is the change in cost per unit variable change called?

- A. Variable cost
- B. Incremental cost**
- C. Fixed cost
- D. Supplemental cost

169. What is used to record historical financial transactions?

- A. Bookkeeping system**
- B. Ledger system
- C. Balance check
- D. General journal system

170. What is a secondary book of accounts, the information of which is obtained from the journal is called?

- A. Balanced sheet
- B. Ledger**
- C. Worksheet
- D. Trial balance

171. The original record of a business transaction is recorded in this book.

- A. Work book
- B. Journal**
- C. Ledger
- D. Account book

172. All the proceeds which are received by the business as a result of the sale of goods is called _____.

- A. Net income
- B. Gross income**
- C. Net revenue
- D. Total sales

173. All are classified under direct labor expenses EXCEPT one. Which one?

- A. Inspection cost
- B. Testing cost
- C. Assembly cost
- D. Supervision cost**

174. What is a measure of the average speed with which accounts receivable are collected?

- A. Current ratio
- B. Quick ratio
- C. Acid test ratio
- D. Receivable turnover**

175. The ratio of the net income before taxes to net sales is called _____.

- A. Current ratio
- B. Inventory turnover
- C. Profit margin ratio**
- D. Price-earnings ratio

176. What do you call a one-time credit against taxes?

- A. Due credit
- B. Tax credit**
- C. Credible credit
- D. Revenue credit

177. What is used when a quick estimate of the doubling time for the invested money is needed?

- A. Rule of 48
- B. Rule of 36
- C. Rule of 24
- D. Rule of 72**

178. What is the increase in the money value of a capital asset is called?

- A. Profit
- B. Capital gain**
- C. Capital expenditure
- D. Capital stock

179. What is the reduction in the money value of capital asset is called?

- A. Capital expenditure
- B. Capital loss**
- C. Loss
- D. Deficit

180. What refers to the negotiable claim issued by a bank in lieu of a term deposit?

- A. Time deposit
- B. Bond
- C. Capital gain certificate
- D. Certificate of deposit**

181. What denotes in the fall in the exchange rate of one currency in terms of the others? This term is usually applies to the floating exchange rate.

- A. Currency appreciation
- B. Currency depreciation**
- C. Currency devaluation
- D. Currency float

182. The deliberate lowering of the price of a nation's currency in terms of the accepted standard (Gold, American dollar or the British pound) is known as _____.

- A. Currency appreciation
- B. Currency depreciation
- C. Currency devaluation**
- D. Currency float

183. What refers to the saving which takes place because goods are not available for consumption rather than consumer really want to save?

- A. Compulsory saving
- B. Consumer saving
- C. Forced saving**
- D. All of the above

184. The flow back of profit plus depreciation from a given project is called _____.

- A. Capital recovery
- B. Cash flow**
- C. Economic return
- D. Earning value

185. As applied to capitalized asset, the distribution of the initial cost by a periodic charges to operation as in depreciation or the reduction of a debt by either periodic or irregular prearranged programs is called _____.

- A. Annuity
- B. Amortization**
- C. Capital recovery
- D. Annuity factor

186. Capitalized cost of any structure or property is computed by which formula?

- A. First cost + interest of first cost
- B. Annual cost – interest of first cost
- C. First cost + cost of perpetual maintenance**
- D. First cost + salvage value

187. The true value of interest rate computed by equations for compound interest for a 1 year period is known as _____.

- A. Expected return
- B. Nominal interest
- C. Effective interest**
- D. Economic return

188. Return on investment ratio is the ratio of the:

- A. Net income to owner's equity**
- B. Market price per share to earnings per share
- C. Cost of goods sold to average cost of inventory at hand
- D. Net credit sales to average net receivable

189. Gross margin is the ratio of the gross profit to _____.

- A. Net sale**
- B. Owner's equity
- C. Inventory turnover
- D. Quick assets

190. What is another term for "acid-test ratio"?

- A. Current ratio
- B. Quick ratio**
- C. Profit margin ratio
- D. Price-earnings ratio

191. What is a government bond which has an indefinite life rather than a specific maturity?

- A. Coupon
- B. T-bill
- C. Debenture
- D. Consol**

192. A form of business firm which is owned and run by a group of individuals for their mutual benefit is called _____.

- A. Cooperative**
- B. Corporation
- C. Enterprise
- D. Partnership

193. What is a stock of a product which is held by a trade body or government as a means of regulating the price of that product?

- A. Stock pile
- B. Hoard stock
- C. Buffer stock**
- D. Withheld stock

194. The ability to meet debts as they become due is known as _____.

- A. Solvency**
- B. Leverage
- C. Insolvency
- D. Liquidity

195. The ability to convert assets to cash quickly is known as _____.

- A. Solvency
- B. Liquidity**
- C. Leverage
- D. Insolvency

196. What is the basic accounting equation?

- A. Assets = liability + owner's equity**
- B. Liability = assets + owners' equity
- C. Owner's equity = assets + liability
- D. Owner's equity = liability – assets

197. The financial health of the company is measured in terms of:

- A. Liquidity
- B. Solvency
- C. Relative risk
- D. All of the above**

198. What is an index of short-term paying ability?

- A. Price-earnings ratio
- B. Current ratio**
- C. Profit margin ratio
- D. Gross margin

199. The common ratio is the ratio of:

- A. Net credit sales to average net receivable
- B. Current assets to current liabilities**
- C. Gross profit to net sales
- D. Net income to owner's equity

200. What is defined as the current assets minus inventories and prepaid expenses?

- A. Profit margin ratio
- B. Price-earnings ratio
- C. Return of investment ratio
- D. Quick ratio**

201. What is the ratio of the quick assets to current liabilities?

- A. Profit margin ratio
- B. Price-earnings ratio
- C. Return of investment ratio
- D. Quick ratio**

202. What is a measure of the average speed with which accounts receivable are collected?

- A. Profit margin ratio
- B. Receivables turnover**
- C. Return of investment ratio
- D. Average age of receivables

203. Receivable turnover is the ratio of:

- A. Net credit sales to average net receivables**
- B. Market price per share to earnings per share
- C. Cost of goods sold to average cost of inventory on hand
- D. Common shareholders' equity to number of outstanding shares

204. What is the ratio of the net income to owner's equity?

- A. Gross margin
- B. Return of investment ratio**
- C. Book value per share of common stock
- D. Inventory turnover

205. What is the ratio of the market price per share to earnings per share called?

- A. Gross margin
- B. Price-earnings ratio**
- C. Book value per share of common stock
- D. Inventory turnover

206. What is the profit margin ratio?

- A. The ratio of the net income before taxes to net sales**
- B. The ratio of gross profit to net sales
- C. The ratio of common shareholders' equity to the number of outstanding shares
- D. The ratio of cost goods sold to average cost of inventory on hand

207. What is a gross margin?

- A. The ratio of net income before taxes to net sales
- B. The ratio of gross profit to net sales**
- C. The ratio of common shareholders' equity to the number of outstanding shares
- D. The ratio of cost of goods sold to average cost of inventory on hand

208. Which of the following is a book value share of common stock?

- A. The ratio of net income before taxes to net sales
- B. The ratio of gross profit to net sales
- C. The ratio of common shareholders' equity to the number of outstanding shares**
- D. The ratio of cost of goods sold to average cost of inventory on hand

209. What is an inventory turnover?

- A. The ratio of net income before taxes to net sales
- B. The ratio of gross profit to net sales
- C. The ratio of common shareholders' equity to the number of outstanding shares
- D. The ratio of cost of goods sold to average cost of inventory on hand**

210. The average age of receivables is computed using which formula?

- A. $365 / \text{receivable turnovers}$**
- B. $365 / \text{average net receivable}$
- C. $365 / \text{inventory turnover}$
- D. $365 / \text{average cost of inventory on hand}$

211. What is a method of determining when the value of one alternative becomes equal to the value of another?

- A. Specific identification method
- B. Average cost method
- C. Break-even analysis**
- D. Incremental value method

212. The days supply of inventory on hand is calculated using which formula?
- A. $365 / \text{receivable turnovers}$
 - B. $365 / \text{average net receivable}$
 - C. $365 / \text{inventory turnover}$**
 - D. $365 / \text{average cost of inventory on hand}$
213. What is defined as the length of time usually in years, for cumulative net annual profit to equal the initial investment?
- A. Return of investment period
 - B. Turnover period
 - C. Break-even period
 - D. Payback period**
214. What is defined as ratio of its return to its cost?
- A. Return of an investment
 - B. Value of an investment**
 - C. Breakeven point of an investment
 - D. Term of an investment
215. Which of the following is an accelerated depreciation method?
- A. Straight line method and sinking fund method
 - B. Straight line method and double declining balance method
 - C. Double declining balance method and SYD method**
 - D. SYD method and sinking fund method
216. What is an accelerated depreciation method?
- A. It is one that calculates a depreciation amount greater than a straight line amount**
 - B. It is one that calculates a depreciation amount lesser than a straight line amount
 - C. It is one that calculates a depreciation amount equal to straight line amount
 - D. It is one that calculates a depreciation not in any way related to straight line amount
217. What refers to the reduction in the level of a national income and output usually accompanied by a fall in the general price level?
- A. Deflation**
 - B. Inflation
 - C. Devaluation
 - D. Depreciation

218. A formal organization of producers within an industry forming a perfect collusion purposely formed to increase profit and block new comers form the industry is called _____.

- A. Monopoly
- B. Cartel**
- C. Corporation
- D. Competitors

219. The paper currency issued by the central bank which forms part of the country's money supply is called _____.

- A. T-bills
- B. Bank notes**
- C. Check
- D. Coupon

220. "When one of the factors of production is fixed in quantity or is difficult to increase, increasing the other factors of production will result in a less than proportionate increase in output".

- A. Law of diminishing return**
- B. Law of supply
- C. Law of demand
- D. Law of supply and demand

221. What is the ratio of the market price per share to the earnings per share?

- A. Inventory turnover
- B. Price-earnings**
- C. Book value per share of common stock
- D. Profit margin

222. What is the ratio of the net income to owner's equity?

- A. Return on investment**
- B. Inventory turnover
- C. Profit margin
- D. Price-earnings

223. What refers to the ration of the net income before taxes to net sales?

- A. Receivable turnover
- B. Acid test ratio
- C. Return on investment
- D. Profit margin**

224. What refers to the buying or selling of goods between two or more markets in order to take profitable advantage of any differences in the prices quoted in these markets?

- A. Cartel
- B. Arbitrage**
- C. Black market
- D. A priori

225. The suspension of repayment of debt or interest for a specified period of time is called _____.

- A. Moratorium**
- B. Escrow
- C. Numeraire
- D. Porcupine

MULTIPLE CHOICE
QUESTIONS in
ENGINEERING MATERIALS

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1. What are considered as the “building blocks” for engineering materials?

- A. Atoms**
- B. Elements
- C. Matters
- D. Compounds

2. What are the major classes of engineering materials?

- A. Metals, ceramics and semiconductors
- B. Polymers, metals and composites
- C. Metals, ceramics, polymers and semiconductors
- D. Metals, ceramics, polymers, semiconductors and composites**

3. What types of materials behave like iron when placed in a magnetic field?

- A. Crystals
- B. Amorphous materials
- C. Ferromagnetic materials**
- D. Metalloids

4. What do you call metals reinforced by ceramics or other materials, usually in fiber form?

- A. Metalloids
- B. Matrix alloys
- C. Metal lattices
- D. Metal Matrix composites**

5. What is a combination of one or more metals with a nonmetallic element?

- A. Metalloids
- B. Matrix Composite
- C. Inert
- D. Ceramic**

6. Polymer comes from Greek words “poly” which means “many” and “meros” which means _____.

- A. metal
- B. material
- C. part**
- D. plastic

7. The engineering materials known as “plastics” are more correctly called _____.

- A. Polyvinyl chloride
- B. Polymers**
- C. Polyethylene
- D. Mers

8. What is a combination of two or more materials that has properties that the components materials do not have by themselves?

- A. Compound
- B. Composite**
- C. Mixture
- D. Matrix

9. What is a reference sheet for the elements that can be used to form engineering materials?

- A. Periodic Table**
- B. Truth Table
- C. Building blocks of Materials
- D. Structure of Materials

10. What physical property of a material that refers to the point at which a material liquefies on heating or solidifies on cooling?

- A. Melting point**
- B. Curie point
- C. Refractive index
- D. Specific heat

11. What physical property of a material that refers to the temperature at which ferromagnetic materials can no longer be magnetized by outside forces?

- A. Melting point
- B. Thermal conductivity
- C. Thermal expansion
- D. Curie point**

12. What physical property of a material refers to the amount of weight gain (%) experienced in a polymer after immersion in water for a specified length of time under a controlled environment?

- A. Dielectric strength
- B. Electric resistivity
- C. Water absorption**
- D. Thermal conductivity

13. What physical property of a material that refers to the rate of heat flow per unit time in a homogenous material under steady-state conditions per unit area, per unit temperature gradient in a direction perpendicular to area?

- A. Thermal expansion
- B. Thermal conductivity**
- C. Heat distortion temperature
- D. Water absorption

14. What physical property of a material refers to the highest potential difference (voltage) that an insulating material of given thickness can withstand for a specified time without occurrence of electrical breakdown through its bulk?

- A. Thermal expansion
- B. Conductivity
- C. Dielectric strength**
- D. Electrical resistivity

15. What physical property of a material refers to the ratio of the amount of heat required to raise the temperature of a unit mass of a substance 1 degree to the heat required to raise the same mass of water to 1 degree.

- A. Specific heat**
- B. Latent heat
- C. Heat of fusion
- D. Heat of fission

16. What physical property of a material refers to the temperature at which a polymer under a specified load shows a specified amount of deflection?

- A. Curie temperature
- B. Specific heat
- C. Heat distortion temperature**
- D. Thermal conductivity

17. What mechanical property of a material refers to the nominal stress at fracture in a tension test at constant load and constant temperature?

- A. Creep strength
- B. Stress rupture strength**
- C. Compressive yield strength
- D. Hardness

18. What mechanical property of a material refers to the resistance to plastic deformation?

- A. Rigidity
- B. Plasticity
- C. Ductility
- D. Hardness**

19. What parameter is defined as the temperature at which the toughness of the material drops below some predetermined value, usually 15ft-lb?

- A. Nil ductility temperature**
- B. Curie temperature
- C. Thermal conductivity
- D. Heat distortion temperature

20. What is obtained by repeatedly loading a specimen at given stress levels until it fails?

- A. Elastic limit
- B. Endurance limit or fatigue strength of material**
- C. Creep
- D. All of the choices

21. What dimensional property of a material refers to the deviation from edge straightness?

- A. Lay
- B. Out of flat
- C. Camber**
- D. Waviness

22. What dimensional property of a material refers to a wavelike variation from a perfect surface, generally much wider in spacing and higher in amplitude than surface roughness?

- A. Lay
- B. Waviness**
- C. surface finish
- D. Out of flat

23. Wood is composed of chains of cellulose molecules bonded together by another natural polymer called _____.

- A. plastic
- B. lignin**
- C. mer
- D. additive

24. What is a polymer production process that involves forming a polymer chain containing two different monomers?

- A. Copolymerization**
- B. Blending
- C. Alloying
- D. Cross-linking

25. What is the generic name of class of polymer which is commercially known as “nylon”?

- A. Polyacetals
- B. Polyamide**
- C. Cellulose
- D. Polyester

26. By definition, a rubber is a substance that has at least _____ elongation in tensile test and is capable of returning rapidly and forcibly to its original dimensions when load is removed.

- A. 100%
- B. 150%
- C. 200%**
- D. 250%

27. What is a method of forming polymer sheets or films into three-dimensional shapes in which the sheet is clamped on the edge, heated until it softens and sags, drawn in contact with the mold by vacuum, and cooled while still in contact with the mold?

- A. Calendaring
- B. Blow molding
- C. Thermoformig**
- D. Solid phase forming

28. What is a process of forming continuous shapes by forcing a molten polymer through a metal die?

- A. Calendaring
- B. Thermoforming
- C. Lithography
- D. Extrusion**

29. What chemical property of a material which refers to its ability to resist deterioration by chemical or electrochemical reactions with environment?

- A. Stereo specificity
- B. Corrosion resistance**
- C. Conductivity
- D. Electrical resistance

30. What refers to the tendency for polymers and molecular materials to form with an ordered, spatial, three-dimensional arrangement of monomer molecules?

A. Stereo specificity

B. Conductivity

C. Retentivity

D. Spatial configuration

31. What is the amount of energy required to fracture a given volume of material?

A. Impact strength

B. Endurance limit

C. Creep strength

D. Stress rupture strength

32. What mechanical property of a material which is a time-dependent permanent strain under stress?

A. Elongation

B. Elasticity

C. Creep

D. Rupture

33. What refers to the stress at which a material exhibits a specified deviation from proportionality of stress and strain?

A. Tensile strength

B. shear strength

C. Yield strength

D. Flexural strength

34. The greatest stress which a material is capable of withstanding without a deviation from acceptable of stress to strain is called _____.

A. Elongation

B. proportional limit

C. yield point

D. elastic limit

35. What is the maximum stress below which a material can theoretically endure an infinite number of stress cycles?

- A. Endurance state
- B. Endurance test
- C. Endurance limit**
- D. endurance strength

36. What is a substance that attracts piece of iron?

- A. Conductor
- B. Semiconductor
- C. Magnet**
- D. Semimetal

37. Which of the following is a natural magnet?

- A. Steel
- B. Magnesia
- C. Lodestone**
- D. Soft iron

38. What is the resistance of a material to plastic deformation?

- A. Hardness**
- B. Stiffness
- C. Creepage
- D. Rigidity

39. Which of the following materials has permeability slightly less than that of free space?

- A. Paramagnetic materials
- B. Non-magnetic materials
- C. Ferromagnetic materials
- D. Diamagnetic materials**

40. What materials has permeabilities slightly greater than of free space?

A. Paramagnetic materials

B. Non-magnetic materials

C. Ferromagnetic materials

D. Diamagnetic materials

41. Which of the materials have very high permeabilities?

A. Paramagnetic materials

B. Non-magnetic materials

C. Ferromagnetic materials

D. Diamagnetic materials

42. What is the defined by ASTM as a material that contains as an essential ingredient an organic substance of large molecular weight, is solid in its finished state, and some stage in its manufactured or in its processing into finished articles, can be shaped by flow?

A. Metal

B. Metalloid

C. Plastic

D. Ceramic

43. Some polymeric materials such as epoxies are formed by strong primary chemical bonds called _____.

A. Metallic bond

B. Van der Waals bond

C. Cross linking

D. Covalent bond

44. What do you call a polymer without additives and without blending with another polymer?

A. Homo polymer

B. Ethenic polymer

C. Polyethylene

D. Copolymer

45. A large molecule with two alternating mers is called as _____.

- A. monomer
- B. elastomer
- C. mers
- D. copolymer or interpolymer**

46. What term is used to describe a polymer that has rubberlike properties?

- A. Vulcanizer
- B. Elasticmer
- C. Polychloroprene
- D. Elastomer**

47. What is defined as an alloy of iron and carbon, with the carbon being restricted within certain concentration limits?

- A. Steel**
- B. Wrought Iron
- C. Cast Iron
- D. Tendons

48. What is the most popular steel refining process or technique which involves casting of steel from the BOF or electric furnace into cylindrical ingots?

- A. Vacuum are remelting (VAR)**
- B. Vacuum induction melting (VIM)
- C. Electron beam refining
- D. Electroslag refining

49. In what special refining process of steel where molten metal is poured down a tundish (chute) into an ingot mold?

- A. Electroslag refining
- B. Vacuum are remelting
- C. Vacuum induction melting
- D. Electron beam refining**

50. What type of steel has carbon as its principal hardening agent?

- A. Alloy steel
- B. Stainless steel
- C. Galvanized steel
- D. Carbon steel**

51. What type of steel has 0.8% carbon and 100% pearlite?

- A. Austenite
- B. Eutectoid**
- C. Hyper-eutectoid
- D. Stainless steel

52. What group of steel are water-hardened tool steels?

- A. Group S
- B. Group W**
- C. Group O
- D. Group T

53. What group of steels are molybdenum high-speed steels?

- A. Group A
- B. Group D
- C. Group M**
- D. Group H

54. Steels that are used for axles, gears, and similar parts requiring medium to high and strength are known as?

- A. Medium-carbon steel**
- B. Low-carbon steel
- C. Very high-carbon
- D. High-carbon steel

55. Galvanized steel are steel products coated with _____.

- A. Carbon
- B. Sulfur
- C. Zinc**
- D. Nickel

56. What ASTM test for tension is designated for plastics?

- A. A370
- B. D638**
- C. E292
- D. C674

57. What ASTM test for compression is designated for plastic?

- A. D638
- B. D695**
- C. D790
- D. D732

58. What ASTM test for shear strength is designated for plastics?

- A. D732**
- B. D790
- C. D695
- D. D638

59. What is the ASTM tension testing designation for standard methods for steel products?

- A. A370**
- B. E345
- C. E8
- D. C674

60. Low-quality steels with an M suffix on the designation intended for non-structural application is classified as _____.

- A. Merchant quality**
- B. Commercial quality
- C. Drawing quality
- D. Special quality

61. The use of acids to remove oxides and scale on hot-worked steels is known as_____.

- A. Tempering
- B. Pickling**
- C. Machining
- D. Galvanizing

62. What is the purpose of molybdenum in steel alloying?

- A. To increase brittleness
- B. To increase dynamic and high-temperature strength and hardness.**
- C. To reduce brittleness, combine with sulfur
- D. To increase corrosion and resistance

63. Which of the following statements is NOT true?

- A. About 10% of the earth's crust is iron.**
- B. Pure iron does not have significant industrial use because it is too weak and soft.
- C. Steel is an alloy of carbon and iron with limits on the amount of carbon (less than 2%)
- D. Steel is made by reducing oxide ore of iron by thermochemical reactions in a blast furnace or direct reductions vessel.

64. What prefix in steel identification means composition varies from normal limits?

- A. E
- B. H
- C. X**
- D. B

65. What is prefix in steel identification means it is made in an electric furnace?

A. E

B. H

C. X

D. B

66. What letter suffix steel identification means that it is steel with boron as an alloying element?

A. xxLxx

B. xxBxx

C. xxHxx

D. xxKxx

67. What refers to the tin mill steel, without a coating?

A. White plate

B. Tin Steel free

C. Black plate

D. Dechromate tin

68. What combination of elements has high electrical resistance, high corrosion resistance, and high strength at red heat temperatures, making it useful in resistance heating?

A. Aluminum bronze

B. Nichrome

C. Hastelloy

D. Alnico

69. A steel cannot qualify for stainless prefix until it has at least how many percent of chromium?

A. 10%

B. 20%

C. 25%

D. 5%

70. Which of the following cast irons is a high-carbon, iron-carbon-silicon alloy?

- A. Deorizers
- B. Deoxidizers**
- C. Deterrent
- D. Deoxifiers

71. Which of the following cast irons is a high-carbon-silicon alloy?

- A. Gray iron**
- B. Malleable iron
- C. White iron
- D. Alloy iron

72. Which of the following cast irons is heat-treated for ductility?

- A. Gray iron
- B. Malleable iron**
- C. White iron
- D. Ductile iron

73. Which cast iron is hard and wear resistant?

- A. Gray iron
- B. Ductile iron
- C. White iron**
- D. Malleable iron

74. What is considered as the general purpose oldest type and widely used cast iron?

- A. Gray iron**
- B. Ductile iron
- C. Alloy iron
- D. Malleable iron

75. What is the effect if manganese in cast iron?

A. To affect the machinability, ductility and shrinkage depending on form

B. To reduce hardness by combining with sulfur below 0.5% and increase hardness above 0.5%

C. To deoxidize molten cast iron

D. To increase fluidity and lowers melting temperature

76. What is the effect of aluminum in cast iron?

A. To increase hardness above 0.5%

B. To deoxidize molten cast iron

C. To affect machinability, ductility, and shrinkage depending on form

D. To reduce hardness by combining with sulfur below 0.5%

77. What is the effect of silicon in cast iron?

A. Reduce hardness by combining with sulfur below 0.5% and increase the hardness above 0.5%

B. Increase fluidity and lowers melting temperature.

C. Softens iron and increase ductility below 3.25% hardens iron above 3.25% and increase acid and corrosion resistance above 13%

D. deoxidizes molten cast iron

78. Iron is said to be abundant in nature. About how many percent of the earth's crust is iron?

A. 10%

B. 5%

C. 20%

D. 8%

79. What is the advantage of quench hardening?

A. Improved strength

B. Hardness

C. Wear characteristics

D. All of the choices

80. What is the lowest-temperature diffusion-hardening process and does not require a quench?

- A. Carburizing
- B. Tempering
- C. Nitriding**
- D. Heat-treating

81. The following statements are true except one. Which one?

- A. Carburizing does not harden a steel.
- B. Flame and induction hardening require the use of hardenable steels.
- C. Quench-hardened steel does not require tempering to prevent brittleness.**
- D. Induction hardening is usually most efficient on small parts.

82. Which of the following is a requirement for hardening a steel?

- A. Heating to the proper temperature
- B. Sufficient carbon content
- C. Adequate quench
- D. All of the choices**

83. What field of study encompasses the procurement and production of metals?

- A. Metallurgy**
- B. Geology
- C. Material Science
- D. Metalgraphy

84. What do you call earth and stone mixed with the iron oxides?

- A. Hematite
- B. Magnetite
- C. Gangue**
- D. Ore

85. What is a coal that has been previously burned in an oxygen-poor environment?

- A. Tuyere
- B. Coke**
- C. Diamond
- D. Hematite

86. What is the most common alloying ingredient in copper?

- A. Brass
- B. Zinc**
- C. Nickle
- D. Aluminum

87. What refers to the casehardening process by which the carbon content of the steel ear the surface of a part is increased?

- A. Carburizing**
- B. Annealing
- C. Normalizing
- D. Martempering

88. What is the process of heating a hardened steel to any temperature below the lower critical temperature, followed by any desired rate of cooling?

- A. Normalizing
- B. Spheroidizing
- C. Carburizing
- D. Tempering**

89. What is defined as an intimate mechanical mixture of two or more phases having a definite composition and a definite temperature of transformation within the solid state?

- A. Pearlite
- B. Eutectoid**
- C. Austernite
- D. Delta solid solution

90. What is the most undesirable of all the elements commonly found in steels?

- A. Sulfur
- B. Phosphorus**
- C. Silicon
- D. Manganese

91. What is a method of casehardening involving diffusion in which the steel to be casehardened is machined, heat-treated, placed in an air-tight box and heated to about 1000oF?

- A. Annealing
- B. Normalizing
- C. Carburizing
- D. Nitriding**

92. What typical penetrator is used in Brinell hardness test?

- A. 10 mm ball**
- B. 120° diamond (brale)
- C. 1.6 mm diameter ball
- D. 20°needle

93. What is the ratio of the maximum load in a tension test to the original cross-sectional area of the test bar?

- A. Tensile strength**
- B. Yield strength
- C. Shear strength
- D. Flexural Strength

94. What is the ratio of stress to strain in a material loaded within its elastic ranger?

- A. Poisson's ratio
- B. Refractive index
- C. Modulus of elasticity**
- D. Percent elongation

95. What is a measure of rigidity?

- A. Stiffness
- B. Hardness
- C. Strength
- D. Modulus of elasticity**

96. In tensile testing, the increase in the gage length measured after the specimen fractures, within the gage length is called _____.

- A. percent elongation**
- B. creep
- C. elasticity
- D. elongation

97. What impurity in steel can cause “red shortness”, which means the steel becomes unworkable at high temperature?

- A. Sulfur**
- B. Silicon
- C. Manganese
- D. Phosphorus

98. What is a process of producing a hard surface in a steel having a sufficiently high carbon content to respond to hardening by a rapid cooling of the surface?

- A. Cyaniding
- B. Nitriding
- C. Flame hardening**
- D. Induction hardening

99. What is the common reinforcement for polymer composites?

- A. Boron
- B. Ceramic
- C. Graphite
- D. Glass fiber**

100. Which of the following fluids conducts electricity?

A. Electrolyte

B. Water

C. Solution

D. Acid

101. What is defined as a local corrosion damaged characterized by surface cavities?

A. Cracking

B. Pitting

C. Cavitation

D. Erosion

102. What refers to the removal of zinc from brasses?

A. Dezincification

B. Graphitization

C. Stabilization

D. Dealloying

103. What is the scaling off of a surface in flakes or layers as the result of corrosion?

A. Exfoliation

B. Corrosion fatigue

C. Scaping

D. Fretting

104. What corrosion occurs under organic coatings on metals as fine, wavy hairlines?

A. Stray current corrosion

B. Microbiological corrosion

C. Filiform corrosion

D. Fretting corrosion

105. What refers to the deterioration of material by oscillatory relative motion of small amplitude (20 to 100 μm) between two solid surfaces in a corrosive environment?

- A. Stray current corrosion
- B. Microbiological corrosion
- C. Filiform corrosion
- D. Fretting corrosion**

106. Indicate the false statement about corrosion.

- A. Plastics and ceramics are immune to many forms of corrosion because they are not good conduction of electricity.
- B. The corroded member in a corrosion cell is the cathode.**
- C. Passivity is a prerequisite for the corrosion protect on many metals.
- D. Corrosion of metals is usually electrochemical in nature.

107. Steel is an alloy of iron and carbon with limits on the amount of carbon to less than _____ percent.

- A. 2**
- B. 3
- C. 4
- D. 1

108. Indicate false statement about stainless steel?

- A. The density of stainless steel is about the same as carbon or low-alloy steels.
- B. Stainless steels are poor conductors of heat.
- C. Stainless steels are poor conductors of electricity.
- D. Stainless steels have tensile moduli greater than those of carbon and alloy steels.**

109. What are the four major alloying elements of austenitic stainless steels?

- A. Iron, chromium, carbon and nickel**
- B. Iron, chromium, zinc and nickel
- C. Iron, chromium, carbon and zinc
- D. Iron, chromium, carbon and copper

110. The electrical resistance of stainless steels can be as much as _____ time that of carbon steel.

- A. 5
- B. 6**
- C. 10
- D. 15

111. What refers to a shape achieved by allowing a liquid to solidify in a mold?

- A. Casting**
- B. Molding
- C. Forming
- D. All of the choices

112. Which of the following is NOT a hardware requirement for die casting?

- A. Water-cooled metal cavities
- B. machined metal holding blocks
- C. Ejection mechanism
- D. Metal mold (matching halves)**

113. What cast iron has modular or spheroidal graphite?

- A. Ductile iron**
- B. Wrought iron
- C. Gray iron
- D. White iron

114. What is a process for making glass-reinforced shapes that can be generate by polling resin-impregnated glass stands through a die?

- A. Continuous pultrusion**
- B. Bulk molding
- C. Vacuum bag forming
- D. Resin transfer moulding

115. What term is used to denote a family of thermosetting polymers that are reaction products of alcohols and acids?

- A. Alkaline
- B. Alkydes**
- C. Alcocids
- D. Aldehyde

116. What is the AISI-SAE steel designation for nickel 3.50 alloy?

- A. 13XX
- B. 23XX**
- C. 25XX
- D. 31XX

117. What is the AISI-SAE designation for resulfurized and rephosphorized carbon steel?

- A. 13XX
- B. 31XX
- C. 23XX
- D. 12XX**

118. What does AISI stands for?

- A. Asian Institute of Steel Industries
- B. American Institute of Steel Industries
- C. Association of Iron and Steel Industries
- D. American Iron and Steel Institute**

119. What does SAE stands for?

- A. Society of Automotive Engineers**
- B. Society of American Engineers
- C. Society of Architects and Engineers
- D. Society of Alloy Engineers

120. What does ASTM stands for?

- A. Association of Steel Testing and Materials
- B. American Society for Testing and Materials**
- C. Asian Society for Testing and Materials
- D. Allied Society for Testing and Materials

121. What is the approximate chromium range of a ferritic stainless steel?

- A. 12% to 18%
- B. 10% to 12%
- C. 16% to 20%**
- D. 20% to 24%

122. The Group H steels can be used in what temperature range?

- A. 600°C to 1100°C**
- B. 1000°C to 1500°C
- C. 1100°C to 2000°C
- D. 200°C to 800°C

123. The following are primary alloying ingredients of Group H steel except:

- A. Molybdenum
- B. Tungsten
- C. Cobalt**
- D. Chromium

124. The chrome-molybdenum steels contain how many percent of molybdenum?

- A. 0.10
- B. 0.20**
- C. 0.30
- D. 0.40

125. The chrome-vanadium steels contain how many percent of vanadium?

A. 0.15 to 0.30

B. 0.05 to 0.15

C. 0.30 to 0.45

D. 0.45 to 0.60

126. Manganese steel usually contains how many percent of manganese?

A. 1 to 5

B. 5 to 10

C. 11 to 14

D. 14 to 18

127. The wear-resistance of this material is attributed to its ability to _____, that is, the hardness is increased greatly when the steel is cold worked.

A. cold harden

B. stress harden

C. cool-temperature

D. strain harden

128. The special chrome steels of the stainless variety contain how many percent of chromium?

A. 4 to 8

B. 9 to 10

C. 11 to 17

D. 17 to 21

129. What refers to the application of any process whereby the surface of steel is altered so that it will become hard?

A. Caburizing

B. Casehardening

C. Annealing

D. Surfacehardening

130. What refers to the ability of steel to be hardened through to its center in large section?

- A. Malleability
- B. Hardenability**
- C. Spheroidability
- D. Rigidity

131. What is the equilibrium temperature of transformation of austenite to pearlite?

- A. 1000° F
- B. 1333° F**
- C. 1666° F
- D. 1222° F

132. The alpha iron will become paramagnetic at temperature above _____.

- A. 770° C**
- B. 550° C
- C. 660° C
- D. 440° C

133. What structure is formed when transformation occurs at temperatures down to the knee of the curve?

- A. Pearlite**
- B. Bainite
- C. Austenite
- D. Martensite

134. What allotropic form of iron refers to iron that has a temperature range of room temperature to 1670° F?

- A. Beta iron
- B. Gamma iron
- C. Delta iron
- D. Alpha iron**

135. What steel surface hardening process requires heating at 1000° F for up to 100 hours in an ammonia atmosphere, followed by slow cooling?

A. Nitriding

B. Flame hardening

C. Precipitation hardening

D. Carburizing

136. What is the chief ore of tin?

A. Cassiterite

B. Bauxite

C. Ilmanite

D. Galena

137. What is the chief ore of zinc?

A. Cassiterite

B. Bauxite

C. Sphalerite

D. Ilmanite

138. What is the chief ore of titanium?

A. Sphalerite

B. Ilmanite

C. Bauxite

D. Cassiterite

139. What is the mixture of gibbsite and diaspore, of which aluminum is derived?

A. Bauxite

B. Rutile

C. Galena

D. Sphalerite

140. The term “brass” is very commonly used to designate any alloy primarily of:

- A. copper and zinc**
- B. aluminum and iron
- C. copper and aluminum
- D. zinc and nickel

141. The term “bronze” is used to designate any alloy containing:

- A. copper and zinc
- B. copper and aluminum
- C. copper and nickel
- D. copper and tin**

142. In a system of designating wrought aluminum alloys, a four digit number is used. What does the first digit indicates?

- A. The purity of aluminum
- B. The identity of the alloy
- C. The alloy group**
- D. The strength of the alloy

143. In a system of designating wrought aluminum alloys, what does the second digit represents?

- A. The purity of aluminum
- B. The identity of the alloy
- C. The modifications of the alloy group or impurity limits**
- D. The alloy group

144. In the system of designating wrought aluminum alloys, the letter F that follows the number indicates what condition of the alloy?

- A. As fabricated**
- B. Strain hardened
- C. Annealed
- D. Artificially aged

145. The following alloys are the chief alloys that are die-cast except:

- A. Zinc alloys
- B. Magnesium alloys
- C. Manganese alloys**
- D. Aluminum alloys

146. What is the minimum tensile strength of Gray Cast Iron class 50?

- A. 25000 lbf/in²
- B. 35000 lbf/in²
- C. 50000 lbf/in²**
- D. 100000 lbf/in²

147. What is the carbon content of wrought iron?

- A. less than 0.1 percent**
- B. exactly 0.1 percent
- C. more than 0.1 percent
- D. ranges from 0.1 percent to 0.2 percent

148. Alnico is an alloy containing how many percent nickel?

- A. 10%
- B. 14%**
- C. 18%
- D. 22%

149. The most common beta brass with a composition of 60% copper and 40% zinc is called _____.

- A. yellow brass
- B. red brass
- C. Muntz metal**
- D. white brass

150. Red brass contains about how many percent of zinc?

- A. 20%
- B. 15%**
- C. 20%
- D. 25%

151. Yellow brass contains approximately how many percent of zinc?

- A. 20%
- B. 50%
- C. 30%**
- D. 40%

152. Indicate the false statement.

- A. Aluminum bronzes contain no tin.
- B. Silicon bronzes are usually used for marine application and high-strength fasteners.
- C. Bronze is a copper-tin alloy.
- D. Tin is relatively soluble in copper.**

153. What is the most abundant metal in nature?

- A. Aluminum**
- B. Steel
- C. Iron
- D. Copper

154. Indicate the false statement about aluminum.

- A. It has 1/3 the weight of steel.
- B. It has 1/3 of the stiffness of steel.
- C. It has high strength-to-weight ratio.
- D. It has poor thermal and electrical conductivity.**

155. What is the effect to aluminum with iron as the alloying element?

- A. Reduce hot-cracking tendencies in casting.**
- B. Improve conductivity
- C. Lowers castability
- D. Improves machinability

156. What is the effect to aluminum with copper as alloying element?

A. Increase strength up to about 12%

B. Reduces shrinkage

C. Improves machinability

D. Increases fluidity in casting

157. Which of the following are two well-known nickel alloys with magnetic properties ideal for permanent magnets?

A. Invar and Nilvar

B. Nichrome and Constantan

C. Elinvar and Invar

D. Alnico and Conife

158. The Portland cement is manufacture from the following elements except:

A. lime

B. silica

C. alumina

D. asphalt

159. What gives the average ratio of stress to strain for materials operating in the nonlinear region in the stress-strain diagram?

A. Modulus of elasticity

B. Proportionality limit

C. Secant modulus

D. Tangent modulus

160. What test determines the hardenability of a steel specimen?

A. Jominy end-quench test

B. The lever rule

C. Gibb's phase test

D. Stress relief test

161. What steel relief process is used with hypoeutectoid steels to change martensite into pearlite?

- A. Tempering**
- B. Normalizing
- C. Annealing
- D. Spheroidizing

162. What is another term for tempering?

- A. Recrystallization
- B. Annealing
- C. Spheroidizing
- D. Drawing or toughening**

163. All are steel surface hardening processes except one. Which one?

- A. Carburizing
- B. Flame hardening
- C. Nitriding
- D. Annealing**

164. For metric wire gage, the No. 2 wire is _____ in diameter.

- A. 0.1 mm
- B. 0.2 mm**
- C. 0.3 mm
- D. 0.4 mm

165. Bus bars of rectangular cross section are generally used for carrying _____.

- A. high electric current**
- B. low electric current
- C. high voltage
- D. low voltage

166. What are used for interconnection on printed-circuit boards?

- A. Unlaminated flat conductors
- B. Insulated conductors
- C. Rounded flexible conductors
- D. Flat flexible conductors**

167. Yellow brass is a copper alloy with improved mechanical properties but reduced corrosion resistance and electrical conductivity. How many percent of yellow brass is copper?

- A. 65%**
- B. 35%
- C. 55%
- D. 45%

168. What type of copper alloy is used as collectors for electric generator?

- A. yellow brass
- B. Beryllium copper
- C. Tin Bronze**
- D. Phosphor bronze

169. What is the electrical resistivity of pure copper in $\mu\Omega\text{-cm}$?

- A. 1.76
- B. 1.71
- C. 1.67**
- D. 3.10

170. What should be the resistivity in $\mu\Omega\text{-cm}$ of a resistor material?

- A. 200 – 300
- B. 100 – 200
- C. 50 – 150**
- D. 10 – 50

171. What is the most widely used dielectric material in the electrical and electronics industry?

- A. Polymer
- B. Plastic**
- C. Rubber
- D. All of the above

172. What are natural or synthetic rubber like materials which have outstanding elastic characteristics?

- A. Thermosetting plastics
- B. Polymers
- C. Elastomers**
- D. Thermoplastic plastics

173. What are cellular forms of urethanes, polystyrenes, vinyls, polyethylene, polypropylenes, phenolics, epoxies and variety of other plastics?

- A. Thermoplastic plastics
- B. Plastic foams**
- C. Polymers
- D. Thermosetting plastics

174. What is the widely used electrical insulator?

- A. Plastic
- B. Polymer
- C. Epoxy
- D. Paper**

175. What is the dielectric strength of an unimpregnated cellulose paper or kraft paper?

- A. 6 to 12 MV/m**
- B. 8 to 14 MV/m
- C. 10 to 16 MV/m
- D. 12 to 18 MV/m

176. What is the most widely known carbide?

- A. Carbon carbide
- B. Lead carbide
- C. Germanium carbide
- D. silicon carbide**

177. Class I capacitors have dielectric constants are up to _____.

- A. 100
- B. 200
- C. 300
- D. 500**

178. What are the typical dielectric constants of class II capacitors?

- A. 500 to 10,000**
- B. 1,000 to 10,000
- C. 500 to 5,000
- D. 100 to 1,000

179. What are the most widely used general-purpose coatings?

- A. Alkyds**
- B. Acrylics
- C. Epoxies
- D. Vinyls

180. What is widely used in the electronic industry as a structural member, such as tube envelopes, hermetic seals to metals or ceramics, protective coating on hybrid and integrated circuits, etc.?

- A. Glass**
- B. Plastic
- C. Silica
- D. Film

181. What refers to glasses which are devitrified about 100°C below their softening point to form a very fine network of crystalline phase?

- A. Fused silica
- B. Glass ceramics**
- C. Fused quartz
- D. Fiber glass

182. The percentage change in magnetic properties of materials resulting from temperature aging called the _____.

- A. aging index
- B. aging factor
- C. aging coefficient**
- D. aging point

183. The change in electrical resistance due to the application of magnetic field is called _____.

- A. magnetic anisotropy
- B. magnetoresistance**
- C. magnetostriction
- D. magnetizing factor

184. Which material is used for de application such as electromagnetic cores and relays?

- A. Iron**
- B. Copper
- C. Steel
- D. Aluminum

185. Which of the following is known as “electrical steel”?

- A. Silicon steel**
- B. Stainless steel
- C. Carbon steel
- D. Cast Steel

186. What is the highest-frequency ferrite?

- A. Garnet**
- B. Spinel
- C. Mumetal
- D. Superinvar

187. Which material is used for Schottky barrier diodes, light-emitting diodes, Gunn diodes and injection lasers?

- A. Gallium Arsenide**
- B. Silicon Carbide
- C. Selenium
- D. Gallian Phosphide

188. What material is used for electroluminescent diodes which can emit either green or red light?

- A. Gallium Arsenide
- B. Silicon Carbide
- C. Selenium
- D. Gallium Phosphide**

189. Lead compounds such as lead sulfide, selenide and telluride may be used for which application?

- A. Diodes and transistors at low temperature
- B. Infrared detectors
- C. Thermoelectric applications
- D. All of the above**

190. For hardness penetration test, the Rockwell test uses what type of penetrator?

- A. Sphere**
- B. Square pyramid
- C. Asymmetrical pyramid
- D. Cube

191. What is the combination of cutting and scratch test of a material?

- A. Knoop test
- B. Vickers test
- C. File hardness test**
- D. Toughness test

192. What refers to the strain energy per unit volume required to reach the yield point?

- A. Elastic toughness**
- B. Fatigue
- C. Hardness
- D. Creep strain

193. The following are typical properties of ceramics except one. Which one?

- A. High melting point
- B. High compressive strength
- C. High corrosion resistance
- D. High thermal conductivity**

194. What refers to the average number of mers in the molecule, typically several hundred to several thousand?

- A. Polymerization constant
- B. Polymerization factor
- C. Degree of polymerization**
- D. Polemerization index

195. What nickel alloy has high electrical and corrosion resistance and high strength at red heat temperature and contain 15 to 20% chromium?

- A. Alnico
- B. Nichrome**
- C. Invar
- D. Nilvar

196. Silicon bronze contains how many percent of silicon?

- A. 96%
- B. 3%**
- C. 1%
- D. 69%

197. What element is added to copper to increase its strength and fatigue properties?

- A. Silicon
- B. Aluminum
- C. Beryllium**
- D. Zinc

198. What element is added to copper to make it extremely hard?

- A. Aluminum**
- B. Zinc
- C. Lead
- D. Silicon

199. What element constitutes the major component of most bronzes?

- A. Zinc
- B. Tin**
- C. Lead
- D. Aluminum

200. What is the most common alloying ingredient in copper?

- A. Tin
- B. Lead
- C. Zinc**
- D. Aluminum