10. The number of neutrons accompanying the formation of $^{139}_{54}$Xe and $^{94}_{38}$Sr from the absorption of a slow neutron by $^{235}_{92}$U, followed by nuclear fission is
   (A) 1
   (B) 2
   (C) 3
   (D) 4
   Answer: Option C

11. Which of the following is not a naturally occurring nuclear fuel?
   (A) Uranium-238
   (B) Thorium-233
   (C) Plutonium-239
   (D) None of these
   Answer: Option C

12. An ideal coolant for a nuclear reactor should
   (A) Be a good absorber of neutrons
   (B) Be capable of attaining high temperature, only when it is pressurised
   (C) Have high density, but low heat transfer coefficient
   (D) Be free from radiation damage and non-corrosive
   Answer: Option D

13. Safety rods provided in nuclear reactors to guard against accidents, in case of earthquake are made of
   (A) High carbon steel
   (B) Molybdenum
   (C) Zircaloy
   (D) Boron or cadmium
   Answer: Option D

14. Heavy water is preferred over ordinary water as a coolant, because it.
   (A) Acts both as an efficient coolant as well as a moderator
   (B) Can be heated to a higher temperature without pressurizing
   (C) Is less prone to radiation damage
   (D) All (A), (B) and (C)
   Answer: Option D

15. Percentage of U-238 in natural uranium is around
   (A) 0.71
   (B) 99.29
   (C) 0.015
   (D) 29.71
   Answer: Option B

16. The time taken for a radioactive element to reduce to 50% of its original weight is _______ years, if its half life period is 12 years.
   (A) 24
   (B) 18
   (C) 6
   (D) 36
   Answer: Option B

17. Which of the following is not a good moderating material?
   (A) Concrete
   (B) Boron
   (C) 18/8 stainless steel
   (D) All (A), (B) and (C)
   Answer: Option D

18. Primary purpose of a _______ nuclear reactor is to supply a high neutron flux of the order of $10^{13}$ to $10^{14}$ neutrons/cm$^2$ second.
19. The electric power generation cost in nuclear power plant is less than that in a coal based thermal power plant, mainly because the
   (A) Fuel cost per unit power generated is less
   (B) Thermal efficiency of the former is higher
   (C) Maintenance cost of the former is less
   (D) None of these
   Answer: Option A

20. Fast breeder nuclear reactors using enriched uranium as fuel may contain upto a maximum of __________ percent of U-235 (i.e. fissile material).
   (A) 15
   (B) 45
   (C) 65
   (D) 85
   Answer: Option D

21. Which is used as a coolant in nuclear reactor due to its high capture cross-section?
   (A) H₂
   (B) N₂
   (C) He
   (D) CO₂
   Answer: Option A

22. Water is a better coolant than a gas (like CO₂, He, N₂ etc.), because it
   (A) Is a better neutron moderator as well
   (B) Require comparatively smaller pumps and heat exchanger for a given heat transfer rate
   (C) Has a better heat transfer characteristics, and it can be pressurised to attain a high temperature
   (D) All (A), (B) and (C)
   Answer: Option D

23. β-rays emission in radioactive disintegration is always accompanied by the emission of
   (A) γ-rays
   (B) α-rays
   (C) Neutrons
   (D) None of these
   Answer: Option A

24. Fuel for a nuclear reactor (thermal) is
   (A) Uranium
   (B) Plutonium
   (C) Radium
   (D) None of these
   Answer: Option A

25. Final product of uranium extraction plant at Jadugoda (Bihar) is
   (A) Uranium
   (B) Uranium oxide
   (C) Uranium carbide
   (D) Magnesium diuranate
   Answer: Option D

26. A heterogeneous reactor is the one, in which the moderator and the
   (A) Coolant are different materials
   (B) Coolant are present in different phases (e.g., heavy water and graphite)
   (C) Fuel are present in different phases (e.g. uranium and heavy water)
   (D) None of these
   Answer: Option C
27. Thorium-232 (a fertile material) on absorption of a neutron gets converted into __________, which is a fissile material.
   (A) Thorium-233
   (B) Uranium-235
   (C) Uranium-233
   (D) Plutonium-239
   Answer: Option C

28. The first underground nuclear test was conducted by India at
   (A) Jaisalmer
   (B) Pokharan
   (C) Kalpakkam
   (D) Narora
   Answer: Option B

29. The half life period of a radioactive substance is best determined by counting the number of alpha particles emitted per second in a Geiger Muller counter from its known quantity. If the half life period of a radioactive substance is one month, then
   (A) 3/4th of it will disintegrate in two months
   (B) It will completely disintegrate in two months
   (C) It will completely disintegrate in four months
   (D) 1/8th of it will remain intact at the end of four months
   Answer: Option B

30. Tarapur (INDIA) atomic power station
   (A) Has two boiling water reactors of American design
   (B) Has an installed capacity of 400 MW
   (C) Is the first power reactor in India, which became critical in 1969
   (D) All (A), (B) and (C)
   Answer: Option D

31. Liquid metal (e.g., molten sodium) is preferred as a coolant in case of a/an __________ reactor.
   (A) Homogeneous
   (B) Graphite moderated
   (C) Fast breeder
   (D) Enriched uranium (3% U-235) fuelled
   Answer: Option C

32. Plutonium
   (A) Is recovered from spent fuel from thermal nuclear reactor
   (B) Has much lower melting point (640°C) compared to thorium (1690°C)
   (C) Both (A) and (B)
   (D) Neither (A) nor (B)
   Answer: Option C

33. Unit of radioactivity is
   (A) Barn
   (B) Fermi
   (C) Angstrom
   (D) Curie
   Answer: Option D

34. Which of the following ores contains maximum percentage of uranium?
   (A) Carnotite
   (B) Thorium
   (C) Rescolite
   (D) Pitchblende
   Answer: Option D

35. Out of the following places, a nuclear power plant is not located at
   (A) Talcher (Orissa)
   (B) Kaiga (Karnataka)
   (C) Rawatbhata (Rajasthan)
   (D) Kalpakkam (Tamilnadu)
36. In nuclear reactions, ________ number is conserved.
   (A) Mass
   (B) Atomic
   (C) Both (A) & (B)
   (D) Neither (A) nor (B)
   Answer: Option C

37. Radioactive decay of a material involves a ________ order reaction.
   (A) Third
   (B) Second
   (C) First
   (D) Zero
   Answer: Option C

38. The main purpose of control rod in a nuclear reactor is to control the
   (A) Chain reaction and hence the power output by regulating the number of secondary neutrons
      causing fission
   (B) Emission of hazardous radiation
   (C) Conversion of fissile material into fertile material
   (D) Velocity of the secondary neutrons
   Answer: Option A

39. Thermal neutrons which are used to cause the fission of U-235 have energy ________ eV.
   (A) < 0.025
   (B) > 1
   (C) 1-25
   (D) > 200
   Answer: Option A

40. The decrease in the atomic number is not observed in case of
   (A) Electron capture
   (B) β-emission
   (C) α-emission
   (D) Positron emission
   Answer: Option B

41. Net efficiency of ordinary light water cooled nuclear reactor is about ________ percent.
   (A) 32
   (B) 52
   (C) 72
   (D) 88
   Answer: Option A

42. Number of secondary neutron emitted on fission of an atom of U-235 by slow neutron
   bombardment is
   (A) 3
   (B) 235
   (C) 200
   (D) 92
   Answer: Option A

43. Bhabha Atomic Research Centre (BARC) located at Trombay (near Bombay, INDIA) has
   (A) Five operating research reactors (namely Apsara, Cirus Zerelina, Purnima and Dhurva)
   (B) A 420 MW nuclear power plant
   (C) A very large capacity (100 tons/yr) heavy water plant
   (D) All (A), (B) and (C)
   Answer: Option A

44. Thorium can be converted into U-233 in a ________ reactor.
   (A) Liquid metal cooled
   (B) Fast breeder
   (C) Thermal
   (D) Swimming pool
45. Which of the following may not need a moderator?
   (A) Candu reactor
   (B) Fast breeder reactor
   (C) Homogeneous reactor
   (D) Pressurised water reactor
   Answer: Option B

46. Isotopes of an element have the same
   (A) Number of neutrons
   (B) Mass number
   (C) Electronic configuration
   (D) Atomic weight
   Answer: Option C

47. Which of the following factors is the most important in the site selection for a nuclear power plant?
   (A) Absence of earthquake prone zone in nearby areas
   (B) Abundant availability of water
   (C) Remotely located from residential areas
   (D) Proximity to fuel source
   Answer: Option A

48. Use of molten metal as a coolant in fast breeder reactor helps in
   (A) Rapid heat transfer from the core
   (B) Accelerating the reaction rate in the core
   (C) Breeding neutrons
   (D) Accelerating the neutrons
   Answer: Option A

49. Graphite is used in nuclear reactor as
   (A) Insulation lining of the reactor
   (B) Fuel
   (C) Lubricant
   (D) Retarder of neutron velocity
   Answer: Option D

50. A nuclear reactor can’t be used for
   (A) The production of radioisotopes
   (B) Supplying intense fields or beams of neutron for scientific experiments
   (C) Marine ship propulsion
   (D) None of these
   Answer: Option D

51. Which of the following nuclear reactors is the most efficient thermodynamically while operating between the same temperature and pressure limits of the reactor?
   (A) Molten sodium cooled
   (B) CO₂ gas cooled
   (C) Pressurised water
   (D) Boiling water
   Answer: Option D

52. Pick out the wrong statement.
   (A) Isotopes have the same number of protons & electrons, but different number of neutrons
   (B) Hydrogen has two isotopes
   (C) In ordinary hydrogen, ²H³ and ²H² are present in the ratio 6400:1
   (D) None of these
   Answer: Option B

53. Which of the following is the most harmful for the human being?
   (A) β-rays
   (B) X-rays
   (C) γ-rays
   (D) Ultra violet rays
54. Emission of β-particles during radioactive decay of a substance is from
   (A) Innermost shell
   (B) Nucleus
   (C) Outermost shell
   (D) None of these
   Answer: Option B

55. Energy equivalent to one atomic mass unit (amu) is __________ MeV.
   (A) 9.31
   (B) 93.1
   (C) 931
   (D) 9310
   Answer: Option C

56. Solar energy results from __________ reaction.
   (A) Fission
   (B) Combustion
   (C) Thermonuclear
   (D) None of these
   Answer: Option C

57. The critical mass of a fissionable material can be reduced by
   (A) Heating it
   (B) Cooling it
   (C) Surrounding it by neutron reflecting material
   (D) Surrounding it by neutron absorbing material
   Answer: Option C

58. Heavy water used in the nuclear reactors to slow down the speed of neutrons is
   (A) Highly purified water
   (B) A compound of oxygen and deuterium
   (C) Water having dissolved salts of heavy metals
   (D) None of these
   Answer: Option B

59. If 4 gm of a radioisotope has a half life period of 10 days, the half life of 2 gm of the same
   isotope will be __________ days.
   (A) 5
   (B) 10
   (C) 20
   (D) 30
   Answer: Option B

60. The ratio of volume of an atom to that of its nucleus is
   (A) $10^{12}$
   (B) $10^{12}$
   (C) $10^8$
   (D) $10^8$
   Answer: Option A

61. The new nucleus formed after β-decay of a radioactive element has
   (A) Less atomic number
   (B) Less atomic weight
   (C) More atomic number
   (D) More atomic weight
   Answer: Option A

62. A control rod
   (A) Should have small absorption cross-section
   (B) Is generally made of boron, hafnium or cadmium
   (C) Should have large absorption cross-section
   (D) Both (B) and (C)
   Answer: Option D
63. Which of the following is a non-fissile material?
   (A) Plutonium-239
   (B) Uranium-235
   (C) Uranium-233
   (D) Thorium-232
   Answer: Option D

64. Which of the following types of nuclear reactors is most prone to radioactive hazards?
   (A) Pressurised water reactor
   (B) Gas cooled reactor
   (C) Molten sodium cooled reactor
   (D) Boiling water reactor
   Answer: Option D

65. Which of the following is not a fertile material?
   (A) Th-232
   (B) U-238
   (C) U-233
   (D) None of these
   Answer: Option C

66. Uranium Corporation of India Limited (UCIL) engaged in the mining & concentration of uranium ore is located at
   (A) Alwaye (in Kerala)
   (B) Jadugoda (in Jharkhand)
   (C) Kalpakkam (in Tamilnadu)
   (D) Gopalpur coast (in Orissa)
   Answer: Option B

67. Uranium ore is mined & concentrated in India at
   (A) Jadugoda (Jharkhand)
   (B) Kota (Rajasthan)
   (C) Tuticorin (Tamilnadu)
   (D) Talcher (Orissa)
   Answer: Option A

68. Coolant used in a fast breeder reactor is
   (A) Molten sodium
   (B) Heavy water
   (C) Ordinary water
   (D) Helium
   Answer: Option A

69. Nuclear fuel complex, Hyderabad is engaged in the job of
   (A) Manufacture of nuclear fuel elements/assemblies
   (B) Processing of uranium ore
   (C) Treatment of spent fuel
   (D) None of these
   Answer: Option A

70. Hydrogen bomb employs the nuclear fusion of
   (A) Hydrogen
   (B) Deuterium
   (C) Tritium
   (D) Helium
   Answer: Option B

71. Which of the following is a fuel for a fusion reactor (thermonuclear reactor)?
   (A) Deuterium and tritium
   (B) U-233
   (C) Thorium
   (D) Heavy water
   Answer: Option A
72. Nuclear power generation capacity in India is
   (A) 3000 MW
   (B) 10000 MW
   (C) More than hydroelectric power generation capacity
   (D) More than thermal power generation capacity
   Answer: Option A

73. Pressure of CO₂ gas (which is a coolant) in the Calder-Hall nuclear reactor is __________ kgf/cm².
   (A) 0.2
   (B) 7
   (C) 35
   (D) 50
   Answer: Option B

74. How many atoms are present in one gm-atom of an element?
   (A) 2 × 10²³
   (B) 6 × 10²³
   (C) 6 × 10¹²
   (D) 5 × 10⁶
   Answer: Option B

75. Which of the following may be used to measure the rate of nuclear disintegration?
   (A) Geiger-Muller Counter
   (B) Cyclotron
   (C) Cold chamber
   (D) Mass spectrograph
   Answer: Option A

76. 'Light water' used as a coolant in nuclear reactor is nothing but
   (A) Ordinary water
   (B) Mildly acidic (pH = 6) water
   (C) Mildly alkaline (pH = 8) water
   (D) None of these
   Answer: Option A

77. Which of the following undergoes fission reaction easily?
   (A) U-235
   (B) U-238
   (C) Th-232
   (D) None of these
   Answer: Option A

78. A radioactive isotope undergoes decay with respect to time following __________ law.
   (A) Logarithmic
   (B) Exponential
   (C) Linear
   (D) Inverse square
   Answer: Option B

79. The function of moderators in nuclear reactor is to
   (A) Slow down the secondary neutrons
   (B) Absorb the secondary neutrons
   (C) Control the chain reaction
   (D) None of these
   Answer: Option A

80. The decay product of tritium (a beta emitter) is
   (A) Lithium
   (B) Helium
   (C) Deuterium
   (D) Hydrogen
   Answer: Option B

81. The molecular weight of heavy water is
82. Enriched uranium means that, it contains
   (A) More than 0.71% of U-235
   (B) Only fertile material
   (C) Only fissile material
   (D) No impurities
   Answer: Option A

83. In the nuclear reaction, \( _{92}^{239}N_{\text{e}} \rightarrow _{94}^{239}Pu_{\text{e}} + ? \); the missing particle is a/an
   (A) Electron
   (B) Proton
   (C) Neutron
   (D) Position
   Answer: Option A

84. Which is a fertile nuclear fuel?
   (A) U-233
   (B) U-235
   (C) Pu-239
   (D) Th-232
   Answer: Option D

85. Spent fuel from the nuclear thermal reactor contains
   (A) Fission products
   (B) Plutonium
   (C) Unused fuel
   (D) All (A), (B) & (C)
   Answer: Option D

86. Heavy water is used as a moderator in a
   (A) Pressurised water reactor (PWR)
   (B) Boiling water reactor (BWR)
   (C) Candu reactor
   (D) Molten sodium cooled reactor
   Answer: Option C

87. Heavy water has maximum density at _________ °C.
   (A) 4
   (B) 11.6
   (C) 0
   (D) 18.6
   Answer: Option B

88. Candu reactor is a _________ nuclear reactor.
   (A) Natural uranium fuelled heavy water cooled & moderated
   (B) Highly enriched uranium (85% U-235) fuelled
   (C) Homogeneous
   (D) Fast breeder
   Answer: Option A

89. The most commonly used nuclear fuel in boiling water reactor is
   (A) Enriched uranium
   (B) Natural uranium
   (C) Plutonium
   (D) Monazite sand
   Answer: Option A

90. Which one is the radioactive isotope of hydrogen?
   (A) Deuterium
   (B) Ortho-hydrogen
91. The phenomenon of nuclear fission is opposite to that of
   (A) Radioactive decay
   (B) Thermionic emission
   (C) Nuclear fusion
   (D) Combustion
   Answer: Option C

92. Both tritium and deuterium have the same number of
   (A) Neutrons
   (B) Electrons
   (C) Protons
   (D) Nucleons
   Answer: Option A

93. The disintegration rate of a radioactive element
   (A) Progressively increases
   (B) Progressively decreases
   (C) Remains constant throughout
   (D) May increase or decrease depending on the material
   Answer: Option B

94. A fast breeder reactor employs
   (A) Graphite as moderator
   (B) Water as coolant
   (C) Molten sodium as coolant as well as moderator
   (D) U-235 as fuel
   Answer: Option D

95. The largest stable nucleus is
   (A) U-235
   (B) U-238
   (C) Pb-206
   (D) Bi-209
   Answer: Option A

96. Heavy water plant is not located at (INDIA)
   (A) Talcher
   (B) Tuticorin
   (C) Ramagundam
   (D) Kota
   Answer: Option C

97. In β-decay of radioactive material, the ratio of neutron to proton
   (A) Increases
   (B) Remain same
   (C) Decreases
   (D) Is unpredictable; may increase or decrease
   Answer: Option C

98. Main source of __________ is monazite sand.
   (A) Uranium
   (B) Polonium
   (C) Hafnium
   (D) Thorium
   Answer: Option D

99. Thermal nuclear reactors using enriched uranium as fuel contains a maximum of ______ percent fissile material i.e. U-235.
   (A) 1
   (B) 2
   (C) 3
100. Research reactors are normally meant for
(A) Producing high neutron flux $10^{12}-10^{13}$ neutrons/cm$^2$, sec and studying the effect of neutron bombardment on different materials
(B) Accelerating the neutrons
(C) Power generation
(D) None of these
Answer: Option A

101. The phenomenon of radioactivity was discovered by
(A) Madam Curie
(B) Becquerel
(C) Roentgen
(D) J.J. Thomson
Answer: Option B

102. Artificially produced radioactive isotopes are used for
(A) Power generation
(B) Treatment of certain diseases
(C) Initiating nuclear fission and fusion
(D) All (A), (B) and (C)
Answer: Option B

103. First experimental observation of nuclear fission was done by
(A) Plane
(B) Rutherford
(C) Fermi
(D) Hahn and Strassmann
Answer: Option C

104. Which one is different for the neutral atoms of the isotopes of an element?
(A) Atomic weights
(B) Atomic numbers
(C) Number of protons
(D) Number of electrons
Answer: Option A

105. Ordinary water is not used as a moderator because, it
(A) Has a low absorption cross-section
(B) Has a low scattering cross-section
(C) Absorbs neutrons
(D) Does not absorb neutrons
Answer: Option C

106. Uranium is recovered from its ore (pitchblende) by
(A) Froth floatation technique
(B) Leaching with sulphuric acid
(C) Smelting in a furnace
(D) Dissolving in water
Answer: Option B

107. Percentage of heavy water in ordinary water is around
(A) 0.015
(B) 7.54
(C) 0.71
(D) 32.97
Answer: Option A

108. Which of the following is not an ore of uranium?
(A) Pitchblende
(B) Kyanite
(C) Carnotite
(D) Rescolite
109. Atoms with same number of neutrons, but different number of nucleons are called
   (A) Isotones
   (B) Isobars
   (C) Isotopes
   (D) Isostere
   Answer: Option A

110. "Critical mass" is the minimum mass of nuclear fissile material required for the
   (A) Sustainment of chain reaction
   (B) Power generation on commercial scale
   (C) Economic power generation
   (D) None of these
   Answer: Option A

111. The emission of an a-particle causes the resultant nucleus to have
   (A) More atomic weight and less atomic number
   (B) Less atomic weight and less atomic number
   (C) Less atomic weight and more atomic number
   (D) None of these
   Answer: Option A

112. When the difference between mass number and atomic number of atoms of two or more
    elements are same, the atoms are termed as
   (A) Isomers
   (B) Isotopes
   (C) Isobars
   (D) Isotones
   Answer: Option D

113. Neutrons have mass approximately equal to that of __________ atoms.
    (A) Hydrogen
    (B) Helium
    (C) Deuterium
    (D) None of these
    Answer: Option A

114. Nuclear fuel generally used in reactors is uranium oxide instead of uranium, because the
    former has higher
    (A) Melting point, hence can be subjected to higher temperature
    (B) Density; hence core volume for a given power output would be smaller
    (C) Resistance to effects of irradiation
    (D) All (A), (B) and (C)
    Answer: Option D

115. Which of the following is artificially produced as it does not occur in nature?
    (A) Uranium-235
    (B) Uranium-233
    (C) Plutonium-239
    (D) Both (B) and (C)
    Answer: Option D

116. Radioactivity of an isotope is expressed in
    (A) Barn
    (B) MeV
    (C) Curie
    (D) Ergs
    Answer: Option C

117. Hydrogen differs from deuterium in __________ properties.
    (A) Radioactive
    (B) Physical
    (C) Chemical
    (D) All (A), (B) and (C)
118. The half life period of a radioactive element is 100 days. After 400 days, one gm of the element will be reduced to _________ gm.
(A) 1/4
(B) 1/8
(C) 1/2
(D) 1/16
Answer: Option D

119. The atomic weight and atomic number of an element are A and Z respectively. What is the number of neutrons in the atom of that element?
(A) A + Z
(B) A - Z
(C) A
(D) Z
Answer: Option B

120. The mass number of an element is not changed, when it emits __________ radiations.
(A) α & β
(B) β & γ
(C) γ & α
(D) α, β, & γ
Answer: Option B

121. Pressure in a Pressurised Water Reactor (PWR) is used for
(A) Maintaining constant pressure in the primary cooling circuit under varying loads
(B) Superheating the steam
(C) Pressurising the water in the primary coolant circuit
(D) None of these
Answer: Option A

122. The half life period of a radioactive element depends upon the
(A) Temperature
(B) Pressure
(C) Amount of element present
(D) None of these
Answer: Option D

123. The main ore of uranium is
(A) Pitchblende
(B) Monazite sand
(C) Cassiterite
(D) Chalcopyrite
Answer: Option A

124. The half life period of a radioactive element depends on its
(A) Temperature
(B) Pressure
(C) Amount
(D) None of these
Answer: Option D

125. Commercial power generation from fusion reactor is not yet possible, because
(A) It is difficult to control fusion reaction
(B) The fuel required (e.g. deuterium and tritium) is scarce
(C) It is difficult to initiate fusion reaction
(D) Quantity of fuel required for initiating fusion reaction is prohibitively high
Answer: Option A

126. Biological shield is provided in a nuclear power reactor to protect the __________ from radiation damage.
(A) Fuel elements
(B) Operating personnel
(C) Walls of the reactor
127. A fast breeder reactor
   (A) Uses natural uranium as fuel
   (B) Does not require a moderator
   (C) Both (A) and (B)
   (D) Neither (A) nor (B)
   Answer: Option B

128. H₂ is a better coolant than CO₂, due to it’s relatively
   (A) Lower density
   (B) Higher specific heat
   (C) Non-reactivity to uranium
   (D) Lower neutron capture cross-section
   Answer: Option B

129. Uranium ore is currently mined & concentrated (in India) at
   (A) Jadugoda
   (B) Ghatshila
   (C) Khetri
   (D) Alwaye
   Answer: Option A

130. Velocity of the thermal neutron (< 0.025 eV) used for fission of U-235 is around _________ m/sec.
    (A) 1
    (B) 2200
    (C) 3 × 10¹¹
    (D) 9 × 10²¹
    Answer: Option B

131. Which of the following accounts for the maximum energy release in the nuclear fission process?
    (A) Kinetic energy of fission products
    (B) Radioactive decay of fission products
    (C) Instantaneous release of γ-rays
    (D) Kinetic energy of neutrons
    Answer: Option A

132. Pick out the wrong statement.
    (A) α-particle emission from a radioactive element makes it electrically negative
    (B) β-particle emission from a radioactive element makes it electrically positive
    (C) A radioactive element having a half life period of 20 years will completely disintegrated in 40 years
    (D) The disintegration constant of a radioactive isotope is independent of pressure, temperature or concentration
    Answer: Option C

133. The ratio of mass of a neutron to that of an electron is about 1839. What is the ratio of the mass of a proton to that of an electron?
    (A) 159
    (B) 1837
    (C) 2537
    (D) 10000
    Answer: Option B

134. _________ moderator is used in a fast breeder reactor.
    (A) Graphite
    (B) Heavy water
    (C) Beryllium
    (D) No
    Answer: Option D

135. The second underground nuclear test was conducted by India at
136. Nuclear fuel usually used in a Boiling Water Reactor (BWR) is
(A) Plutonium
(B) Enriched uranium
(C) Natural uranium
(D) Thorium
Answer: Option B

137. In the gaseous diffusion process of uranium enrichment, the natural uranium is converted into gaseous
(A) Uranium oxide
(B) Uranium hexafluoride
(C) Uranium carbide
(D) Uranium sulphate
Answer: Option B

138. Atoms of U-238 and U-235 differ in structure by three
(A) Electrons and three protons
(B) Protons
(C) Neutrons
(D) Electrons
Answer: Option C

139. Enrichment of uranium is done to increase the concentration of __________ in the natural uranium.
(A) U-238
(B) U-233
(C) U-235
(D) Pu-239
Answer: Option C

140. Moderating material used in a thermal-reactor should be a
(A) Good absorber of neutrons
(B) Solid substance
(C) Poor absorber of neutrons
(D) None of these
Answer: Option C

141. A pressurised water reactor (PWR) uses pressurised water as a
(A) Coolant
(B) Working fluid in power turbine
(C) Moderator
(D) None of these
Answer: Option A

142. Which of the following radiations is the least penetrating?
(A) α-rays
(B) β-rays
(C) γ-rays
(D) X-rays
Answer: Option A

143. Critical energy should be __________ the neutron binding energy of the atom in order to initiate a nuclear fission.
(A) Equal to
(B) Less than
(C) More than
(D) Either more or less
Answer: Option C
144. __________ nuclear reactor does not require a heat exchanger to supply steam to power
turbine.
   (A) Molten sodium cooled
   (B) Helium cooled
   (C) Boiling water
   (D) Pressurised water
   Answer: Option C

145. Hydrogen has __________ isotopes.
   (A) No
   (B) One
   (C) Two
   (D) Three
   Answer: Option D

146. A thermal nuclear reactor compared to a fast breeder reactor
   (A) Uses slower neutrons for fission
   (B) Uses faster neutrons for fission
   (C) Gives higher power density
   (D) Requires less fuel to run at the same power level
   Answer: Option A

147. Which of the following is not used as a moderator in nuclear reactor?
   (A) Molten sodium
   (B) Light water
   (C) Beryllium
   (D) Boron hydride
   Answer: Option A

148. Pick out the wrong statement.
   (A) Atoms with same number of nucleons but different number of protons are called isobars
   (B) Atoms with same number of protons but different number of nucleons are called isoters
   (C) Out of α, β, and γ-rays, the one having maximum penetration power are γ-rays
   (D) The product formed by emission of α-particle has mass number less by 4 units than the parent
   nuclide
   Answer: Option B

149. Which one is radioactive in nature?
   (A) Helium
   (B) Deuterium
   (C) Heavy hydrogen
   (D) Tritium
   Answer: Option D

150. Sodium melts (at atmospheric pressure) at a temperature of __________ °C.
   (A) 58
   (B) 98
   (C) 348
   (D) 588
   Answer: Option B

151. Which is not a fissile nuclear material?
   (A) U-233
   (B) U-235
   (C) U-238
   (D) Pu-239
   Answer: Option C

152. The radioisotope used to study the thyroid gland is
   (A) Iodine
   (B) Cobalt
   (C) Iron
   (D) Carbon
   Answer: Option A
153. Fast breeder reactors are most usable in India, because of our largest __________ deposits.
   (A) Thorium
   (B) Plutonium
   (C) Uranium
   (D) None of these
   Answer: Option A

154. Which of the following is not used as a nuclear fuel cladding material?
   (A) Zircaloy
   (B) Cadmium
   (C) Ceramics
   (D) Stainless steel
   Answer: Option B

155. An electron has a mass that is approximately __________ that of the proton.
   (A) 1836 (approximately)
   (B) 1/1836 (approximately)
   (C) 1
   (D) ∞
   Answer: Option B

156. 75% of a radioactive element decays in 6 hours. Its half life period is __________ hours.
   (A) 3/4
   (B) 1/6
   (C) 3
   (D) 4
   Answer: Option C

157. Which of the following reactors is operated at high neutron flux and low power level?
   (A) Breeder reactor
   (B) Research reactor
   (C) Heterogeneous reactor
   (D) Liquid metal (e.g., molten sodium) cooled reactor
   Answer: Option B

158. Secondary cooling circuit is a must in molten sodium cooled fast breeder reactor for
   (A) Achieving high degree of superheat in the steam
   (B) Faster heat removal rate from the core
   (C) Lowering the coolant circulation pressure
   (D) Avoiding the mixing of water with radioactive sodium, as it may cause explosion
   Answer: Option D

159. Absorption/scattering cross-section of an element is expressed in "barn", which is equivalent to
   (A) $10^{-24}$ cm$^2$
   (B) $10^{-12}$ cm
   (C) 1 Angstrom
   (D) $10^{-24}$ cm
   Answer: Option A

160. One 'amu' is equivalent to
   (A) 9.31 MeV
   (B) 931 eV
   (C) 931 MeV
   (D) 931 J
   Answer: Option C

161. Isotopes of an element have different
   (A) Mass number
   (B) Electronic configuration
   (C) Nuclear charge
   (D) Chemical properties
   Answer: Option A

162. Indian monazite sand contains __________ percent thorium.
163. An element having large number of _________ is most easily subjected to nuclear fission.
   (A) Protons
   (B) Electrons
   (C) Neutrons
   (D) Nucleons
   Answer: Option D

164. Thorium metal
   (A) Resembles steel in appearance
   (B) Is less hard (in the range of silver)
   (C) Is highly ductile
   (D) All (A), (B) and (C)
   Answer: Option D

165. The amount of a radioactive material (having a half life of 100 years) remaining after 400 years will be _________ of its original weight.
   (A) 1/2
   (B) 1/4
   (C) 1/8
   (D) 1/16
   Answer: Option D

166. Which of the following isotopes is not present in natural uranium?
   (A) U-238
   (B) U-234
   (C) U-235
   (D) U-232
   Answer: Option D

167. Mass of a positron is same as that of a/an
   (A) Electron
   (B) α-particle
   (C) Proton
   (D) Neutron
   Answer: Option A

168. U-235 content in enriched uranium, that is normally used in power reactors (e.g., at Tarapur atomic power plant), is about _________ percent.
   (A) 85
   (B) 50
   (C) 3
   (D) 97
   Answer: Option C

169. Pick out the wrong statement.
   (A) The nucleus of a hydrogen atom is identical with a proton
   (B) A, β-ray particle is identical with an electron
   (C) Mass of an electron is about 1/1800th of the lightest nucleus
   (D) Positron is heavier than a proton
   Answer: Option D

170. Thorium-232 is converted into uranium-233 in a/an _________ nuclear reactor.
   (A) Thermal
   (B) Fast breeder
   (C) Heavy water moderated
   (D) Enriched uranium
   Answer: Option B

171. Nuclear power plant in INDIA is not located at
172. Heavy water plant (in INDIA) is not located at
(A) Kota and Baroda
(B) Talcher (Orissa)
(C) Tuticorin (Tamilnadu)
(D) Kaiga (Karnataka)
Answer: Option D

173. The number of neutrons in the nucleus of Uranium-233 \((_{92}U^{233})\) is
(A) 141
(B) 92
(C) 233
(D) 325
Answer: Option A

174. Nuclides having the same atomic numbers are termed as
(A) Isotopes
(B) Isomers
(C) Isotones
(D) Isobars
Answer: Option B

175. A homogeneous reactor is the one, in which the
(A) Fissile atoms are evenly distributed throughout the mass of nuclear reactor
(B) Same substance (e.g. heavy water) is used as moderator & coolant
(C) The fuel and the moderator is mixed to form a homogeneous material
(D) All (A), (B) and (C)
Answer: Option C

176. The size of an atom is of the order of one
(A) °Angstrom
(B) Fermi
(C) Micron
(D) mm
Answer: Option A

177. Molten sodium is used as a coolant in a fast breeder reactor, because of its
(A) Excellent moderating properties
(B) Neutron breeding capability
(C) Faster heat removal capability from the core
(D) Capability to increase the reaction rate in the core
Answer: Option C

178. Specific gravity of uranium and plutonium is about
(A) 8
(B) 13
(C) 19
(D) 27
Answer: Option

179. Heat is generated in a nuclear reactor (thermal) by
(A) Combustion of a nuclear fuel e.g. uranium
(B) Fusion of atoms of uranium
(C) Absorption of neutrons in uranium atoms
(D) Fission of U-235 by neutrons
Answer: Option D

180. The atomic mass of an element is fractional, because
(A) Of uncertainty principle
(B) It may have isobars
181. In a homogeneous nuclear reactor, the _________ are mixed together.
   (A) Fuel & coolant
   (B) Fuel & moderator
   (C) Coolant & moderator
   (D) None of these
   Answer: Option B

182. "Critical mass" is the minimum mass of nuclear fissile material required for the
   (A) Sustainment of chain reaction
   (B) Power generation on commercial scale
   (C) Economic power generation
   (D) None of these
   Answer: Option A

183. A fertile material is the one, which can be
   (A) Converted into fissile material on absorption of neutron
   (B) Fissioned by slow (thermal) neutrons
   (C) Fissioned by fast neutrons
   (D) Fissioned by either slow or fast neutrons
   Answer: Option A

184. The atomic number of an element is equal to the number of _________ present in its atom.
   (A) Neutrons
   (B) Electrons
   (C) Protons
   (D) Either (B) or (C)
   Answer: Option D

185. In a pressurised water reactor (PWR), the
   (A) Fuel is natural uranium and heavy water acts both as moderator & coolant
   (B) Coolant water boils in the core of the reactor
   (C) Coolant water is pressurised to prevent bulk boiling of water in the core
   (D) Use of moderator is not required
   Answer: Option C

186. Fast breeder test reactor at Kalpakkam (INDIA) is designed for using
   (A) Thorium as a fertile material
   (B) U-238 as a fertile material
   (C) Helium as a coolant
   (D) Uranium ore directly as a fuel
   Answer: Option A

187. What is the average life of a radioactive atom having a 'half life period' of $T$?
   (A) $1.44T$
   (B) $0.144T$
   (C) $14.4T$
   (D) $2T$
   Answer: Option A

188. Radioactive decay is a _________ change.
   (A) Chemical
   (B) Nuclear
   (C) Physical
   (D) None of these
   Answer: Option B

189. In a nuclear explosion, the energy is released primarily in the form of _________ energy.
   (A) Potential
   (B) Thermal
   (C) Kinetic
   (D) Electrical
190. The sum of masses of two nuclei produced in nuclear fission compared to the mass of original nucleus is
(A) Less
(B) More
(C) Same
(D) Much more
Answer: Option A

191. The mass number of an element is equal to the number of __________ in the nucleus.
(A) Electrons
(B) Neutrons
(C) Protons
(D) Neutrons plus protons (i.e., nucleons)
Answer: Option D

192. Heavy water (D₂O) in a nuclear reactor serves as a
(A) Coolant
(B) Moderator
(C) Both (A) & (B)
(D) Neutron absorber
Answer: Option C

193. __________ have the same mass number, but different nuclear charge.
(A) Isotopes
(B) Isobars
(C) Isotones
(D) None of these
Answer: Option B

194. A boiling water reactor is the one, in which the
(A) Coolant water is allowed to boil in the core of the reactor
(B) Coolant water, after being heated in the reactor core, generates steam in a boiler
(C) Pressurised water is pumped into the core
(D) Fuel and the coolant are thoroughly mixed to form a homogeneous solution
Answer: Option A

195. Energy produced in the nuclear fission is of the order of __________ MeV.
(A) 20
(B) 200
(C) 1000
(D) 2000
Answer: Option B

196. The most abundant isotope of natural uranium is
(A) $_{92}^{238}$U
(B) $_{92}^{235}$U
(C) $_{92}^{234}$U
(D) None of these
Answer: Option A

197. A fast breeder reactor
(A) Utilises fast neutrons for causing fission
(B) Converts fertile material (e.g., U-238) into fissile material (Pu-239)
(C) Normally employs molten sodium as coolant
(D) All (A), (B) and (C)
Answer: Option D

198. A moderator __________ the neutrons.
(A) Slows down
(B) Absorbs
(C) Accelerates
(D) Reflects
Answer: Option A
199. Which is the most commonly used molten metal for cooling of nuclear reactors?
   (A) Calcium
   (B) Sodium
   (C) Mercury
   (D) Zinc
   Answer: Option B

200. Extraction of uranium from its ore is done by ________ method.
   (A) Chemical
   (B) Pyrometallurgical
   (C) Physical beneficiation
   (D) Electrometallurgical
   Answer: Option A

201. Percentage of the heavy water in ordinary water is around
   (A) 0.015
   (B) 7.54
   (C) 0.71
   (D) 32.97
   Answer: Option A

202. Pick out the wrong statement.
   (A) The ratio of the density of the 'nucleus' to that of the 'atom' is $10^{12}$
   (B) $\alpha$-particle is identical with a doubly charged helium ion
   (C) The mass of deuterium atom is half that of helium atom
   (D) Gamma rays are high energy electrons
   Answer: Option D

203. The $_{92}^{238}\text{U}$ emits an $\alpha$-particle. The product is
   (A) $_{90}^{234}\text{U}$
   (B) $_{90}^{238}\text{U}$
   (C) $_{90}^{236}\text{U}$
   (D) $_{92}^{236}\text{U}$
   Answer: Option A

204. The atomic number of a radioactive element is not changed, when it emits ________ rays.
   (A) $\alpha$
   (B) $\beta$
   (C) $\gamma$
   (D) $\alpha$ & $\beta$
   Answer: Option C

205. Coolant used in a boiling water reactor is
   (A) Hydrogen gas
   (B) Water
   (C) Steam
   (D) A mixture of water & steam
   Answer: Option D

206. Isotopes of an element have different
   (A) Mass number
   (B) Electronic configuration
   (C) Nuclear charge
   (D) Chemical properties
   Answer: Option A

207. The ratio of neutrons to protons of an element having a mass number and atomic number of 80 and 40 respectively is
   (A) 1
   (B) 0.5
   (C) 2
   (D) 4
   Answer: Option A
208. The ratio of atomic radius to its nuclear radius is about
   (A) $10^5$
   (B) $10^8$
   (C) $10^{12}$
   (D) $10^{15}$
   Answer: Option A

209. Fast breeder Test Reactor (FBTR) is located at
   (A) Kalpakkam (near Madras)
   (B) Kota (in Rajasthan)
   (C) BARC (Trombay)
   (D) Tarapur (in Maharashtra)
   Answer: Option A

210. Out of the following places, heavy water plant is not located at
   (A) Baroda
   (B) Ramagundam
   (C) Talcher
   (D) Tuticorin
   Answer: Option B

211. A radioactive substance does not emit
   (A) $\alpha$-ray
   (B) Proton
   (C) Position
   (D) $\beta$-ray
   Answer: Option B

212. Which of the following nuclear materials is fissile?
   (A) Uranium-238
   (B) Thorium-232
   (C) Plutonium-239
   (D) None of these
   Answer: Option C

213. Thermal shield is used in high powered nuclear reactors to
   (A) Protect the walls of the reactor from radiation damage
   (B) Absorb the fast neutrons
   (C) Slow down the secondary neutrons
   (D) Protect the fuel element from coming in contact with the coolant
   Answer: Option A

214. Gas cooling as compared to water cooling of nuclear reactors
   (A) Cannot attain a high temperature
   (B) Is more efficient as gas has a higher specific heat
   (C) Can produce only saturated steam for feeding to power turbine
   (D) None of these
   Answer: Option D

215. Pick out the wrong statement.
   (A) The disintegration rate of a radioactive substance cannot be increased by heating it
   (B) Electrons have negligible mass and unit negative change
   (C) Deuterium atom has one proton and two neutrons in its nucleus
   (D) Cadmium is capable of absorbing neutrons
   Answer: Option C

216. Unit of radioactivity is
   (A) Barn
   (B) Fermi
   (C) Angstrom
   (D) Curie
   Answer: Option D

217. Commercial power generation from fusion reactor is not yet possible, because
   (A) It is difficult to control nuclear fusion reaction
The fuel required (i.e., deuterium & tritium) is scarce
It is difficult to initiate fusion reaction
Quantity of fuel required for initiating fusion reaction is prohibitively high
Answer: Option A

218. The velocity of thermal (slow) neutrons triggering nuclear fission reaction (having energy
equal to 0.025 eV) is about _________ metres/second.
(A) 1100
(B) 2200
(C) 3300
(D) 4400
Answer: Option B

219. Molten sodium (as a coolant in fast breeder reactor)
(A) Can’t attain high temperature at normal pressure
(B) Is not at all corrosive, even at a higher temperature
(C) Is highly radioactive at elevated temperatures and can cause explosion, when it comes in
contact with air or water
(D) None of these
Answer: Option C

220. Positron is a/an
(A) Nucleus having two protons
(B) Helium nucleus
(C) Electron with positive charge
(D) Nucleus with one proton and one neutron
Answer: Option C

221. Out of the following, nucleus of _________ atom contains the largest number of neutrons.
(A) U-235
(B) U-238
(C) U-239
(D) Pu-239
Answer: Option C

222. Nuclear power reactor located at Tarapur is of _________ type.
(A) Fast breeder
(B) Pressurised water
(C) Boiling water
(D) Gas cooled
Answer: Option C

223. The amount of a radioisotope remaining undecayed after a time equal to four times its half
life, will be _________ percent.
(A) 3.125
(B) 6.25
(C) 12.50
(D) 25
Answer: Option B

224. Quantity of fissionable material (i.e. U-235) in natural uranium is _________ percent.
(A) 0.71
(B) 6.31
(C) 99.29
(D) 12.73
Answer: Option A

225. Nuclear reactors are provided with shield to guard against the emission of mainly
_________ rays.
(A) X
(B) α and β
(C) Neutrons & gamma
(D) Infrared
Answer: Option C
226. Extraction of uranium from its ore is done using __________ methods.
   (A) Electrometallurgical
   (B) Pyrometallurgical
   (C) Chemical
   (D) Physical beneficiation
   Answer: Option C

227. Which of the following is a moderating material used in nuclear reactor?
   (A) Graphite
   (B) Cadmium
   (C) Zircaloy (an alloy of zirconium and aluminium)
   (D) Stainless steel
   Answer: Option A

228. Pick out the correct statement.
   (A) Positron is the antiparticle of electron
   (B) In $\alpha$-decay, the ratio of neutron to proton decreases
   (C) Ionising power of $\beta$-rays is higher than that of $\alpha$-rays
   (D) Speed of $\alpha$-rays is more than that of $\gamma$-rays
   Answer: Option A

229. Uranium percentage in monazite sand is about
   (A) 0.01
   (B) 0.25
   (C) 1.2
   (D) 7
   Answer: Option B

230. Percentage of natural uranium present in uranium ore found in Jadugoda (Jharkhand, India) is
   (A) 0.1
   (B) 1
   (C) 2
   (D) 12
   Answer: Option A

231. Fast breeder reactors do not
   (A) Use Th-232 as fissile fuel
   (B) Convert fertile material to fissile material
   (C) Use fast neutrons for fission
   (D) Use molten sodium as coolant
   Answer: Option A

232. Pick out the correct statement.
   (A) Loss of electrons from neutral atoms produces negative ions
   (B) The radius of nucleus & atomic size are of the order of $10^{-12}$ cm & $10^{-8}$ cm respectively
   (C) Gain of electrons by neutral atoms form cations
   (D) Proton to neutron ratio in a stable nucleus is 2 : 1
   Answer: Option B

233. Fuel for a fast breeder reactor is
   (A) Plutonium
   (B) Uranium
   (C) Radium
   (D) Neptunium
   Answer: Option A

234. The main ore of thorium is
   (A) Pitchblende
   (B) Monazite sand
   (C) Limonite
   (D) Galena
   Answer: Option B

235. MeV is the unit of