

Paper Code No. : D-01

D - 01

Question Booklet No. :

ENTRANCE EXAMINATION – 2020

SET - D

ROLL NO : 001 5 4 2 3 2

Signature of Invigilator

Total Marks : 200

Time : THREE HOURS

Instructions to Candidates

- Do not write your name or put any other mark of identification anywhere in the OMR Response Sheet. IF ANY MARK OF IDENTIFICATIONS IS DISCOVERED ANYWHERE IN OMR RESPONSE SHEET, the OMR sheet will be cancelled, and will not be evaluated.
- This Question Booklet contains the cover page and a total of 200 Multiple Choice Questions of 1 mark each.
- Space for rough work has been provided at the beginning and end. Available space on each page may also be used for rough work.
- There is negative marking in Multiple Choice Questions. For each wrong answer, 0.25 marks will be deducted.
- USE/POSSESSION OF ELECTRONIC GADGETS LIKE MOBILE PHONE, iPhone, iPad, page ETC. is strictly PROHIBITED.
- Candidate should check the serial order of questions at the beginning of the test. If any question is found missing in the serial order, it should be immediately brought to the notice of the Invigilator. No pages should be torn out from this question booklet.
- Answers must be marked in the OMR response sheet which is provided separately. OMR Response sheet must be handed over to the invigilator before you leave the seat.
- The OMR response sheet should not be folded or wrinkled. The folded or wrinkled OMR/Response Sheet will not be evaluated.
- Write your Roll Number in the appropriate space (above) and on the OMR Response Sheet. Any other details, if asked for, should be written only in the space provided.
- There are four options to each question marked A, B, C and D. Select one of the most appropriate options and fill up the corresponding oval/circle in the OMR Response Sheet provided to you. The correct procedure for filling up the OMR Response Sheet is mentioned below.

CORRECT METHOD

(A) (B) (C) (D)

WRONG METHOD

(A) (B) (C) (D) (A) (B) (C) (D) (A) (B) (C) (D) (A) (B) (C) (D) (A) (B) (C) (D) (A) (B) (C) (D)

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1. Electrons revolve around the nucleus in orbitals which have
 - A. Variable energy
 - B. Fixed energy
 - C. Infinite energy
 - D. Zero energy
2. Electrons revolve only in those orbitals with angular momentum as an
 - A. Half integral of 'h'
 - B. Integral multiple of 'h'
 - C. Integral multiple of $\frac{h}{2\pi}$
 - D. Half integral multiple of 2π
3. Lowest energy orbital is
 - A. 2s
 - B. 2p
 - C. 3s
 - D. 3p
4. d-sub-shell can accommodate maximum
 - A. 2 electrons
 - B. 10 electrons
 - C. 14 electrons
 - D. 6 electrons
5. When atoms loose or gain electrons they acquire configuration of
 - A. Next Nobel gas
 - B. Halogen
 - C. Alkali metals
 - D. Alkaline metals
6. Colloidal solution can
 - A. Scatter light
 - B. Not scatter light
 - C. Absorb heat
 - D. Evolve heat
7. Particle size in suspension is
 - A. Less than 10^3 nm
 - B. 10^2 nm
 - C. Greater than 10^3 nm
 - D. 10 nm

8. Which one is not strong electrolyte
- A. KCl
B. KNO₃
C. CH₃COOH
D. NaClO₄
9. Lime water is
- A. CaO
B. Ca(OH)₂
C. CaCO₃
D. CaCl₂
10. The rate of law for a reaction is $K[A][B]^2$ which one of the following statement is false
- A. The reaction is first order in A
B. The reaction is second order in B
C. The reaction is second order over all
D. K is the reaction rate constant
10. Rate of reaction does not depend upon
- A. Temperature
B. Concentration of reactant
C. Pressure
D. Theory of expanding gases
12. If $n = 3$, the electrons are in
- A. K shell
B. L shell
C. M shell
D. N shell
13. The minimum amount of energy needed to start a reaction is called the
- A. Activation energy
B. Energy of reaction
C. Entropy of reaction
D. Reaction mechanism energy
14. Which of the following statement about s-orbital is incorrect
- A. They are found in all principal energy levels
B. They are spherical in shape
C. They can only hold one electron
D. The maximum number of s-orbital in any principal level is 1
15. The electronic configuration of an element with atomic number 8 is
- A. $1s^2, 2p^6$
B. $1s^2, 2s^2, 2p^6$
C. $2s^2, 2p^6$
D. $1s^2, 2s^2, 2p^4$

16. One mole of H_2O equals
- A. 22.4 L at 1 atm and 25°C
- ~~B.~~ 6.023×10^{23} atoms of hydrogen and 6.023×10^{23} atoms of oxygen
- C. 18 gm
- D. 1 gal
17. Relative molecular mass of CO_2 is
- A. 22
- ~~B.~~ 44
- C. 66
- D. 88
18. When a chemical substance loses one or more electrons it is said to be
- A. Oxidized
- B. Reduced
- C. Decomposed
- D. Displaced
19. $2\text{FeSO}_4(\text{s}) \xrightarrow{\Delta} \text{Fe}_2\text{O}_3(\text{s}) + \text{SO}_2(\text{g}) + \text{SO}_3(\text{g})$ is an example of
- A. Addition reaction
- B. Substitution reaction
- C. Decomposition reaction
- D. Displacement reaction
20. The non-metal which is liquid in nature is
- A. Oxygen
- B. Hydrogen
- ~~C.~~ Bromine
- D. Iodine
21. Which one is not allotrope of carbon
- A. Diamond
- B. Graphite
- ~~C.~~ Fullerene C-60
- D. Gold
22. Isotopes of an element have
- A. Same physical properties
- B. Different chemical properties
- C. Different number of neutrons
- D. Different atomic numbers
23. Calculate the number of particles in 0.1 mole of carbon atoms
- A. 12.044×10^{23}
- B. 1.51×10^{23}
- C. 6.023×10^{23}
- ~~D.~~ 6.023×10^{22}

24. Example of isobar is
- A. $^{35}_{17}\text{Cl}$ and $^{37}_{17}\text{Cl}$ B. $^{12}_6\text{C}$ and $^{14}_6\text{C}$
- C. $^{39}_{19}\text{K}$ and $^{40}_{20}\text{Ca}$ D. $^{40}_{18}\text{Ar}$ and $^{40}_{20}\text{Ca}$
25. Which atom has three unpaired electrons in its outer shell?
- A. Boron B. Carbon
- C. Nitrogen D. Oxygen
26. The hydrogen ion concentration of a solution is 10^{-3} M . The nature of the solution is
- A. Acidic B. Basic
- C. Neutral D. Amphoteric
27. Rutherford's α -particle scattering experiment was responsible for the discovery of
- A. Atomic nucleus B. Electrons
- C. Protons D. neutrons
28. Which of the following substance is an electrolyte
- A. Alcohol B. Sodium chloride
- C. Carbon dioxide D. Sugar
29. Tyndall effect is observed due to
- A. Reflection of light B. Refraction of light
- C. Scattering of light D. Polarization of light
30. Pauli exclusion Principle helps to calculate the maximum number of electrons that can be accumulated to any
- A. Orbital B. Sub-shell
- C. Shell D. Orbit
31. The correct order of ionic radii of the species
- $\text{N}^{3-}, \text{O}^{2-}, \text{Na}^+$ and F^-
- A. $\text{Na}^+ < \text{F}^- < \text{O}^{2-} < \text{N}^{3-}$ B. $\text{F}^- < \text{O}^{2-} < \text{N}^{3-} < \text{Na}^+$
- C. $\text{O}^{2-} < \text{N}^{3-} < \text{F}^- < \text{Na}^+$ D. $\text{N}^{3-} < \text{Na}^+ < \text{F}^- < \text{O}^{2-}$

32. Which one does not involve an ideal gas law
- A. Pressure
B. Volume
C. Temperature
D. Time
33. For a reaction $PV = 2\text{dm}^3$ and volume $= 4\text{dm}^3$, then the corresponding pressure is
- A. 1 atm
B. 4 atm
C. 0.5 atm
D. 2 atm
34. It is necessary to balance a chemical equation in order to satisfy
- A. Conservation of motion
B. Conservation of momentum
C. Conservation of energy
D. Conservation of mass
35. Rusting of Iron involves
- A. Reduction as well as combination reactions
B. Oxidation as well as combination reactions
C. Reduction as well as displacement reactions
D. Oxidation as well as displacement reactions
36. The non metal which is liquid at room temperature is
- A. Hg
B. Br
C. C
D. He
37. Bauxite is an ore of
- A. Iron
B. Aluminum
C. Mercury
D. Copper
38. The chemical formula for caustic potash is
- A. NaOH
B. Ca(OH)_2
C. $\text{NH}_4\text{(OH)}$
D. KOH
39. The sulphide ores are converted into oxides by heating strongly in the presence of excess of air. The process is called as
- A. Roasting
B. Smelting
C. Calcinations
D. Refining

40. Which of the elements has two shells and both are completely filled
- A. Helium
B. Neon
C. Calcium
D. Boron
41. Which one of the following ore is best concentrated by Froth floatation process
- A. Magnetite
B. Siderite
C. Galena
D. Malachite
42. Extraction of gold and silver involves leaching with CN^- , silver is later recovered by
- A. Distillation
B. Zone refining
C. Displacement of Zn
D. Liquation
43. Purest form of iron is
- A. Cast iron
B. Hard steel
C. Stainless steel
D. Wrought iron
44. A substance that donates a pair of electrons to form coordinate bond is called
- A. Lewis acid
B. Lewis base
C. Bronsted Lowry acid
D. Bronsted Lowry base
45. Solvay process is used to manufacture
- A. Potassium carbonate
B. Sodium carbonate
C. Sodium chloride
D. Sodium hydroxide
46. Alkali metal with highest ionization potential is
- A. Na
B. Li
C. Rb
D. Cs
47. Which of the following species has the highest ionization potential
- A. Li^+
B. Mg^+
C. Al^+
D. Ne

48. The orbits in which electrons move according to Bohr are
A. Elliptical
B. Cylindrical
C. Circular
D. Oval
49. Formation of NH_4^+ is an example of
A. Covalent bonds
B. Electrovalent bonds
C. Coordinate bonds
D. Double covalent bonds
50. While forming magnesium oxide (MgO), magnesium
A. Loses one electron
B. Loses more than one electron
C. Gain one electron
D. Gains more than one electron
51. The hydroxide ion $[\text{OH}^-]$ concentration of a solution is 10^{-12} M. The pH value of the solution is
A. 12
B. 11
C. 2
D. 7
12, 9
52. The chemical formula for gypsum is
A. $\text{CaSO}_4 \cdot \text{H}_2\text{O}$
B. $\text{CaSO}_4 \cdot 1/2 \text{H}_2\text{O}$
C. $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
D. $\text{CaSO}_4 \cdot 10\text{H}_2\text{O}$
53. The empirical formula of the compound containing carbon and hydrogen is CH_2 . The molecular mass of the compound is 70 amu. The molecular formula of the compound is
A. C_2H_4
B. C_3H_4
C. C_4H_8
D. C_5H_{10}
54. Calculate number of moles for 52 gm of Helium
A. 13
B. 12
C. 11
D. 10
55. The maximum number of electron that can be accumulated in an energy level is
A. n^2
B. $2n^2$
C. $2n$
D. N

56. Which of the following statement is correct
- A. Size of an anion is greater than the atom from which it is formed
 - B. Size of a cation is greater than the atom from which it is formed
 - C. The electronic configuration of an atom and its cation is same
 - D. The electronic configuration of an atom and its anion is same
57. The metal which is liquid at room temperature is
- A. Mercury
 - B. Lead
 - C. Zinc
 - D. Silver
58. Ethanoic acid reacts with absolute ethanol in presence of an acid catalyst to give an ester. The reaction is called as
- A. Saponification
 - B. Esterification
 - C. Hydrolysis
 - D. Hydration
59. Ethane with the molecular formula C_2H_6 has
- A. 6 covalent bond
 - B. 7 covalent bond
 - C. 8 covalent bond
 - D. 9 covalent bond
60. $Zn(s) + CuSO_4(aq) \longrightarrow ZnSO_4(aq) + Cu(s)$ reaction is an example of
- A. Addition reaction
 - B. Substitution reaction
 - C. Displacement reaction
 - D. Elimination reaction
61. The number of valence electron in Cl^- ion are:
- A. 7
 - B. 8
 - C. 17
 - D. 18
62. The correct electronic configuration for sodium atom is
- A. 2, 8
 - B. 8, 2, 1
 - C. 2, 1, 8
 - D. 2, 8, 1

63. Which statement is incorrect for s-orbital
- A. They are found in all principal energy levels
 - B. They are spherical in shape
 - C. They can hold only one electron
 - D. The maximum number of s-orbital in any principal energy level is one.
64. Butanone is a four carbon compound with the functional group
- A. Carboxylic acid
 - B. Aldehyde
 - C. Ketone
 - D. Alcohol
65. Which statement is false for colloidal solution
- A. The colloidal solution is a heterogeneous mixture.
 - B. Relatively small size of particles and not seen with naked eye.
 - C. These particle scatter beam of visible light.
 - D. They do settle immediately.
66. The number of structural isomers in Pentane are
- A. 2
 - B. 3
 - C. 4
 - D. 5
67. Two objects of equal masses have velocities 3 msec^{-1} and 4 msec^{-1} . The ratio of their kinetic energies is
- A. 4 : 3
 - B. 3 : 4
 - C. 9 : 16
 - D. none of these
68. A body is dropped from a certain height to the ground when it is halfway down, it possesses
- A. Kinetic energy
 - B. potential energy
 - C. both kinetic and potential energies
 - D. none of these

69. A coolie carries a luggage of mass 40 Kg from one end of the platform to another end of the platform through a distance of 50 m. The work done by the coolie is
- A. Zero
B. 40 Joules
C. 2000 Joules
D. none of these
70. Time taken by a 100 watts bulb to consume 5000 joules of energy is
- A. 100 sec
B. 500 sec
C. 50 sec
D. none of these
71. One horse power is equal to
- A. 3.6×10^6 Joules
B. 746 watts
C. 486 Joules
D. none of these
72. Which element is used as a moderator in nuclear reactors?
- A. Uranium
B. Cadmium
C. Mercury
D. Graphite
73. Which of the following is a scalar quantity?
- A. Displacement
B. Force
C. Acceleration
D. Work
74. Which of the following pair of physical quantity is vector ?
- A. Distance & Displacement
B. Mass & Distance
C. Displacement and velocity
D. Mass & Velocity
75. A force of 6 Newtons and another of 8 Newtons (perpendicular to first) can be applied to produce the effect of a single force equal to
- A. 1 Newton
B. 2 Newton
C. 14 Newton
D. 10 Newtons

- Entrance Examination - 2020**

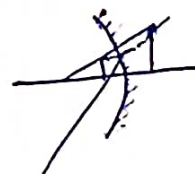
83. The length of an astronomical telescope is
- The sum of the focal length of objective and eye piece
 - The difference between focal length of objective and eye piece
 - product of the focal length of objective and eye piece
 - none of these
84. Which of the following is transmitted by a wave?
- Amplitude
 - velocity
 - energy
 - momentum
85. Velocity of sound in vacuum (in msec^{-1}) is
- Zero
 - 330
 - 3×10^8
 - none of these
86. The example of non ohmic resistance is
- copper wire
 - carbon resistance
 - diode
 - silver wire
87. The specific resistance of the wire depends upon
- Its length
 - its area of cross section
 - its material
 - none of these
88. In case of liquids, ohm's law is
- fully obeyed
 - partially obeyed
 - there is no relation between current and potential difference
 - none of these
89. The magnifying power of a compound microscope in terms of magnification M_o due to the objective and the magnifying power M_e by the eye piece is given by
- $M_o \times M_e$
 - $M_o + M_e$
 - $M_o - M_e$
 - none of these

90. Ohm's law deal with the relation between
- A. Current and potential difference
 - B. capacity and charge
 - C. capacity and potential
 - ~~D. all are true~~
91. One volt is equal to
- A. 1 joule
 - B. 1 newton/coulomb
 - C. 1 joule/coulomb
 - D. 1 newton/sec
92. Unit of resistance is
- A. Volt / ampere
 - B. volt² / ampere
 - C. volt/ampere²
 - D. none of these
93. The equivalent resistance of resistors in series is equal to
- A. Equal to the mean of component resistors
 - B. less than lowest of the component resistors
 - C. in between the lowest and the highest of the component resistor
 - D. Equal to the sum of the component resistors
94. In a circuit containing two unequal resistors connected in parallel
- A. The current is same in both the resistors
 - B. a large current flows through large resistor
 - C. the voltage drops across both the resistor is the same
 - D. none of these
95. Resistances of 20, 30 and 60 ohms are connected in parallel and the combination is connected in series with 10 ohms resistance. The equivalent resistance is equal to
- A. 10 ohms
 - B. 20 ohms
 - C. 30 ohms
 - ~~D. none of these~~
96. The quantity of electricity that deposits one gm equivalent of a substance is called
- A. Farad
 - B. faraday
 - C. coulomb
 - D. none of these

- liberated is m , the mass of silver deposited would be
- ☐ A. $1.7m$
- ☐ B. $1.7m$
- ☐ C. $3.4m$
- ☐ D. $3.5m$
- Which of the following processes in which light nuclei combine to form heavy nuclei is
- ☐ A. Fission
- ☐ B. Fusion
- ☐ C. Radioactive decay
- ☐ D. None of the above
- Which of the following is used as back view mirror in automobiles
- ☐ A. Concave mirror
- ☒ B. Convex mirror
- ☐ C. Plane mirror
- ☐ D. None of the above

104. When a bunch of keys on the end of a chain is swing round a steady speed in a circle
- It has an acceleration towards the center of the circle
 - It is pulled by the chain with centripetal force
 - It exerts a centrifugal force of the chain
 - none of these
105. A body of mass 2 Kg moving on a horizontal surface with an initial velocity of 4 msec^{-1} comes to rest after 2 seconds. If one wants to keep this body moving on the same surface with the velocity of 4 msec^{-1} the force required is
- 8 Newtons
 - 4 Newtons
 - 2 Newtons
 - zero
106. A man pushes a wall and fails to displace it. He does
- Negative work
 - positive but not maximum work
 - no work at all
 - maximum work
107. A bullet of mass 0.1 Kg is fired with a speed of 100 m sec^{-1} . The Mass of gun is 50 Kg. The velocity of the recoil is
- 0.2 msec^{-1}
 - 0.1 msec^{-1}
 - 0.5 msec^{-1}
 - 0.05 msec^{-1}
108. When ray of light enters a glass slab from air
- Its wavelength decreases
 - Its wavelength increases
 - Its frequency increases
 - none of these
109. It is possible to observe total internal reflection when a ray travel from
- Air into water
 - air into glass
 - water into glass
 - glass into water
110. If the critical angle for total internal reflection form a medium to vacuum is 30° . The velocity of light in the medium is
- $3 \times 10^8 \text{ msec}^{-1}$
 - $1.5 \times 10^8 \text{ msec}^{-1}$
 - $6 \times 10^8 \text{ msec}^{-1}$
 - none of the these

111. Twinkle of stars is a phenomenon due to
- A. Refraction of light
B. Reflection of light
C. Scattering of light
D. Polarization of light
112. A convex lens can form a virtual image of the object is placed
- A. Between the lens and its focus
B. at the focus of the lens
C. between f and $2f$
D. at infinity
113. A virtual image larger than the object can be produced by
- A. Convex mirror
B. Concave mirror
C. Plain mirror
D. Concave lens
114. Transverse wave can propagate
- A. Both in a gas and a metal
B. in a gas but not in metal
C. not in a gas but in metal
D. neither in gas nor in metal
115. Which of the following is a longitudinal wave?
- A. Sound wave
B. Water wave
C. Light wave
D. none of these
116. The law that governs the force between electric charges is called
- A. Ampere's Law
B. Coulomb's Law
C. Faraday's Law
D. Ohm's Law
117. Which of the following is a unit of electric charge?
- A. Coulomb
B. Newton
C. Volt
D. Coulomb/Volt
118. An electric field can deflect
- A. X-rays
B. neutrons
C. protons
D. none of these



119. The electric charge at rest produces
- A. An electric field only
 - B. magnetic field only
 - ☒ C. both electric and magnetic field
 - D. none of these
120. Check the correct relation
- A. Potential = charge / capacity
 - ☒ B. Potential = charge + capacity
 - C. Potential = charge \times capacity
 - D. none of these
121. The unit of electric field intensity is
- A. Newton/coulomb
 - B. Joule/coulomb
 - c. Volt/meter
 - D. Newton/meter
122. Current in a conductor is due to
- A. Motion of free electrons in it
 - B. motion of +ve ions
 - C. free electrons and holes
 - D. protons
123. When the temperature of the metallic conductor is increased, its resistance
- A. Always decreases
 - B. always increases
 - C. remains the same
 - D. may increase or decrease
124. A kilowatt hour is a unit of
- A. Energy
 - B. power
 - C. electric charge
 - D. electric current
125. Heat produced in a resistance R when current I flows through it for time t is given by the relation
- A. $IR^2 / 4.2$
 - B. $I^2Rt / 4.2$
 - C. $4.2 IR / t^2$
 - D. $IRt^2 / 4.2$
126. Heat produced in a conductor is
- A. Directly proportional to its resistance
 - B. inversely proportional to its resistance
 - C. inversely proportional to time
 - D. none of these

127. You are given three bulbs of 25, 40 and 60 watts which of these has lowest resistance
- A. 25 watts
B. 40 watts
C. 60 watts
D. insufficient data
128. Alternating current is one which changes in
- A. Direction
B. magnitude
C. magnitude as well as direction
D. none of these
129. The frequency of A.C. mains in India is
- A. 30 c/s
B. 50 c/s
C. 60 c/s
D. 120 c/s
130. Phenomenon of radioactivity is associated with
- A. Fission of nuclei
B. disintegration of neutrons
C. emission of spectral lines spontaneous
D. disintegration of nuclei of atoms
131. Radioactive substance do not emit
- A. Alpha rays
B. beta rays
C. positrons
D. protons
132. Energy generation in stars is mainly due to
- A. Chemical reaction
B. fission of heavy nuclei
C. fusion of light nuclei
D. fusion of heavy nuclei
133. The half-life (T) and decay constant (λ) of a radioactive substance are related as
- A. $\lambda T = 1$
B. $\lambda T = 0.693$
C. $T/\lambda = 0.693$
D. $\lambda/T = 0.693$

$$\frac{1}{n+y} = u, \frac{1}{n-y} = v$$

$$22u + 15v = 5 \times 3$$

$$55u + 45v = 14$$

$$66u + 45v = 15$$

$$55u + 45v = 14$$

$$\hline 11u = 1$$

$$u = \frac{1}{11}$$

$$6 + 45v =$$

$$\Rightarrow 45v = 9$$

$$\Rightarrow v = \frac{1}{5}$$

$$\frac{22}{11}$$

$$u = \frac{1}{11}$$

$$v = \frac{1}{5}$$

$$n+y =$$

$$n-y =$$

134. If we add 1 to the numerator and subtract 1 from the denominator a fraction becomes 1. It also becomes $\frac{1}{2}$ if we add 1 to the denominator, then the fraction is

$$\begin{aligned} \frac{x}{y+1} &= \frac{1}{2} \\ \Rightarrow 2x &= y+1 \\ \Rightarrow 2x - y &= 1 \end{aligned}$$

- A. $\frac{2}{3}$ B. $\frac{3}{4}$
C. $\frac{4}{5}$ D. $\frac{3}{5}$

135. A person borrowed Rs. 16550 from bank. The rate of interest is 10% per annum compound interest. He pays it back in three equal annual installments. The value of each installment is

- A. Rs. 7171 B. Rs. 6713
C. Rs. 6655 D. Rs. 7115

136. In mostly banks interest is calculated in savings bank account as

- A. Minimum balance in 6 months as principle for 1 month
B. Maximum balance in 6 months as principle for 1 month
C. Minimum balance in 6 months divided by 6 and known as 1 month principle
D. Minimum balance in 6 months of each month as principle for 1 month

$$\begin{array}{r} 9 \overline{) 100} \\ \underline{9} \\ 10 \\ \underline{9} \\ 1 \end{array}$$

$$\begin{aligned} \frac{6}{4} + \frac{4}{6} \\ \frac{36+16}{24} \\ = \frac{52}{24} \\ \frac{100}{18} \\ \frac{18}{252} \\ 9 \end{aligned}$$

137. The cost of a television set is Rs. 7500. The buyer agrees to pay Rs. 4000 in cash, followed by 4 equal monthly installments of Rs. 900 each. The rate of interest paid by the buyer is

- A. 4% B. 14%
C. 10% D. 15%

138. The solution of the equations $\frac{22}{x+y} + \frac{15}{x-y} = 5$ and $\frac{55}{x+y} + \frac{45}{x-y} = 14$ is

$$\begin{aligned} \frac{22}{9} + \frac{15}{-3} &= 5 \\ \frac{22-45}{9} &= 5 \end{aligned}$$

- A. 8, 3 B. 6, 3
C. 3, 6 D. None of these

139. If $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = \frac{10}{3}$ and $x + y = 10$, then the value of $x \cdot y$ is

$$\begin{aligned} \frac{22}{9} + \frac{15}{3} &= 5 \\ \frac{22+45}{9} &= 5 \\ \frac{67}{9} &= 5 \end{aligned}$$

- A. 24 B. 9
C. 16 D. 36

140. If $\left(x - \frac{1}{x}\right) = 2$, then the value of $\left(x^4 + \frac{1}{x^4}\right)$ is

A. 4

B. 2

C. 12

D. 34

141. The value of $\frac{(x^2 - y^2)^3 + (y^2 - z^2)^3 + (z^2 - x^2)^3}{(x - y)^3 + (y - z)^3 + (z - x)^3}$ is

A. $(x^2 - y^2)(y^2 - z^2)(z^2 - x^2)$

B. $3(x^2 - y^2)(y^2 - z^2)(z^2 - x^2)$

C. $(x + y)(y + z)(z + x)$

D. $3(x + y)(y + z)(z + x)$

142. The ages of Mr. X and Mr. Y are in the ratio of 7 : 9. 12 years ago the ratio of their ages was 3 : 5.

After how many years the ratio of ages becomes 6 : 7.

A. 15 years

B. 21 years

C. 27 years

D. 12 years

143. For what value of k will $kx + 2y = 5$ and $3x + y = 1$ have unique solution

A. $k = -6$

B. $k \neq 6$

C. $k = 6$

D. $k = 2$

144. If $\sin \theta = \frac{m}{n}$ and $\sqrt{n^2 - m^2} = 1$, then $\tan \theta$ is equal to

A. $\frac{\sqrt{n^2 - m^2}}{2}$

B. m

C. $\frac{m^2}{2}$

D. $\frac{n^2}{2}$

$$\begin{aligned} &= 8 \\ &\left(x^2 + \frac{1}{x^2} + 2\right)^2 \\ &\left(x - \frac{1}{x}\right)^2 = 4 \\ &\Rightarrow x^2 + \frac{1}{x^2} - 2 = 4 \\ &\Rightarrow x^2 + \frac{1}{x^2} = 6 \\ &\Rightarrow \left(x^2 + \frac{1}{x^2}\right)^2 = 36 \\ &\Rightarrow x^4 + \frac{1}{x^4} + 2 = 36 \\ &\Rightarrow x^4 + \frac{1}{x^4} = 34 \end{aligned}$$

$$\begin{aligned} &\frac{kx}{3x} \neq \frac{2y}{y} \\ &\frac{k}{3} \neq \frac{2}{1} \\ &k \neq 6 \end{aligned}$$

$$\begin{aligned} &1 - \cos^2 \theta = \sqrt{\frac{m}{n}} \\ &p = m \\ &h = n \\ &b = \sqrt{h^2 - p^2} \\ &= \sqrt{n^2 - m^2} \\ &= 1 \\ &\frac{p}{b} = \frac{m}{1} \end{aligned}$$

145. If $\sin(\alpha + \beta) = \cos(\alpha - \beta) = \frac{\sqrt{3}}{2}$, then the values of α and β are

A. $15^\circ, 45^\circ$

B. $45^\circ, 15^\circ$

C. $15^\circ, 15^\circ$

D. $45^\circ, 45^\circ$

146. If $\tan \theta = -\frac{5}{12}$ and $\frac{3\pi}{2} < \theta < 2\pi$, then $\cos\left(\frac{\theta}{2}\right)$ is equal to

A. $-\frac{5}{\sqrt{26}}$

B. $\frac{5}{\sqrt{26}}$

C. $-\frac{12}{13}$

D. none of these

147. If $\tan \theta = \sqrt{e^2 - 1}$, then $\{\sec \theta + (\tan^3 \theta \times \operatorname{cosec} \theta)\}$ is equal to

A. e^3

B. $e^{3/2}$

C. $(e^2 - 1)^{3/2}$

D. $(e^2 - 1)^{7/2}$

148. $\sin^6 \theta + \cos^6 \theta + 3\sin^2 \theta \cos^2 \theta = \dots\dots\dots$

A. -1

B. 0

C. 1

D. 2

149. A point is at a distance of 100 m from the front of a tree. If from the top of the tree the angle of depression of the point is 45° , then the height of the tree is

A. 50 m

B. 100 m

C. $50\sqrt{2}$ m

D. $100\sqrt{2}$ m

150. The centroid of a triangle with two vertices $(3, 4)$, $(-1, -9)$ is $(2, -4)$, the coordinates of the third vertex are

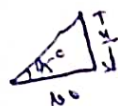
A. $(-4, -7)$

B. $(4, -7)$

C. $(4, 7)$

D. $(7, 4)$

$$(\sin^2 \theta)^3 + (\cos^2 \theta)^3 + 3\sin^2 \theta \cos^2 \theta (\sin^2 \theta + \cos^2 \theta) = 1^3 = 1$$



$$3 - 1 = 2, 4 -$$

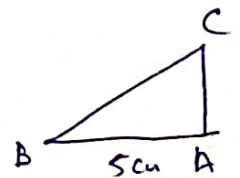
$$4 - 2 = 2, -5 -$$

$$2, -$$

$$x + 2 = 2$$

$$\Rightarrow x = 0$$

151. The origin divides the line joining $(-4, -2)$ and $(8, 4)$ in the ratio
- A. $1 : 2$ B. $1 : 1$
C. $1 : 3$ D. $2 : 3$
152. Ratio line $2x + 3y + 7 = 0$ divides a line joining the points $(2, 3)$ and $(5, 6)$ will be
- A. $5 : 1$ internally B. $5 : 1$ externally
C. $4 : 7$ externally d. $3 : 7$ internally
153. The area of a parallelogram ABCD is ' X ' cm^2 . T be a point at BC such that $BT = \frac{1}{3} BC$. Then the area of ΔABT is
- A. $X/6 \text{ cm}^2$ B. $X/9 \text{ cm}^2$
C. $X/12 \text{ cm}^2$ D. $X/3 \text{ cm}^2$
154. A flag stands on a building, its top and the base make the angles 45° and 30° at a point respectively. This point is 45 m apart from the base of the building. The height of the flag is
- A. $15\sqrt{3}(\sqrt{3} - 1) \text{ m}$ B. $15\sqrt{3}(\sqrt{3} + 2) \text{ m}$
C. $45\sqrt{3} \text{ m}$ D. none of these
155. ΔABC is a right triangle. From A perpendicular AD drawn to hypotenuse BC. If $AB = 5 \text{ cm}$ and $AC = 12 \text{ cm}$, then the length of AD will be
- A. $156/3 \text{ cm}$ B. $65/12 \text{ cm}$
C. $60/13 \text{ cm}$ D. $117/8 \text{ cm}$
156. Four triangles which are made by joining the mid points of the sides of a triangle, is
- A. isosceles triangle B. equilateral triangle
C. similar but not congruence triangle D. congruence triangle
157. Two chords AB and CD of a circle intersect each other internally at P and if $CP = 8 \text{ cm}$, $DP = 1 \text{ cm}$ and $AP = BP = x \text{ cm}$, then x is equal to
- A. $\sqrt{2} \text{ cm}$ B. $2\sqrt{2} \text{ cm}$
C. 4 cm D. $4\sqrt{2} \text{ cm}$



158. A circle whose diameter is 10 cm and has two chords parallel to each other and of lengths 4 cm and 6 cm respectively the distance between the chords is about
- A. 0.26 cm
B. 0.58 cm
C. 0.53 cm
D. None of these
159. The two chords AB and CD of a circle intersect each other at an external point O. If $AO = 6$ cm, $OB = 12$ cm and $OC = 8$ cm then OD is equal to
- A. 4.5 cm
B. 9 cm
C. 14 cm
D. None of these
160. Water is flowing at the rate of 2 m/sec from the pipe of diameter 7 cm. Flow of water in litre/minute is
- A. 630
B. 990
C. 462
D. None of these
161. A cone is cut half way by a plane parallel to the base, the volume of two portions are in the ratio
- A. 1 : 1
B. 1 : 3
C. 1 : 2
D. 1 : 4
162. The total surface of a sphere and a cube are equal. The ratio of their volumes will be
- A. $\sqrt{6} : \sqrt{\pi}$
B. $6 : \pi$
C. $\sqrt{\pi} : \sqrt{6}$
D. $\pi : 6$
163. A sphere of radius r cm is to be converted into a cube. The side of the biggest cube so made will be
- A. $\frac{r}{\sqrt{3}}$ cm
B. $\frac{2r}{\sqrt{3}}$ cm
C. $\frac{2r}{\sqrt{2}}$ cm
D. $\frac{r}{\sqrt{2}}$ cm
- Handwritten notes for question 162: $4\pi r^2 = 6a^2$
- Handwritten notes for question 163: $\frac{4}{3}\pi r^3 = a^3$

164. The diameter of the base of a cone is 42 cm and its volume is 12936 cm^3 . It's height is

A. 28 cm

B. 21 cm

C. 35 cm

D. 14 cm

$$\frac{1}{3} \pi r^2 h = 12936$$

$$\Rightarrow 22 \times 44 \times h = 116$$

$$\Rightarrow h = \frac{616}{22 \times 44}$$

165. If \bar{x} is the mean of p observations then the sum of all observations is

A. $\bar{x} + p$

B. $\bar{x} - p$

C. $\bar{x}(p)$

D. $p(\bar{x})$

166. A frequency table is a table which displays the manner in which frequency are distributed over :

A. One class

B. Eight classes

C. Several classes

D. Class interval

167. The frequency of 3 numbers 4, 6 and 8 are $(x+2)$, x and $(x+1)$ respectively. If their arithmetic mean is 5.67 then the value of x will be

A. 7

B. 6

C. 8

D. 4

168. In the following series the frequency distribution of the marks obtained is given :

Marks obtained	10	12	14	16	18
No. of subjects	4	6	5	x	2

If the arithmetic mean of marks obtained is 13.3 then the value of x is

A. 4

B. 5

C. 3

D. 6

169. 'OGIVE' is a presentation of

A. Ungrouped series

B. Frequency series

C. Distribution of cumulative frequency

D. Grouped series

170. The value of x in $\frac{\sqrt{324}}{\sqrt{49}} \times \frac{\sqrt{676}}{\sqrt{169}} \times \frac{126}{\sqrt{81}} = x$ is

A. 18

-B. 72

C. 36

D. 65

171. If $(x - p)$ is the H.C.F. of $x^2 - x - 6$ and $x^2 + 3x - 18$, then the value of p is

A. $p = 3$

B. $p = 4$

C. $p = 6$

D. $p = 1$

172. A number when divided by 5, 6, 7 and 8 remainder is 3 and when divided by 9 remainder is 0. Number is

A. 1680

-B. 1683

C. 1783

D. 1769

173. If $x = (2)^{1/3} + (2)^{2/3} + 2$, then the value of $x^3 - 6x^2 + 6x$ is

A. 2

B. 3

C. 6

D. 8

174. If $\frac{4 + 3\sqrt{5}}{\sqrt{5}} = a + b\sqrt{5}$, then the value of b is

A. $3/5$

B. $4/5$

c. $2/5$

D. $1/5$

175. If $x = \frac{u+v}{1-uv}$ and $y = \frac{u-v}{1+uv}$, then the value of $\frac{x+y}{1-xy}$ is

A. $\frac{u}{1+v^2}$

B. $\frac{2u}{1+v}$

C. $\frac{2u}{1+u^2}$

D. $\frac{2u}{1-u^2}$

176. The sum and product of the zeros of quadratic polynomial are 2 and -15 respectively. The quadratic polynomial is
- A. $x^2 - 2x + 15$ B. $x^2 - 2x - 15$
 C. $x^2 + 2x - 15$ D. $x^2 + 2x + 15$
177. The $\log_{10}(x^2 - 6x + 45) = 2$, then the values of x are
- A. 6, 9 B. 9, -5
 C. 10, 5 D. 11, -5
178. The two numbers are such that their product is equal to their sum and the numbers are equal. They are
- A. 4, 4 B. 2, 4
 C. 2, 2 D. 4, 2
179. If α, β are the roots of the equation $3x^2 - 2x - 5 = 0$. Then the value of $\alpha^3 + \beta^3$ is
- A. 98/27 B. 10/27
 C. 80/81 D. 10/3
180. If α, β are the roots of the equation $(x - a)(x - b) = c$, then the roots of the equation $(x - \alpha)(x - \beta) + c = 0$ is
- A. a, c B. b, c
 C. a, b D. a + c, b + c
181. The quadratic equation whose roots are $1 - \sqrt{2}$ and $1 + \sqrt{2}$ is
- A. $x^2 + 2x + 1 = 0$ B. $x^2 - 2x + 1 = 0$
 C. $-x^2 + 2x - 1 = 0$ D. $x^2 - 2x - 1 = 0$
182. If $XY = 12$, $YZ = 20$ and $XZ = 15$, then XYZ is equal to
- A. 30 B. 48
 C. 45 D. 60

$$D = 4 - 4 \cdot 3 \times 5$$

$$= 4 + 60$$

$$= 64$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{2 \pm 8}{6}$$

$$= \frac{2+8}{6},$$

$$= \frac{5}{3},$$

$$\left(\frac{5}{3}\right)^3 - 1^3$$

183. The sum of n natural numbers is

A. $\frac{n}{2}(n+1)$

B. $\frac{n^2}{2}$

C. $(n+2)$

D. $\frac{1}{2}(n+1)$

$$\begin{array}{r} 45 \\ 91 \times \\ \hline 1365 \end{array}$$

$$-87$$

184. The sum of three numbers in A.P. is 27 and their product is 504, then the numbers are:

A. 3, 8, 14

B. 5, 8, 14

C. 4, 7, 14

D. 4, 9, 14

185. The sum of 30 terms of an A.P. whose n^{th} term is $3n-1$ is

A. 1360

B. 1365

C. 1370

D. 1375

$$\begin{aligned} 3-1 &= 2 \\ 6-1 &= 5 \\ 9-1 &= 8 \end{aligned}$$

$$\begin{aligned} a &= 2, d = 3, n = 30 \\ S_n &= \frac{n}{2} [2a + (n-1)d] \\ &= 15 [4 + 87] \end{aligned}$$

186. The angle of elevation of the sun when the length of the shadow of a pole is equal to the height of the pole is

A. $\frac{\pi}{2}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{6}$

$$\begin{array}{r} 36 \\ 14 \\ \hline 144 \\ 360 \\ \hline 504 \end{array}$$

187. Intercepts on x-axis and y-axis of two lines L_1 and L_2 are $(-a, -b)$ and (b, a) respectively. The tangent of angle between two lines is

A. $\frac{2ab}{a^2 - b^2}$

B. 1

C. $\frac{a^2 - b^2}{2ab}$

D. None of these

188. ABC is a triangle and D is mid point of BC. If coordinates of A, B, C are $(1, 2)$, $(-1, 3)$ and $(3, -5)$ respectively then the coordinates of the point which divides AD in the ratio of 2 : 1 internally will be

A. $(1, -6)$

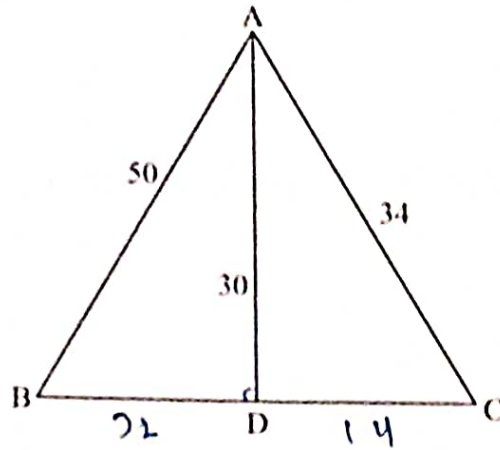
B. $(-1, 6)$

C. $(-1, -6)$

D. $(1, -2)$

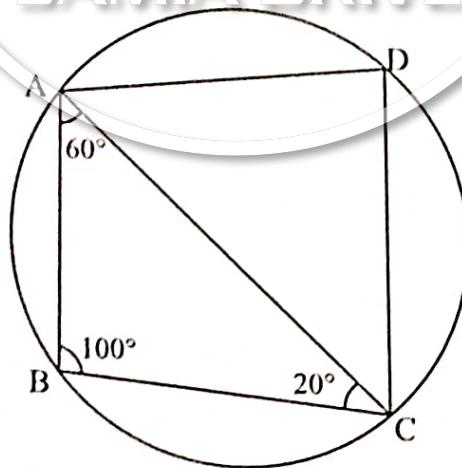
$$\frac{m x_2 + n x_1}{m+n}, \frac{m y_2 + n y_1}{m+n}$$

189. In the given figure, $\angle BDA = 90^\circ$, $AB = 50$ cm, $AD = 30$ cm, $AC = 34$ cm, then measure of side BC is



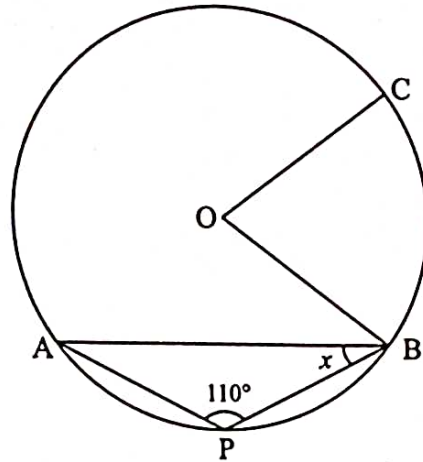
$$\begin{aligned}
 AB^2 &= AD^2 + BD^2 \\
 BD^2 &= AB^2 - AD^2 \\
 &= 2500 - 900 \\
 &= 1600 \\
 BD &= 40 \\
 DC^2 &= AC^2 - AD^2 \\
 &= 34^2 - 30^2 \\
 &= 1156 - 900 \\
 &= 256 \\
 DC &= 16
 \end{aligned}$$

- A. 56 cm
B. 60 cm
C. 40 cm
D. 16 cm
190. In ΔABC , $DE \parallel BC$, if $AD = x$, $DB = x - 2$, $AE = x + 2$ and $EC = x - 1$, the value of x is
- A. 2
B. 3
C. 4
D. 5
191. In the given figure, $\angle BAC = 60^\circ$ and $\angle BCA = 20^\circ$, then $\angle ADC$ is equal to

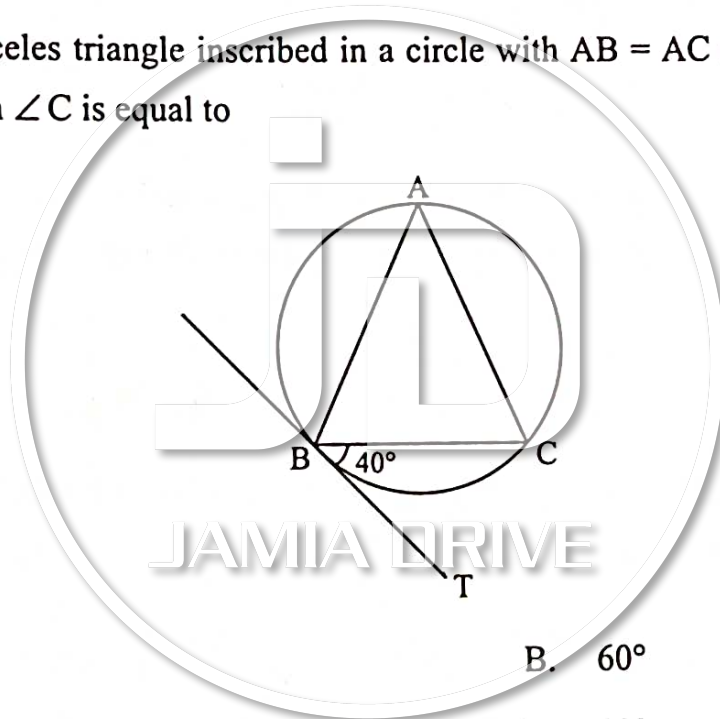


- A. 90°
B. 60°
C. 80°
D. 10°

192. In the given figure, O is the centre and $\angle APB = 110^\circ$, then $\angle BOC$ is equal to



- A. 55°
 B. 80°
 C. 65°
 D. none of these
193. $\triangle ABC$ is an isosceles triangle inscribed in a circle with $AB = AC$ and BT is tangent at B and $\angle CBT = 40^\circ$, then $\angle C$ is equal to



- A. 40°
 B. 60°
 C. 70°
 D. 80°
194. In $\triangle PQR$ and $\triangle QRT$, $\angle PQR = \angle QRT$ and $\angle QPR = \angle RQT$, then $\triangle PQR$ is similar to
- A. $\triangle TQR$
 B. $\triangle RTQ$
 C. $\triangle QRT$
 D. $\triangle RQT$
195. Right angle $\triangle ABC$ is right angle at B and $\angle CAB = 30^\circ$. The perpendiculars drawn at AB and AC meet at point O. Angle formed at O will be equal to
- A. 60°
 B. 45°
 C. 30°
 D. none of these

196. In ΔABC , AD is the perpendicular which meets BC at D . Then

A. $BC^2 + CD^2 = AB^2 + AC^2$

B. $AB^2 + CD^2 = AC^2 + BD^2$

C. $BD^2 + CD^2 = AB^2 + BC^2$

—D. $AB^2 + AD^2 = CD^2 + BD^2$

197. The volume of the biggest possible cone cut from the cube that of side 12 cm is

A. $144 \pi \text{ cm}^3$

B. $432 \pi \text{ cm}^3$

C. $114 \pi \text{ cm}^3$

D. $532 \pi \text{ cm}^3$

198. The volume of the greatest cube that can be cut out from the sphere of radius 5 cm is

A. $121\sqrt{2} \text{ cm}^3$

B. $125\sqrt{2} \text{ cm}^3$

C. $\frac{250}{\sqrt{2}} \text{ cm}^3$

D. $\frac{1000}{3\sqrt{3}} \text{ cm}^3$

199. The brass cube whose height is 9 metric tone is melted and recasted into the 25 m long square shaped rod. Then a complete cube is cut from this rod. Then the weight of the cube is

A. 42 Kg

B. 52 Kg

C. 62 Kg

D. 72 Kg

200. If the height and diagonal of a volumetric solid are 12 cm and 17 cm respectively and base area is 72 cm^2 then its surface area will be

A. 276 cm^2

B. 204 cm^2

C. 408 cm^2

D. 552 cm^2