1. Bohr's theory of hydrogen atom did not explain fully

A. diameter of H atom
B. emission spectra
C. ionisation energy
D. the fine structure of even hydrogen spectrum

2. A current loop placed in a non-uniform magnetic field experiences :

A. a force of repulsion
B. a force of attraction
C. a torque but not force
D. a force and a torque

3. For a heavily doped *n*-type semi-conductor, Fermi-level lies

A. a little below the conduction band
B. a little above the valence band
C. a little inside the valence band
D. at the centre of the band gap

4. Which of the following indicates that the galaxies are receding from us ?

A. Neutron Star
B. White dwarf
C. Black hole
D. Red shift

5. What does it represents?

A. AND
B. NAND
C. OR
D. NOR

6. In a transistor, the relation between α and β is

A. $\beta = \alpha /(1 - \alpha)$
B. $\beta = 1/(1 - \alpha)$
C. $\beta = \alpha /(1 + \alpha)$
D. $\beta = 1 - \alpha$

7. In a transistor

A. there is 1 *p*-*n* junction
B. there are 2 *p*-*n* junctions
C. there are 3 *p*-*n* junctions
D. none of these

8. Germanium is doped with arsenic, what will be the result ?

A. *p*-type semi-conductor
B. *n*-type semi-conductor
C. intrinsic semi-conductor
D. none of these

9. An electron is moving in 1st orbit. The factor $nh/2\pi$ is

A. It's Angular momentum
B. Energy
C. Linear momentum
D. None of these

10. The energy of an electron is

A. hc/λ
B. $h\lambda/c$
C. hv/c
D. none of these

11. According to Bohr's Theory, electron moves around in those orbits only in which $nh/2\pi$ is its

A. Impulse
B. Angular momentum
C. Force
D. Kinetic Energy

12. Which of the following waves can produce photo-electric effect?

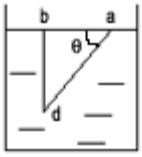
A. Ultra-sound
B. Infra-red
C. Radio-waves
D. X-rays

13. A glass prism of $\mu = 1.5$ is immersed in water as shown

in the figure. A beam of light incident normally on the face *ab* is internally reflected from the face *ad* so as to incident normally on face *bd*. Given that refractive index of glass is 3/2 and that of water is 4/3. What is the value of θ ?

A. $\theta > \sin^{-1}(8/9)$ B. $\theta > \sin^{-1}(2/3)$

C. $\theta < \sin^{-1}(2/3)$ D. none of these



14. If two lenses are kept coaxial together, then what will be their power?

A. $R_1 + R_2$ B. $(R_1 R_2)/(R_1 + R_2)$ C. $(R_1 + R_2)/(R_1 R_2)$ D. none of these

15. The angular fringe-width does not depend upon

A. wavelength (λ) B. distance between slits (d)

C. distance between slits and screen (D) D. ratio (λ /d)

16. In a double slit experiment, the distance between slits is increased ten times whereas their distance from screen is halved, then what is the fringe-width?

A. remains same B. becomes 1/10 C. becomes 1/20 D. becomes 1/40

17. Which of the following electro-magnetic rays has maximum wavelength?

A. Radio waves B. X-rays C. Infra-red rays D. Ultra-violet rays

18. The resonant frequency is proportional to

A. R/LC B. $1/\sqrt{LC}$ C. $\sqrt{LC}$ D. none of these

19. The wave with wavelength of 10 cm lies in region of

A. Radio waves B. Micro-waves C. X-rays D. Infra-red rays

20. If L = 100μ H, current changes by 1 A in 0.1 second. What is the emf produced?

A. 1 mV B. 100 mV C. 10 mV D. 0.1 V

21. A magnetic needle is placed in a non -uniform magnetic field; which one is correct?

A. both force and torque act B. force but no torque

C. torque but no force D. none of these

22. In a circular coil of radius *r* the magnetic field at the centre is proportional to:

A. r^2 B. r C. $1/r$ D. $1/r^2$

23. If two electron beams travel in the same direction, they will

A. attract each other B. repel each other C. nothing will happen D. none of these

24. One charge is moving along a circle in a magnetic field B, mass = 10^5 kg, velocity = 1m/s, magnetic field = 10^{-2} *T*, *Q* = 10^7 coulomb. What is

the radius of its circular tank?

A. 1m B. 0.1m C. 10m D. none of these

25. If two resistors of resistances 2*R* and 3*R* are connected in parallel, then the heat produced in them will be in the ratio

A. 3 : 2 B. 2 : 1 C. 1 : 4 D. 4 : 1

26. A graph is drawn with force along Y-axis & time along X-axis. The area under the graph represents

A. momentum B. couple C. moment of the force D. impulse of the force

27. When a substance was heated, its conductivity increased. What should it be out of the following?

A. Metal B. Insulator C. Semi-conductor D. Semi-metal

28. A mass is revolving in a circle which is in a plane of paper. The direction of tangential acceleration is

A. upward to radius B. towards the radius

C. tangential D. at right angle to angular velocity

29. What is the potential at the center *c* ?

A. 0 B. $Kq/a\sqrt{2}$

C. $\sqrt{2}\,(Kq/a)$ D. none

30. Electric field lines are parallel to the plane face of a hemisphere, what is the total flux passing through it

A. $E.\pi r^2/2$ B. $E.\pi r^2/2E_0$

C. $E.2\pi r^2$ D. 0

31. At Boyle's temperature,

A. Joules effect is positive B. *b* of Vander Waal's equation is zero

C. Gas obeys Boyle's law D. None of these

32. At 0 *K* which is true?

A. *b* of Vander Waal's equation becomes very small B. all gases get liquified

C. metal become solidified D. the motion of gas molecules becomes zero

33. Calculate the work done if temperature is changed from 0°C to 200°C at 1 atmosphere (R = 2 cal K^{-1})

A. 100 calories B. 200 calories C. 400 calories D. 800 calories

34. If a Carnot's Engine functions at source

temperature 127°C and at a sink temperature 87°C,
what is its efficiency?
A. 10% B. 25% C. 40% D. 50%

35. Which is an intensive property?
A. Volume B. Mass C. Refractive index D. Weight

36. If a particle is travelling with a speed of 0.9 of the speed of sound and is emitting radiations of frequency 1 kHz and moving towrads the observer, what is its apparent frequency?
A. 1.1 B. 0.8 C. 0.4 D. 10 kilohertz

37. In case of a transverse wave, frequency is proportional to:
A. $\sqrt{T}$ B. 1/T C. $1/\sqrt{T}$ D. T

38. A string is tied on a sonometer. Second end is hanging downward through a pulley with tension *T*. The velocity of the transverse wave produced is proportional to
A. $1/\sqrt{T}$ B. $\sqrt{T}$ C. T D. 1/T

39. If the frequency of oscillations of a particle doing SHM is *n*, the frequency of K.E. is
A. 2n B. n C. n/2 D. none of these

40. The ratio of the terminal velocities of two drops
of radii *R* and *R*/2 is
A. 2 B. 1 C. 1/2 D. 4

41. If a mercury drop is divided into 8 equal parts, it's total energy
A. remains same B. becomes twice C. becomes half D. becomes 4 times

42. Strain energy per unit volume in a stretched string is
A. 1/2 (stress x strain) B. stress x strain C. $(\text{stress x strain})^2$ D. stress/strain

43. A satellite is revolving around earth. If it's height is increased to 4 times the height of geo-stationary satellite, what will become its time period?
A. 8 days B. 4 days C. 2 days D. 16 days

44. When a body is lifted from surface of earth to a height equal to radius of earth, then the change in its P.E. is
A. mgR B. 2 mgR C. 1/2 mgR D. 4 mgR

45. A body is projected from earth's surface to become its satellite, its time period of revolution will not depend upon
A. mass of earth B. its own mass C. gravitational constant D. radius of orbit

46. Moment of inertia depends upon

A. Axis of rotation | B. Torque applied | C. Angular speed | D. Angular momentum

47. What is not conserved in the case of celestial bodies revolving around sun?
A. Kinetic energy B. Mass C. Angular momentum D. Linear momentum

48. If a force acts on a body, whose action line does not pass through its centre of gravity, then the body will experience
A. Angular acceleration B. Linear acceleration
C. No acceleration D. None of these

49. If a neutron collides with an alpha-particle, with velocity *V*, what is its resultant velocity?
A. 1/5 V B. 2/5 V C. 3/5 V D. 4/5 V

50. Momentum is closely related to
A. Force B. Impulse C. Velocity D. Kinetic Energy

51. In case of a uniform circular motion, velocity and acceleration are
A. Perpendicular B. Same direction C. Opposite direction D. Not related to each other

52. An engine of power 7500W makes a train move on a horizontal surface with constant velocity of 20 $ms^{-1.}$ The force involved in the problem is
A.375 N B.400 N C.500 N D.600 N

53. A person moves towards east for 5 km, then towards north for 12 km and then moves vertically up by 13 km. What is his distance now from the origin?
A. $13\sqrt{2}$ B. 5 C. 10 D. 20

54. What is $\vec{F} \cdot \vec{ds}$
A. Torque B. Impulse C. Momentum D. Work

55. Which one is not a dimensional constant?
A. Acceleration due to gravity B. Surface Tension of water
C. Velocity of light D. Reynold's Numer

56. Which of the following can measure the position of a particle most accurately?
A. polarized light B. light with high wavelength
C. light with low wavelength D. none of these

57. The dimension of Angular Momentum is
A. MLT^{-2} B. ML^2T^{-1} C. ML^2T^{-2} D. ML^2T

58. The dimension of '*a*' in Vander Waal's gas equation is?

A. Atom litre^{-2} mol^{2} B. Atom litre^{2} per mol C. Atom litre^{-1} mol^{-2} D. Atom litre^{2} mol^{-2}

59. The dimension of Action is

A. M^2LT^{-3} B. MLT^{-1} C. MLT^{-2} D. ML^2T^{-1}

60. Photos get stuck on perfectly easily on reflecting surfaces because:

A. sticking area is more because of smoothness of reflecting surfaces

B. vacuum gets created between photo and reflecting surface

C. reflecting surfaces are warm surfaces

D. glue sticks nicely on reflecting surfaces

61. When oxalic acid crystals are heated with phosphorus pentaoxide, we get

A. vapours of phosphorus trioxide

B. carbon monoxide

C. carbon dioxide and water vapours

D. carbon monoxide and carbon dioxide

62. When very dilute nitric acid acts on magnesium, it gives rise to

A. ammonia B. nitrous oxide C. hydrogen D. nitric oxide

63. The general formula for alkene is

A. C_nH_{2n+2} B. C_nH_{2n-2} C. C_nH_{2n} D. C_nH_n

64. The coloured discharge tubes for advertisements contain

A. Argon B. Xenon C. Helium D. Neon

65. While preparing Cl_2 from HCl, MnO_2 acts as a/an

A. dehydrating agent B. reducing agent C. catalytic agent D. oxidising agent

66. When a bee bites, it injects mainly

A. formic acid B. acetic acid C. carbonic acid D. hydrochloric acid

67. Most stable valence state of Mn in its salts is

A. 2 B. 5 C. 3 D. 7

68. The polarity is maximum in

A. N-F B. C-F C. O-F D. F-F

69. Which of the following is used in radio carbon dating?

A. C^{12} B. C^{11} C. C^{13} D. C^{14}

70. If one starts with 1 curie of radioactive substance ($T_{1/2}$ = 12 hr), the activity left after a period of 1week will be about

A. 1 curie B. 120 microcurie C. 60 microcurie D. 8 millicurie

71. The number of d-electrons in $[Cr(H_2O_6)]^{3+}$ ion (Atomic no. of Cr = 24) is

A. 2 B. 3 C. 4 D. 5

72. The pyrites are heated with hydrochloric acid. The solution so obtained will give blood red colour with

A. $K_4Fe(CN)_6$ B. KCN C. $K_3Fe(CN)_6$ D. KSNC

73. Which of the following structures is most likely for $XeOF_4$?

A. Tetrahedral B. Square pyramidal C. Square planar D. Octahedral

74. The harmonic connected with growth of animal is

A. Pepsin B. Ptylin C. Thyroxine D. Renin

75. The correct order of increasing oxidising power is

A. $F_2 < Cl_2 < Br_2 < I_2$ B. $F_2 < Br_2 < Cl_2 < I_2$ C. $Cl_2 < Br_2 < F_2 < I_2$ D. $I_2 < Br_2 < Cl_2 < F_2$

76. Nitrates of all metals are

A. unstable B. stable C. coloured D. soluble

77. Bromination of aniline will give

A. 2, 3, 4 trinitrophenol B. 2, 4, 6 tribromoaniline C. 1, 3, 5-tribromoaniline D. 2, 3, 5-tribromoaniline

78. Acetamide is treated separately with the following reagents. Which of them would give methylamine?

A. PCl_5 B. $NaOH/Br_2$ C. Sodalime D. Hot conc. H_2SO_4

79. Acetic acid exists as a dimmer in benzene due to

A. condensation reaction B. hydrogen bonding

C. presence of carbonyl group D. presence of H-atom and α -carbon atom

80. There is no s-s bond in

A. $S_2O_4^{2-}$ B. $S_2O_5^{2-}$ C. $S_2O_5^{2-}$ D. $S_2O_6^{2-}$

81. Which one of the following statements shows the difference between ketone and ether?

A. Ether contains N, P but ketone does not contain N, P

B. Ether reacts with phenyl-hydrazine but ketone does not

C. Ketone does not give acetylation but ether does

D. None of these

82. Dry distillation of calcium acetate yields

A. acetaldehyde B. formaldehyde C. acetone D. ethane

83. Phenol under vigorous nitration condition, i.e., treating with conc. HNO_3 and conc. H_2SO_4 will give

A. 1, 2, 3-trinitrophenol B. Diethylbenzene C. Aniline D. 2, 4, 6-trinitrophenol

84. The reaction of C_2H_5MgCl with acetaldehyde on acidification yields

A. an aldehyde B. a ketone C. a primary alcohol D. a secondary alcohol

85. For an exothermic reaction, temperature increases by 10^oC; then how will the equilibrium be attained faster?

A. 2 times B. same C. 1/2times D. 4 times

86. A catalyst increases the rate of reaction as

A. reacting substances are brought into higher specific relation with each other

B. energy is added to the system

C. molecules of the reactants are speeded up so that random encounters are more

D. product of the reaction are removed simultaneously

87. What weight of $K_2Cr_2O_7$ would be required to produce 100 ml of 0.1 N $K_2Cr_2O_7$ solution? (Eq. Wt. of $K_2Cr_2O_7 = 49$)

A. 0.049 gm B. 4.9 gm C. 0.49 gm D. 0.0049 gm

88. Molecular O_2 contains two unpaired electrons. They are

A. π^* and σ B. σ^* and π C. σ^* and π^* D. π^* and π^*

89. In the addition of HBr to propene in the absence of peroxides, the first step involves the addition of

A. H^+ B. Br^- C. H^o D. Br^o

90. The number of sigma bond in toluene is

A. 12 B. 18 C. 15 D. 9

91. It is possible to distinguish between optical isomers by

A. infra-red spectroscopy B. mass spectrometry

C. melting point determination D. polarimetry

92. Organic Compounds of carbon and hydrogen and with a general formula C_nH_{2n} are called

A. alkanes B. alkenes C. alkynes D. olefines

93. Electrolysis of CH_3COOK will give

A. methane B. ethene C. ethane D. manganese

94. Coinage metals are present in

A. s-block B. d-block C. p-block D. f-block

95. The most commonly used silver salt in photography is

A. $AgNO_3$ B. AgCl C. AgBr D. Ag_2O_3

96. Besides iron, essential component of steel is

A. cobalt B. chromium C. copper D. manganese

97. An important mineral for magnesium is

A. malachite B. cassiterite C. carnalite D. galena

98. If a reaction takes place like $H_3BO_3 + NaOH \rightarrow X + H_2O$, then X will be

A. Na_2BO_3 B. $NaBO_2$ C. Na_3BO_3 D. none of these

99. Which of the following nitrate evolves laughing gas on heating?

A. KNO_3 B. $Pb(NO_3)_2$ C. NH_4NO_3 D. $AgNO_3$

100. Nitrogen (I) oxide is produced by

A. thermal decomposition of ammonium nitrate B. disproportion of ammonium N_2O_4

C. thermal decomposition of ammonium nitrite D. interaction of hydroxylamine with nitrous acid

101. Inertness of N_2 gas is due to

A. no vacant d orbital B. high dissociation energy C. high electronegativity D. none of these

102. In reaction of H_2O_2 and alkaline K3Fe(CN)6, H_2O_2 acts as a/an

A. acid B. base C. oxidant D. reductant

103. Which of these contains only an electron and a proton?
A. Helium B. Deuterium C. Hydrogen D. Tritium

104. For reaction N_2 (g) + O_2 (g) $\rightarrow$ 2NO (g), Δ H = + 1812, then
A. Δ E = Δ H B. Δ E > Δ H C. Δ E < Δ H D. none of these

105. What will be the IUPAC name of $CH_2 = CHCH_2Cl$?
A. 1-chlorotripropene B. 3-chloro-1-propene C. Methylchloroethene D. 1-chloro-2-methylethene

106. Which of the following statements is/are wrong?
A.All hydrocarbons containing 6 carbon atoms are aromatic
B. There is no organic compound except bromine which contains 6 C atoms and is known as aromatic compound
C. Hydrocarbon contains C, H, N, P, etc.
D. All of the above

107. Which of the following is the hardest substance?
A. Steel B. Graphite C. Silicon D. Diamond

108. Hydrogen gas has
A. covalent bonding B. ionic bonding C. metallic bonding D. Vander Wall's force

109. The momentum associated with a photon of frequency v is
A. hv/c B. hc/v C. uc/h D. h/uc

110. Slag is an easily fusible material formed by the reaction between
A. ore and the flux B. ore and reducing agent
C. impurities present and the flux D. none of these

111. ($C_6H_5NH_2 + COCl_2 + [A] \rightarrow C_6H_5NH.CO.NHC_6H_5$). The compound [A] is
A. $(C_6H_5)2NH$ B. $C_6H_5NH_2$ C. $(CH_3)_3N$ D. $(C_6H_5)_3N$

112. In which molecule, the distance between the two adjacent carbon a1kanes is largest?

A. Ethane B. Ethene C. Ethyne D. Benzene

113. Baeyer's reagent is

A. alkaline permanganate solution B. acidified permanganate solution

C. neutral permanganate solution D. aqueous bromine solution

114. The hybridisation of carbon atom in C-C single bond of $HC \equiv C - CH = CH_2$ is

A. sp^3-sp^3 B. sp^2-sp^3 C. sp-sp^2 D. sp^3-sp

115. Iron is in + 2 oxidation state in

A. $K_4[Fe(CN)_6]$ B. $K_3[Fe(CN)_6]$ C. $Na_2[Fe(NO)_2CN)_5]$ D. $[Fe(OH)_2]^+$

116. Transition metals

A. exhibit dia magnetism B. do not form alloys

C. undergo inert pair effect D. show variable oxidation state

117. Ozone can be easily detected by the use of

A. silver B. silver chloride C. mercury D. hydrogen peroxide

118. Oxygen molecule exhibits

A. paramagnetism B. bleaching powder C. potassium permanganate D. sodium peroxide

119. Which of the following phosphorus oxyacids is reducing in character?

A. H_3PO_3 B. H_3PO_4 C. $H_4P_2O_6$ D. $H_4P_2O_7$

120. Which one of the following is dibasic acid?

A. Phosphorous acid B. Hypophosphorous acid C. Phosphoric acid D. Hypophosphoric acid

121. If in a triangle ABC, angle C is 45^o, then (1 + cot A)(1 + cot B) equals

A. 1 B. -1 C. 2 D. $1/\sqrt{2}$

122. If the cube roots of unity are 1, ω, ω^2, then the roots of the equation $(x - 2)^3 + 27 = 0$ are

A. -1, 2 - 3ω, 2 - 3ω^2 B. -1, 2 + 3ω, 2 + 3ω^2 C. -1, - ω, - ω^2 D. -1, -1, -1

123. If A, B, and C are any three sets, then A - (B $\cap$ C) is equal to

A. (A - B) $\cap$ C B. (A - B) $\cup$ C C. (A - B) $\cap$ (A - C) D. (A - B) $\cup$ (A - C)

124. The angle of elevation of the top of a tower at horizontal distance equal to the height of the tower from the base of the tower is

A. 30^o B. 45^o C. 60^o D. none of the above

125. If α is a complex number such that $\alpha^2 + \alpha + 1 = 0$, then α^{31} is
A. 1 B. 0 C. α^2 D. α

126. If z is a complex number, then
A. $|z^2| < |z|^2$ B. $|z^2| \geq |z|^2$ C. $|z^2| = |z|^2$ D. $|z^2| > |z|^2$

127. The origin and the roots of the equation $z^2 + pz + q = 0$ form an equilateral triangle if
A. $q^2 = p$ B. $q^2 = 3p$ C. $p^2 = 3q$ D. $p^2 = q$

128. The distance between the lines $4x + 3y = 11$ and $8x + 6y = 15$ is
A. 7/10 B. 7/2 C. 4 D. none of the above

129. Two circles $x^2 + y^2 = 6$ and $x^2 + y^2 - 6x + 8 = 0$ are given. Then the equation of the circle through their points of intersection and the point (1, 1) is
A. $x^2 + y^2 - 4y + 2 = 0$ B. $x^2 + y^2 - 6x + 4 = 0$ C. $x^2 + y^2 - 3x + 1 = 0$ D. none of the above

130. In an ellipse, the distance between its foci is 6 and its minor axis is 8. Then its eccentricity is
A. 3/5 B. $1/\sqrt{2}$ C. 1/2 D. 4/5

131. If b and c are the length of the segments of any focal chord of a parabola $y^2 = 4ax$, then the length of the semi-latus rectum is
A. $bc/(b + c)$ B. $\sqrt{bc}$ C. $(b + c)/2$ D. $2bc/(b + c)$

132. $[1 + \cos(\pi/8)] [1 + \cos(3\pi/8)] [1 + \cos(5\pi/8)] [1 + \cos(7\pi/8)]$ is equal to
A. $\pi/2$ B. $(1 + \sqrt{2})/2\sqrt{2}$ C. 1/2 D. 1/8

133. In a triangle ABC, a = 13cm, b = 12cm, and c = 5 cm. The distance of A from BC is
A. 144/13 B. 65/12 C. 60/13 D. 25/13

134. The principal value of $\sin^{-1}(\sin 5\pi/3)$ is
A. $4\pi/3$ B. $-\pi/3$ C. $-5\pi/3$ D. $5\pi/3$

135. If $\sin^{-1} x = \pi/5$ for some $x \in [1, -1]$, then the value of $\cos^{-1} x$ is
A. $9\pi/10$ B. $7\pi/10$ C. $5\pi/10$ D. $3\pi/10$

136. If ω is a cube root of unity, then the value of $(1 + \omega - \omega^2)(1 - \omega + \omega^2)$ is
A. 4 B. 2 C. 0 D. 1

137. $\tan^{-1}(1/5) + \tan^{-1}(1/7) + \tan^{-1}(1/3) + \tan^{-1}(1/8) =$
A. $\pi/3$ B. $\pi/4$ C. $\pi/2$ D. π

138. The equations $x^2 - ax + b = 0$ and $x^2 + bx - a = 0$ have a common root, then

A. $a + b = 0$ or $a - b = 1$ B. $a - b = 0$ C. $a + b = 1$ D. $a = b$

139. If α, β are the roots of $x^2 + px + q = 0$, then $-1/\alpha$, $1/\beta$ are the roots of the equation

A. $x^2 - px + q = 0$ B. $x^2 + px + q = 0$ C. $qx^2 + px + 1 = 0$ D. $qx^2 - px + 1 = 0$

140. The real roots of $| x |^2 - 3x^2 + 3| x | - 2 = 0$ are

A. ± 1 B. ± 2 C. 1, 2 D. 0, 2

141. The 20th term of the series 2 x 4 + 4 x 6 + 6 x 8 ..... is

A. 840 B. 420 C. 1680 D. 1600

142. If (a, b), (c, d), (e, f) are the vertices of a triangle such that a, c, e are in G.P. with common ratio r and b, d, f are in G.P. with ratio s, then the area of the triangle is

A. (ab/2) (r + 1) (s + 1) (s - r) B. (ab/2) (r - 1) (s - 1) (s - r)

C. (ab/2) (r - 1) (s - 1) (s - r) D. (ab/2) (r + 1) (s + 2) (s + r)

143. If (a + b)/(1 - ab), b, (b + c)/(1 - bc) are in A.P., then a, 1/b, c are in

A. H.P. B. A.P. C. G.P. D. none of the above

144. 1/2! - 1/3! + 1/4! - 1/5! + ... equals

A. e^{-1} B. log 2 C. log e D. e

145. $(1/2)x^2 + (2/3)x^3 + (3/4)x^4 + (4/5)x^5 + ...$ is

A. -x/(1 + x) + log (1 + x) B. x/(1 + x) + log (1 + x) C. x/(1 - x) + log (1 - x) D. none of the above

146. The number of ways in which n ties can be selected from a rack displaying 3n different ties is

A. 3 x n! B. 3n!/(n! 2n!) C. 3n!/2n! D. 3n!

147. The number of ways in which 5 boys and 5 girls can sit in a row so that all the girls sit together is

A. 12600 B. 7200 C. 86400 D. 14400

148. The coefficient of x^6 in the expansion of $(1 + x + x^2)^{-3}$ is

A. 6 B. 5 C. 4 D. 3

149. The sum of the series $\sum_{r=0}^{10} {}^{20}C_r$ **is**

A. $2^{19} - [(1/2)({}^{20}C_r)]$ B. $2^{19} + [(1/2)({}^{20}C_r)]$ C. 2^{19} D. 2^{20}

150. If α is a zero of $ax^2 + bx + c$, then one of the factors of $ax^2 + bx + c$ is

A. $c - \alpha$ B. $a - \alpha$ C. $x + \alpha$ D. $x - \alpha$

151. If A is 3 x 4 matrix and B is a matrix such that A'B and BA' are both defined. Then B is of the type

A. 3 x 4 B. 4 x 4 C. 3 x 3 D. 4 x 3

152. The point (3, 2) is reflected in the y-axis and then moved a distance 5 units towards the negative side of y-axis. The co-ordinates of the point thus obtained are

A. (3, -3) B. (-3, 3) C. (3, 3) D. (-3, -3)

153. If a, b, c are different and $\begin{vmatrix} a & a^2 & a^3 - 1 \\ b & b^2 & b^3 - 1 \\ c & c^2 & c^3 - 1 \end{vmatrix} = 0$**, then**

A. $ab + bc + ca = 0$ B. $a + b + c = 0$ C. $a + b + c = 1$ D. $abc = 1$

154. If A = $\begin{bmatrix} ab \\ ba \end{bmatrix}$**,** $A^2 = \begin{bmatrix} \alpha\beta \\ \beta\alpha \end{bmatrix}$**, then**

A. $\alpha = 2ab$, $\beta = a^2 + b^2$ B. $\alpha = a^2 + b^2$, $\beta = a^2 - b^2$ C. $\alpha = a^2 + b^2$, $\beta = 2ab$ D. $\alpha = a^2 + b$, $\beta = ab$

155. The value of $\Delta = \begin{vmatrix} 1 & 2 & -1 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{vmatrix}$ **is**

A. 5 B. 2 C. 1 D. 0

156. The equation of the line joining the points (-2, 4, 2) and (7, -2, 5) are

A. $(x + 2)/3 = (y - 4)/-2$ B. $x/-2 = y/4 = z/2$

= (z - 2)/1
C. x/7 = y/-2 = z/5 D. none of the above

157. If difference of the roots of the equation $x^2 + px + 8 = 0$ is 2, then p is equal to
A. ± 2 B. ± 4 C. ± 6 D. ± 8

158. The mean deviation of the numbers 3, 4, 5, 6, 7 is
A. 25 B. 5 C. 1.2 D. 0

159. If byx and bxy are the regression coefficients of y on x and x on y respectively, then
A. byx + bxy ≥ 2r (x, y) B. byx + bxy = 2r (x, y) C. byx + bxy < 2r (x, y) D. none of the above

160. Cards are drawn from a pack until the spade-ace turns up. Then on an average, the number of cards dealt is
A. 57/2 B. 49/2 C. 53/2 D. none of the above

161. A number is chosen at random among the first 120 natural numbers. The probability that the number chosen being a multiple of 5 or 15 is
A. 1/6 B. 1/5 C. 1/8 D. none of the above

162. For two events A and B, if P(A) = P(A/B) = 1/4 and P(B/A) = 1/2, then
A. A is a subevent of B B. A and B are mutually exclusive
C. A and B are independent and P(A'/B) = 3/4 D. none of the above

163. The inverse of the function $y = [(10^x - 10^{-x})/(10^x + 10^{-x})] + 1$ is
A. $y = 1/2 [\log_{10} x/(2 - x)]$ B. $y = [\log_{10} x/(2 - x)]$ C. $y = 1/2 [\log_{10} x/(1 - x)]$ D. none of the above

164. Let $f : R \to R$ be a mapping defined by $f(x) = x^3 + 5$, then $f^{-1}(x)$ is equal to
A. $(5 - x)^{1/3}$ B. $(x + 5)^{1/3}$ C. 5 - x D. $(x - 5)^{1/3}$

165. If $f(x) = (1 - \sin x)/(\pi - 2x)^2$ when $x \neq \pi/2$ and $f(\pi/2) = \lambda$, then f(x) will be a continous function at $x = \pi/2$ when λ is
A. 1/4 B. 1/2 C. 1/8 D. none of the above

166. $\lim_{x \to 1} [\log_e x/(x - 1)]$ is equal to
A. 1/2 B. 0 C. 1 D. 2

167. If the line ax + by + c = 0 is a normal to the curve xy = 1, then
A. a < 0, b < 0 B. a > 0, b > 0

C. $a > 0, b < 0$ or $a < 0, b > 0$ D. none of the above

168. If $f'(x) = (x - 2a)^{2n} (x - b)^{2m + 1}$ where $m, n \in N$, then
A. x = b is a point of inflexion B. x = b is a point of minima
C. x = b is a point of maxima D. none of the above

169. $\int | x |^3 dx$ is equal to
A. $- x^3/4$ B. $| x |^4/4$ C. $x^4/4$ D. none of the above

170. $\int dx/(x^2 + x + 1)$ is equal to
A. $\sqrt{3}/2 + \tan^{-1} [(2x + 1)/\sqrt{3}] + c$ B. $2/\sqrt{3} + \tan^{-1} [(2x + 1)/\sqrt{3}] + c$
C. $1/\sqrt{3} + \tan^{-1} [(2x + 1)/\sqrt{3}] + c$ D. none of the above

171. $\int_0^{\pi/2}$ **dx/(1 + tanx) is equal to**

A. $\pi/4$ B. $\pi/3$ C. $\pi/2$ D. π

172. Lim $\phi(x) = a^3$, $a \neq 0$, then Lim $\phi(x/a)$ is
$x \to 0$ $x \to 0$
A. $1/a^2$ B. $1/a^3$ C. a^3 D. a^2

173. 7 men and 7 women are to sit round a table so that there is a man on either side of a woman. The number of seating arrangement is
A. $(7!)^2$ B. $(6!)^2$ C. (6!) D. (7!)

174. If the position vectors of three points are a - 2b + 3c, 2a + 3b - 4c, -7b + 10c, then the three points are
A. collinear B. coplanar C. non-collinear D. none of the above

175. The scalar A . [(B + C) x (A + B + C)] equals
A. 0 B. [ABC] + [BCA] C. [ABC] D. none of the above

176. If a variable takes the discrete values $\alpha + 4, \alpha - 7/2, \alpha - 5/2, \alpha - 3, \alpha + 1/2, \alpha - 1/2, \alpha + 5$ ($\alpha > 0$), then the median is
A. $\alpha - 1/2$ B. $\alpha + 5/4$ C. $\alpha - 5/4$ D. $\alpha - 2$

177. The angle of the elevation of the top of a tower any point on the ground is 30^o and moving 20 metres towards the tower, it becomes

60^o. The height of the tower is

A. 10 m B. $10\sqrt{3}$ m C. $10/\sqrt{3}$ m D. none of the above

178. If A, B, and C be any three sets such that then $A \cup B = A \cup C$ and $A \cap B = A \cap C$, then

A. A = B = C B. A = C C. B = C D. A = B

179. The equation $y^2 - x^2 + 2x - 1 = 0$ represents

A. a pair of straight lines B. a circle C. a parabola D. an ellipse

180. The points (-a, -b), (0, 0), (a, b) and (a^2, ab) are

A. collinear B. vertices of a rectangle

C. vertices of a parallelogram D. none of the above