1. Following two wave trains are approaching each other.
$y_1 = a \sin 200 \pi t$ $y_2 = a \sin 208 \pi t$
The number of beats heard per second is :
A. 8 B. 4 C. 1 D. 0

2. One of the geo-stationary satellites of India is vertically above
A. New Delhi B. Mumbai C. Allahabad D. None of these

3. Light of wavelength 2400×10^{-10} m in air will become light of wavelength in glass ($\mu = 1.5$) equal to
A. 1600×10^{-10} m B. 7200×10^{-10} m C. 1080×10^{-10} m D. none of these

4. The ratio of secondary to primary turns is 4:5. If power input is *P*, what will be the ratio of power output (neglect all losses) to power input ?
A. 4:9 B. 9:4 C. 5:4 D. 1:1

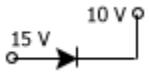
5. Lenz's law applies to
A. electrostatics B. lenses
C. electro-magnetic induction D. cinema slides

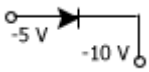
6. If a proton and anti-proton come close to each other and annihilate, how much energy will be released ?
A. 1.5×10^{-10} J B. 3×10^{-10} J C. 4.5×10^{-10} J D. none of these

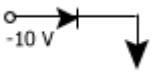
7. If *Sn* is doped with *As*, what will be the result ?
A. *n*-type semi-conductor B. *p*-type semi-conductor C. intrinsic semi-conductor D. none of these

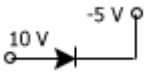
8. A charge is placed at the centre of a cube, what is the electric flux passing through one of its faces?
A. $(1/6) \times (q/\varepsilon_0)$ B. q/ε_0 C. $6q/\varepsilon_0$ D. None of these

9. What is the degree of freedom in case of a mono atomic gas ?
A. 1 B. 3 C. 5 D. None of these

10. The ratio of secondary to primary turns is 4:5. If power input is *P*, what will be the ratio of power output (neglect all losses) to power input ?
A. 

B. 

C. 

D. 

11. Speed of recession of galaxy is proportional to its distance

A. directly B. inversely C. exponentially D. none of these

12. If a substance goes in a magnetic field and is pushed out of it, what is it ?
A. Paramagnetic B. Ferromagnetic C. Diamagnetic D. Antiferromagnetic

13. Which is not a scalar quantity?
A. Work B. Power C. Torque D. Gravitational Constant

14. Minimum energy required to excite an electron in a Hydrogen atom in ground state is :
A. -13.6 eV B. 13.6 eV C. 10.2 eV D. 3.4 eV

15. If Gravitational Constant is decreasing in time, what will remain unchanged in case of a satellite orbiting around earth ?
A. Time period B. Orbiting radius C. Tangential velocity D. Angular velocity

16. If a transparent medium of refractive index $\mu = 1.5$ and thickness $t = 2.5 \times 10^{-5}$ m is inserted in front of one of the slits of Young's Double Slit experiment, how much will be the shift in the interference pattern ? The distance between the slits is 5.0×10^{-3} cm and that between slits and screen is 100 cm.
A. 5 cm B. 2.5 cm C. 0.25 cm D. 0.1 cm

17. How does light propagate in optical fibres?
A. Total internal reflection B. Refraction C. Reflection D. None of these

18. Dispersion of light is due to
A. wavelength B. intensity of light C. density of medium D. none of these

19. Which of the following conclusions is correct regarding a stationary body?
A. No force is acting on the body
B. Vector sum of forces acing on the body is zero
C. The body is in vacuum
D. The forces acting on the body do not constitute a couple

20. Energy released in stars is due to
A. Fission B. Fusion C. Combustion D. Chemical reaction

21. 13 days is the half-life period of a sample. After how many days, the sample will become 1/16th of the original substance ?
A. 52 B. 3.8 C. 3 D. none of these

22. Absolute zero is the temperature at which

A. water solidifies
B. all gases become liquid
C. motion of molecules becomes minimum
D. everything solidifies

23. Motion of liquid in a tube is described by

A. Bernaulli's Theorem
B. Poiseuille Equation
C. Stoke's Law
D. Archimedes' Principle

24. Molecular motion shows itself as

A. Temperature
B. Internal Energy
C. Friction
D. Viscosity

25. Which is this gate ?

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

26. Energy bands in solids are a consequence of

A. Ohm's Law
B. Pauli's Exclusion Principle
C. Bohr's Theory
D. Heissenberg's Uncertainty Principle

27. A boy of mass M stands on the floor of an elevator moving downwards with an acceleration a which is less than g. The force exerted by the boy on the floor of the elevator is

A. Mg x Ma
B. g + a
C. Mg – Ma
D. Mg + Ma

28. A body A of mass m_1 exerts a force on another body B of mass m_2. If the acceleration of B be a_2, then the acceleration (in magnitude) of A is

A. $m_2/m_1\ (a_2)$
B. $m_1m_2\ a_2$
C. $m_1/m_2\ (a_2)$
D. $(m_1 + m_2)\ a_2$

29. What does not change when sound enters from one medium to another ?

A. Wavelength
B. Speed
C. Frequency
D. none of these

30. Resolving power of a microscope depends upon

A. wavelength of light used, directly
B. wavelength of light used, inversely
C. frequency of light used
D. focal length of objective

31. An astronaut of weight Mg is in a rocket accelerating upward with an acceleration of 4g. The apparent weight of the astronaut will be

A. 5Kg
B. 4Kg
C. Mg
D. zero

32. One proton beam enters a magnetic field of 10^{-4} m/s normally, sp. charge = 10^{11} C/kg, velocity = 10^9 m/s. What is the radius of the circle describe by it ?

A. 0.1 m
B. 100 m
C. 10 m
D. none of these

33. If a black body radiates 20 calories per second at 227°C, it will radiate at 727°C

A. 10 calories per second | B. 80 calories per second | C. 320 calories per second | D. none of these

34. If a carnot engine is working with source temperature equal to 227°C and its sink temperature is at 27°C, its efficiency will be

A. 20% | B. 10% | C. 67% | D. 50%

35. If the frequency of an oscillating particle is *n*, then the frequency of oscillation of its potential energy is

A. n | B. 2n | C. n/2 | D. 4n

36. If an electron oscillates at a frequency of 1 GHz, it gives :

A. X-rays | B. Micro-waves
C. Infra-red rays | D. None of these

37. Earth's atmosphere is richest in

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

38. Cathode rays consist of

A. Photons | B. Electrons | C. Protons | D. α -particles

39. A body of mass m_1 is moving with a velocity V. It collides with another stationary body of mass m_2. They get embedded. At the point of collision, the velocity of the system

A. increases | B. decreases but does not become zero
C. remains same | D. becomes zero

40. One projectile moving with velocity V in space, gets burst into 2 parts of masses in the ratio 1:2. The smaller part becomes stationary. What is the velocity of the other part ?

A. 4V | B. V | C. 4V/3 | D. 2V/3

41. A thief steals a box of weight W & jumps from the third floor of a building. During jump, he experiences a weight of

A. W | B. 3W | C. 1.5W | D. zero

42. Two electron beams are moving parallel in space but in opposite directions; then

A. they will attract each other | B. they will repel each other
C. no interaction will take place | D. none of these

43. Two wires with resistances R and 3R are connected in parallel, the ratio of heat generated in 2R and R is

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

44. A wire is drawn such that its radius changes from r to $2r$, the new resistance is

A. 2 times B. 4 times C. 8 times D. 1/16 times

45. In solids, inter-atomic forces are
A. totally repulsive B. totally attractive
C. combination of (a) and (b) D. none of these

46. When horse starts running all of a sudden, the rider on the horse back falls backward because
A. he is taken aback
B. he is afraid
C. due to inertia of rest, the upper part of his body remains at rest
D. due to inertia of motion, the lower part of his body comes in motion

47. What should be the minimum velocity at the highest point of a body tied to a string, so that the string just does not slack ?
A. $\sqrt{}$ (Rg) B. $\sqrt{}$ (5Rg) C. $(R/g)^{3/2}$ D. $\sqrt{}$ (2Rg)

48. If a person standing on a rotating disc stretches out his hands, the speed will:
A. increase B. decrease
C. remain same D. none of these

49. EMF is most closely related to
A. mechanical force B. potential difference C. electric field D. magnetic field

50. Planetary system in the solar system describes
A. conservation of energy B. conservation of linear momentum
C. conservation of angular momentum D. none of these

51. Lenz's law is based upon
A. energy B. momentum C. angular momentum D. inertia

52. Faraday's second law states that mass deposited on the electrode is directly proportional to
A. atomic mass B. atomic mass x velocity C. atomic mass/valency D. valency

53. Unit of power is
A. kilowatt hour B. kilowatt per hour C. kilowatt D. erg

54. Power can be expressed as
A. F.v B. 1/2 (Fv^2) C. F.t D. F x v

55. Units of coefficient of viscosity are
A. Nms^{-1} B. $Nm^2 s^{-1}$ C. $Nm^{-2} s$ D. Nms^{-2}

56. Dimensions of torque are

A. MLT^{-2} B. ML^2T^{-2} C. $M^2L^2T^{-2}$ D. $ML^{-2}T^{-2}$

57. A body of weight *mg* is hanging on a string, which extends its length by *l*. The work done in extending the string is

A. *mg l* B. *mg l*/2 C. 2 *mg l* D. none of these

58. The water droplets in free fall are spherical due to

A. gravity B. viscosity C. surface tension D. inter-molecular attraction

59. A ball of mass 1Kg is accelerating at a rate of $1ms^{-2}$. The rate of change of momentum is

A. 1 Kg ms^{-2} B. 2 Kg ms^{-2} C. 3 Kg ms^{-2} D. 4 Kg ms^{-2}

60. A body orbitting around earth at a mean radius which is two times as great as the parking orbit of a satellite. The period of the body is

A. 4 days B. $2\sqrt{2}$ days C. 16 days D. 64 days

61. Gamma rays are

A. high energy electrons B. low energy electrons

C. high energy electro-magnetic waves D. high energy positrons

62. Which is the most abundant metal in the earth's crust?

A. Fe B. Al C. Ca D. Na

63. Which one does not give a precipitate with excess of NaOH?

A. $ZnSO_4$ B. $FeSO_4$ C. $AgNO_3$ D. $HgCl_2$

64. What volume of CO_2 will be liberated at NTP of 12 gm of carbon is burnt in excess of oxygen?

A. 11.2 litres B. 22.4 litres C. 2.24 litres D. 1.12 litres

65. Which base is found only in nucleotides of RNA?

A. Adenine B. Uracil C. Guanine D. Cytosine

66. Ascorbic acid is the chemical name of

A. Vitamin B_6 B. Vitamin A C. Vitamin C D. Vitamin D

67. A hydrocarbon has carbon and hydrogen. Its molecular weight is 28. Its possible formula would be

A. C_3H_6 B. C_2H_4 C. CH_4 D. C_4H_8

68. The first Noble Prize in chemistry was given to
A. Faraday B. Cnrizzaro C. Mendeleevs D. Moseley

69. Four different colloids have the following gold number. Which one has its most effective action?
A. 10 B. 30 C. 20 D. 40

70. Which is an example of thermosetting polymer?
A. Polythene B. PVC C. Neoprene D. Bakelite

71. The number of unpaired electrons in ferrous ion is
A. 3 B. 2 C. 4 D. 5

72. Strongest reducing agent is
A. K B. Mg C. Al D. Ba

73. Which of the following is man-made element?
A. Ra B. U C. Np D. C – 4

74. Which of the following statements is/are correct?
A. Boiling point of alkylhalide is greater than its corresponding alkane
B. In water, solubility of $CH_3OH > C_2H_5OH > C_6H_5OH$
C. Aniline is a weaker base than NH_3
D. All of the above

75. Which amine of the following will not answer Carbylamine reaction?
A. Ethylamine B. Methylamine C. Dimethylamine D. Phenylamine

76. Tollen's reagent can be used to detect
A. $(CH_3)_2 – CHOH$ B. $CH_3 – CO.CH_3$ C. CH_3CH_2CHO D. CH_3OCH_3

77. Glycerol on heating with Potassium bisulphate yields
A. Acetone B. Glyceraldehyde C. Acrolein D. Propanol

78. Salicylic acid on heating with sodalime gives
A. Benzene B. Calcium salicylate C. Benzoic acid D. Phenol

79. Which one of the following will not give iodoform test?
A. Ethanol B. Ethanal C. 2-propanone D. None of these

80. The rusting of iron is catalysed by

A. Fe B. O_2 C. Zn D. H^+

81. 100 ml of a liquid A was mixed with 25 ml of a liquid B to give non-ideal solution of A-B mixture. The volume of this mixture will be

A. 75 ml
B. 125 ml exact
C. fluctuating between 75 ml and 125 ml
D. close to 125 ml but not to exceed 125 ml

82. IUPAC name of a compound having the formula $(CH_3)_3$ C - CH = CH_2 is

A. 3, 3 - dimethyl - l - butene
B. 1, 1 - dimethyl - 3 - butene
C. 1,1, 1 - dimethyl - 2 - propene
D. 3, 3, 3 - dimethyl - 1 - l propene

83. Which of the following compounds will be optically active?

A. $(OH_3)_2$ – CHOH B. CH_3 - CH_2 - CH_2 - CH_3 C. CH_3 – CHCl.COOH D. $(CH_3)_3$.C.Cl

84. The major components of brass are

A. Zn and Sn B. Cu and Zn C. Fe and Ni D. Zn and Fe

85. Lunar castic is

A. Silver Chloride B. Silver Nitrate C. Sodium Hydroxide D. Potassium Nitrate

86. When hot iron is exposed in hot water vapour, the compound formed is

A. FeO B. Fe_2O_4 C. Fe_3O_4 D. $Fe_2 (OH)_2$

87. Which of the following halide is not oxidised by MnO_2?

A. F B. Cl^- C. Br^- D. I^-

88. The outermost electronic configuration of the most electronegative element is

A. ns^2np^3 B. ns^2np^4 C. ns^2np^5 D. ns^2np^6

89. Shape of CO_2 is

A. tetrahedral B. trigonal C. bent D. linear

90. The catalyst used in the manufacture of H_2SO_4 by contact process is

A. Al_2O_3 B. Cr_2O_3 C. V_2O_5 D. MnO_2

91. The composition of the common glass is

A. $Na_2O.CaO.6SiO_2$ B. $Na_2O.Al_2O_3.2SiO_2$ C. $CaO.Al_2O_3.2SiO_2$ D. $Na_2O.CaO.Al_2O_3.6SiO_2$

92. In a borax lead test, the brown colour is due to

A. Chromium B.Cobalt C. Manganese D. Iron

93. Which of the following is not a fertiliser?

A. Urea B. Superphosphate of lime C. Benzene Hexachloride D. Potassium

94. Which one of the following belongs to representative group of elements in the Periodic Table?

A. Lanthanum B. Argon C. Chromium D. Aluminium

95. Which one of the following is not an isotope of Hydrogen?

A. Tritium B. Deuterium C. Ortho-hydrogen D. None of the above

96. In the reaction $I_2 + 2S_2O_3^{2-} = 2I^- + S_4O_6^{2-}$, equivalent weight of iodine will be equal to

A. its molecular weight B. 1/2 of its molecular weight

C. 1/4 the molecular weight D. twice the molecular weight

97. Which of the following is the most powerful oxidising agent?

A. F_2 B. Cl_2

C. Br_2 D. I_2

98. From the following values of dissociating constants of four acids, which value represents the strongest acid?

A. 2×10^{-2} B. 0.02×10^{-1} C. 3×10^{-3} D. 2.0×10^{4}

99. In which of the following cases, does the reaction go the farthest for completion?

A. $K = 10^3$ B. $K = 10^{-2}$ C. $K = 10$ D. $K = 1$

100. The reaction which proceeds in the forward direction is

A. $Fe_2O_3 + 6HCl \rightarrow 2FeCl_3 + 3H_2O$ B. $NH_3 + H_2O + NaCl \rightarrow NH_4Cl + NaOH$

C. $SnCl_4 + Hg_2Cl_2 \rightarrow SnCl_2 + 2HgCl_2$ D. $2CuI + I_2 + 4K^+ \rightarrow 2Cu^{2+} + 4KI$

101. The substance capable of being drawn into fine wire is called

A. malleable B. tensile C. ductile D. mild

102. The idea that most of the mass of an atom is concentrated in a very small core, i.e., nucleus is given by

A. Amedo Avogadro B. Rutherford C. Bohr D. Henery Mosley

103. Which of the following does contain a co-ordinate covalent bond?

A. $N_2H_5^+$ B. $BaCl_2$ C. HCl D. H_2O

104. Which of the following contains both covalent and ionic bonds?

A. CCl_4 B. $CaCl_2$ C. NH_4Cl D. H_2O

105. Keeping in view the periodic law and the periodic table, suggest which of the following elements should have the maximum electronegative character?

A. Oxygen B. Nitrogen C. Fluorine D. Astatine

106. The electronic configuration of element atomic number 37 is

A. (2, 8) $3s^2 3p^6 3d^{10} 4s^2 4p^6 5s^1$ B. (2, 8) $3s^2 3p^6 3d^{10} 4s^2 5s^6 4p^5$

C. (2, 8) $3s^2 3p^6 4s^2 3d^9 5s^1 4p^5$ D. none of these

107. The pH of 0.1 M solution of a weak acid is 3. What is the value of ionisation constant for the acid?

A. 0.1 B. 10^{-3} C. 10^{-5} D. 10^{-7}

108. Pure Aniline is a

A. brown coloured liquid B. colourless liquid C. brown coloured solid D. colourless solid

109. Sulphide ores are generally concentrated by

A. roasting B. froth floatation C. reducing by carbon D. tempering

110. One mole of CO_2 contains

A. 6.02×10^{23} atoms of C B. 6.02×10^{23} atoms of O

C. 18.1×10^{23} molecules of CO_2 D. 3 gm atom of CO_2

111. The Avogadro Number or a mole represents

A. 6.02×10^{23} ions B. 6.02×10^{23} atoms C. 6.02×10^{23} molecules D. 6.02×10^{23} entities

112. What is the weight of one molecule of a monoatomic element X whose atomic weight is 36?

A. 6.0×10^{-23} gm B. 6.02×10^{23} gm C. 36×10^{23} gm D. 36×10^{-23} gm

113. When α -particles are set through a thin metal foil, most of them go straight through the foil because

A. α -particles are much heavier than electrons B. α -particles are positively charged

C. α -particles move with high velocity D. α -particles move with low velocity

114. The reaction, which proceeds in the forward direction, is

A. $Fe_2O_3 + 6HCl \rightarrow 2FeCl_3 + 3H_2O$ B. $NH_3 + H_2O + NaCl \rightarrow NH_4Cl + NaOH$

C. $SnCl_4 + Hg_2Cl_2 \rightarrow SnCl_2 + 2HgCl_2$ D. $2CuI + I_2 + 4K \rightarrow 2Cu^+ + 4KI$

115. The first order constant for the decomposition of N_2O_5 is 6.2×10^{-4} sec^{-1}. The half-life period for this decomposition in second is

A. 1117.7 B. 111.7 C. 223.4 D. 160.9

116. When the same amount of zinc is treated separately with excess of H_2SO_4 and excess of NaOH, the ratio of volumes of H_2 evolved is

A. 1 : 1 B. 1 : 2 C. 2 : 1 D. 9 : 4

117. Calcium does not combine directly with

A. oxygen B. nitrogen C. hydrogen D. carbon

118. Carbon differs from other elements of its sub-group due to

A. availability of d-orbitals for bonding B. its limitation to a co-ordination number four

C. its tendency to catenate D. its unique ability to form multiple bonds

119. Iodine reacts with cold dil. NaOH to give

A. $NaI + H_2O + O_2$ B. $NaI + NaIO + O_2$ C. $NaI + NaIO + H_2O$ D. $NaI + NaIO_3 + H_2O$

120. The number of isomers for the atomic compound of the formula C_7H_8O is

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

121. Which of the following is not true in linear programming problem?

A. A column in the simplex table that contains all of the variables in the solution is called pivot or key column.

B. A basic solution which is also in the feasible region is called a basic feasible solution.

C. A surplus variable is a variable subtracted from the left hand side of a greater than or equal to constraint to convert it into an equality.

D. A slack variable is a variable added to the

left hand side of a less than or equal to constraint to convert it into an equality.

122. The equation of the circle whose diameter lies on $2x + 3y = 3$ and $16x - y = 4$ and which passes through (4, 6) is

A. $x^2 + y^2 = 40$ B. $5(x^2 + y^2) - 4x - 8y = 200$

C. $x^2 + y^2 - 4x - 8y = 200$ D. $5(x^2 + y^2) - 3x - 8y = 200$

123. Let n(A) = 4 and n(B) = 5. The number of all possible injections from A to B is

A. 120 B. 9 C. 24 D. none

124. If $aN = \{ax : x \in N\}$ and $bN \cap cN = dN$, where $b, c \in N$ are relatively prime, then

A. c = bd B. b = cd C. d = bc D. none of the above

125. A square root of $3 + 4i$ is

A. $\sqrt{3} + i$ B. $2 - i$ C. $2 + i$ D. none of the above

126. Which of the following is not applicable for a complex number?

A. Inequality B. Division C. Subtraction D. Addition

127. | maximum amp (z) - minimum amp (z) | is equal to

A. $\sin^{-1}(3/5) - \cos^{-1}(3/5)$ B. $\pi/2 + \cos^{-1}(3/5)$

C. $\pi - 2\cos^{-1}(3/5)$ D. $\cos^{-1}(3/5)$

128. If e, e' be the eccentricities of two conics S and S' and if $e^2 + e'^2 = 3$, then both S and S' can be

A. hyperbolas B. ellipses C. parabolas D. none of the above

129. A stick of length 'l' rests against the floor and a wall of a room. If the stick begins to slide on the floor, then the locus of its middle point is

A. an ellipse B. a parabola C. a circle D. a straight line

130. The eccentricity of the ellipse which meets the straight line $x/y + y/2 = 1$ on the axis of x and the straight line $x/3 - y/5 = 1$ on the axis of y and whose axes lie along the axes of co-ordinates is

A. $2\sqrt{6}/7$ B. $3\sqrt{2}/7$ C. $\sqrt{6}/7$ D. none of the above

131. A and B are positive acute angles satisfying the equations $3\cos^2 A + 2\cos^2 B = 4$ and $3\sin A/\sin B = 2\cos B/\cos A$, then $A + 2B$ is equal to

A. $\pi/3$ B. $\pi/2$ C. $\pi/6$ D. $\pi/4$

132. At a point 15 metres away from the base of a 15 metres high house, the angle of elevation of the top is

A. 90^o B. 60^o C. 30^o D. 45^o

133. If $\tan(\pi \cos \theta) = \cot(\pi \sin \theta)$, $0 < \theta < 3\pi/4$, then $\sin(\theta + \pi/4)$ equals

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

134. In a triangle ABC, $\angle B = \pi/3$, $\angle B = \pi/4$, and D divides BC internally in the ratio1 : 3. Then $(\sin \angle BAD)/(\sin \angle CAD)$ equals

A. $\sqrt{2}/3$ B. $1/\sqrt{3}$ C. $1/\sqrt{6}$ D. $1/3$

135. The straight line $5x + 4y = 0$ passes through the point of intersection of the lines

A. $x + y - 2 = 0$, $3x + 4y - 7 = 0$ B. $x - y = 0$, $x + y = 0$

C. $x + 2y - 10 = 0$, $2x + y + 5 = 0$ D. none of the above

136. The number of common tangents of the circles $x^2 + y^2 - 2x - 1 = 0$ and $x^2 + y^2 - 2y - 7 = 0$ is

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

137. If the product of the roots of the equation $\alpha x^2 + 6x + \alpha^2 + 1 = 0$ is -2, then α equals

A. -2 B. -1 C. 2 D. 1

138. If the roots of $a_1x^2 + b_1x + c_1 = 0$ and $a_2x^2 + b_2x + c_2 = 0$ are same, then

A. $a_1/a_2 = b_1/b_2 = c_1/c_2$ B. $a_1 = b_1 = c_1$, $a_2 = b_2 = c_2$

C. $a_1 = a_2$, $b_1 = b_2$, $c_1 = c_2$ D. $c_1 = c_2$

139. The roots of the equation $(3 - x)^4 + (2 - x)^4 = (5 - 2x)^4$ are

A. two real and two imaginary B. all imaginary

C. all real D. none of the above

140. The value of $\sum_{x=1}^{10} (-1)^n$ is

A. 10 B. 0 C. 1 D. -1

141. If the 10th term of a G.P. is 9 and 4th term is 4, then its 7 th term is

A. 9/4 B. 4/9 C. 6 D. 36

142. $1 - 1/2 + 1/3 - 1/4 + \ldots\ldots$ to ∞ equals

A. log 2 B. e C. e^{-1} D. none of the above

143. $9/1! + 19/2! + 35/3! + 57/4! + 85/5! + \ldots\ldots =$

A. 16e -5 B. 7e - 3 C. 12e - 5 D. none of the above

144. How many different arrangements can be made out of the letters in the expansion $A^2B^3C^4$, when written in full?

A. 9!/(2! + 3! + 4!) B. 9!/(2! 3! 4!) C. 2! + 3! + 4! (2! 3! 4!) D. 2! 3! - 4!

145. The numbner of straight lines that can be drawn out of 10 points of which 7 are collinear is

A. 23 B. 21 C. 25 D. 24

146. 1/n! + 1/[2! (n - 2)!] + 1/[4! (n - 4)!] + ... is

A. $(2^{n-1})/n!$ B. $2^n/[(n + 1)!]$ C. $2^n/n!$ D. $2^{n-2}/[(n - 1)!]$

147. The term independent of x in $(x^2 - 1/x)^9$ is

A. 1 B. 49 C. -1 D. none of the above

148. The 9th term of an A.P. is 499 and 499th term is 9. The term which is equal to zero is

A. 501th B. 502th C. 500th D. none of the above

149. If $A = \begin{bmatrix} 3 & 4 \\ 2 & 4 \end{bmatrix}$, $B = \begin{bmatrix} -2 & -2 \\ 0 & -1 \end{bmatrix}$ then $(A + B)^{-1}$

A. is a skew symmetric matrix B. $A^{-1} + B^{-1}$

C. does not exist D. none of the above

150. If AB = A and BA = B, then B^2 is equal to

A. B B. A C. 1 D. 0

151. If the determinant $\begin{vmatrix} a & b & 2a\alpha + 3b \\ b & c & 2b\alpha + 3c \\ 2a\alpha + 3b & 2b\alpha + 3c & 0 \end{vmatrix} = 0$, then

A. a, b, c are in H.P.

B. α is a root of $4ax^2 + 12bx + 9c = 0$ or a, b, c are in G.P.

C. a, b, c are in G.P. only

a, b, c are in A.P.

152. The value of K so that (x - 1)/-3 = (y - 2)/2K = (z - 3)/2 and (x - 1)/3K = (y - 1)/1 = (z - 6)/-5 may be perpendicular is given by

A. -7/10 B. -10/7 C. -10 D. 10/7

153. The equation of the plane containing the line $\vec{r} = \vec{i} + \vec{j} + \lambda(2\vec{i} + \vec{i} + 4\vec{k})$ is

A. $\vec{r} \cdot (-\vec{i} - 2\vec{j} + \vec{k}) = 0$

B. $\vec{r} \cdot (\vec{i} + 2\vec{j} - \vec{k}) = 0$

C. $\vec{r} \cdot (\vec{i} + 2\vec{j} - \vec{k}) = 3$

D. none of the above

154. The mean of discrete observations $y_1, y_2, \ldots\ldots y_n$ is given by

A. $\dfrac{\sum_{i=1}^{n} y_i f_i}{\sum_{i=1}^{n} f_i}$

B. $\dfrac{\sum_{i=1}^{n} y_i f_i}{n}$

C. $\dfrac{\sum_{i=1}^{n} y_i}{\sum_{i=1}^{n} i}$

B. $\dfrac{\sum_{i=1}^{n} y_i}{n}$

155. For a poisson distribution whose mean is λ, the standard deviation will be

A. λ^2 B. $1/\lambda$ C. $\sqrt{\lambda}$ D. λ

156. If a, b, c, d are constants such that a and c are both negative and r is the correlation coefficient between x and y, then the correlation coefficient between (ax + b) and (cy + d) is equal to

A. (a/c)r B. c/a C. - r D. r

157. A person draws a card from a pack of 52 playing cards, replaces it and shuffles the pack. He continues doing this until he draws a spade, the chance that he will fail in the first two draws is

A. 1/16 B. 9/16 C. 9/64 D. 1/64

158. In tossing 10 coins, the probability of getting exactly 5 heads is

A. 193/256 B. 9/128 C. 1/2 D. 63/256

159. Four tickets marked 00, 01, 10, 11 respectively are placed in a bag. A ticket is drawn at random five times, being replaced each time, the probability that the sum of the numbers on tickets thus drawn is 23, is

A. 100/256 B. 231/256 C. 25/256 D. none of the above

160.The value of $\int_0^{\pi/4} \tan^2 x \, dx$ is equal to

A. $\pi/4$ B. $1 + (\pi/4)$ C. $1 - (\pi/4)$ D. none of the above

161. Let $f[x + (1/x)] = [x^2 + (1/x^2)](x \neq 0)$, then f(x) is equal to

A. $x^2 - 1$ B. $x^2 - 2$ C. x^2 D. none of the above

162. Let $f(x) = [\tan(\pi/4 - x)]/\cot 2x$, $x \neq \pi/4$. The value which should be assigned to f at $x = \pi/4$, so that it is continous everywhere is

A. 1 B. 1/2 C. 2 D. none of the above

163. If $f_1(x)$ and $f_2(x)$ are defined on domains D_1 and D_2 respectively, then domain of $f_1(x) + f_2(x)$ is

A. $D_1 \cap D_2$ B. $D_1 \cup D_2$ C. $D_1 - D_2$ D. $D_2 - D_1$

164. The derivative of $\sin x^3$ with respect to $\cos x^3$ is equal to

A. $- \tan x^3$ B. $- \cot x^3$ C. $\cot x^3$ D. $\tan x^3$

165. If y = f(x) is an odd differentiable function defined on (∞, ∞) such that f'(3) = -2, then f'(-3) equals

A. 4 B. 2 C. -2 D. 0

166. The line (x/a) + (y/b) = 1 touches the curve $y = be^{-x/a}$ at the point

A. (a, ba) B. (a, a/b) C. (a, b/a) D. none of the above

167. The least value of 'a' for which the equation $(4/\sin x) + [1/(1 - \sin x)] = a$ has atleast one solution on the interval $(0, \pi/2)$ is

A. 4 B. 1 C. 9 D. 8

168. The area bounded by the curve $y^2 = 8x$ and $x^2 = 8y$ is

A. 32/7 B. 24/5 C. 72/3 D. 64/3

169. The integrating factor of the differential equation $[(dy/dx)(x \log x)] + y = 2 \log x$ is given by

A. log (log x) B. e^x C. log x D. x

170. If $y = \tan^{-1}[(\sin x + \cos x)/(\cos x - \sin x)]$, then dy/dx is equal to

A. 1/2 B. 0 C. 1 D. none of the above

171. The length of tangent from (5, 1) to the circle $x^2 + y^2 + 6x - 4y - 3 = 0$ is

A. 81 B. 29 C. 7 D. 21

172. The equation of the straight line which is perpendicular to y = x and passes through (3, 2) will be given by

A. x - y = 5 B. x + y = 5 C. x + y = 1 D. x - y = 1

173. If the imaginary part of (2z + 1)/(iz + 1) is - 2, then the locus of the point representing z in the complex plane is

A. a circle B. a straight line C. a parabola D. none of the above

174. The sum of 40 terms of an A.P. whose first term is 2 and common difference 4, will be

A. 3200 B. 1600 C. 200 D. 2800

175. If a, b, c are in A.P., then a/bc, 1/c, 2/b are in

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

176. The term independent of x in $[x^2 + (1/x^2)]$ is

A. 1 B. -1 C. 48 D. none of the above

177. The equation of a line through (2, -3) parallel to y-axis is

A. y = -3 B. y = 2 C. x = 2 D. x = -3

178. The value of $\int_{-2}^{2} (ax^3 + bx + c)\,dx$ depends on

A. the value of b B. the value of c C. the value of a D. the value of a and b

179. The range of the function $f(x) = (1 + x^2)/x^2$ is equal to

A. [0, 1] B. [1, 0] C. (1, ∞) D. [2, ∞]

180. Two vectors are said to be equal if

A. their magnitudes are same

B. direction is same

C. they meet at the same point

D. they have magnitude and same sense of direction