1. Asprin is an acetylation product of
(1) o-hydroxybenzoic acid (2) o-dihydroxybenzene
(3) m-hydroxybenzoic acid (4) p-dihydroxybenzoic

2. The number of molecules of ATP produced in the lipid metabolism of a molecule of palmitic acid is
(1) 130 (2) 36 (3) 56 (4) 86

3. In DNA, the complementary bases are
(1) uracil and adenine; cytosine and guanine
(2) adenine and thymine; guanine and cytosine
(3) adenine and thymine; guanine and uracil
(4) adenine and guanine; thymine and cytosine

4. Which of the following elements constitutes a major impurity in pig iron ?
(1) Silicon (2) Oxygen
(3) Sulphur (4) Graphite

5. Repeated use of which of the following fertilizers would increase the acidity of the soil ?
(1) Urea (2) Potassium Nitrate
(3) Ammonium Sulphate (4) Superphosphate of lime

6. Phenylmethanol can be prepared by reducing the benzaldehyde with
(1) CH_3Br (2) Zn and HCL (3) CH_3Br and Na (4) CH_3I and Mg

7. In the commercial gasoline, the type of hydrocarbons which are more desirable is
(1) branched hydrocarbon (2) straight-chain hydrocarbon
(3) linear unsaturated hydrocarbon (4) toluene

8. The compound obtained by heating a mixture of ethylamine and chloroform with ethanolic potassium hydroxide (KOH) is
(1) an ethyl isocyanide (2) an alkyl halide
(3) an amine (4) an amide and nitro compound

9. In graphite, electrons are
(1) localized on every third C-atom (2) present in anti-bonding orbital
(3) localized on each C-atom (4) spread out between the structure

10. Alkyl halide is converted into an alcohol by
(1) addition (2) substitution
(3) elimination (4) dehydrohalogenation

11. The electronic configuration of transition elements is exhibited by
(1) $ns^2(n-1)\,d^{1-10}$ (2) $ns^2(n-1)d^{10}$
(3) ns^1 (4) ns^2np^5

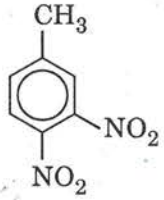
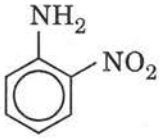
12. The given reaction $2\,FeCl_3 + SnCl_2 \rightarrow 2\,FeCl_2 + SnCl_4$ is an example of
(1) first order reaction (2) second order reaction
(3) third order reaction (4) None of these

13. Which of the following is not a Lewis acid ?
(1) BF_3 (2) $FeCl_3$ (3) SiF_4 (4) C_2H_4

14. Aldol condensation will not take place in
(1) HCHO (2) CH_3CH_2CHO
(3) CH_3CHO (4) CH_3COCH_3

15. Which of the following compound gives benzoic acid on hydrolysis ?
(1) Chlorophenol (2) Chlorotoluene
(3) Chlorobenzene (4) Benzoyl Chloride

16. Which of the following has zero dipole moment ?
(1) *cis* 2-butene (2) *trans* 2-butene
(3) I-butene (4) 2-methyl, I-propene

17. An aniline on nitration gives
(1) 
(2) 
(3) 
(4) Both (2) and (3)

18. The number of moles of oxygen in one litre of air containing 21% oxygen by volume, in standard conditions, is
(1) 0.186 mole (2) 0.21 mole
(3) 0.0093 mole (4) 2.10 moles

19. The concentration units, independent of temperature, would be
(1) molality (2) molarity
(3) normality (4) weight volume percent

20. Half-life of radioactive ^{14}C is 5760 years. In how many years 200 mg of ^{14}C will be reduced to 25 mg ?
(1) 5760 years (2) 11520 years
(3) 17280 years (4) 23040 years

21. The coordination number and oxidation state number of Cr in $K_3Cr(C_2O_4)_3$ are respectively
(1) 6 and +3 (2) 4 and +2 (3) 3 and +3 (4) 3 and 0

22. The alkene $R - CH = CH_2$ reacts readily with B_2H_6 and the product on oxidation with alkaline hydrogen peroxides produces
(1) $R - CH_2 - CHO$ (2) $R - CH_2 - CH_2 - OH$
(3) $R - \underset{\displaystyle CH_3}{\overset{\displaystyle |}{C}} = O$ (4) $R - \underset{\displaystyle OH}{\overset{\displaystyle |}{CH}} - \underset{\displaystyle OH}{\overset{\displaystyle |}{CH_2}}$

23. Which of the following ions can cause coagulation of proteins ?
(1) Ag^+ (2) K^{++} (3) Mg^{++} (4) Ni^{++}

24. The explosive nitro-glycerine is
(1) a complex compound (2) a nitro hydrocarbon
(3) an ester (4) an ether

25. The manufacture of nylon-66 involves condensation or co-polymerisation of
(1) hexa methylene diamine and adipic acid
(2) ethylene glycol and phthalic acid
(3) urea and formaldehyde
(4) None of these

26. Which of the following sets of elements has the strongest tendency to form anions ?
(1) N, O, F (2) Na, K, Rb
(3) Cu, Ag, Au (4) Pb, Bi, Po

27. In the formation of BeF_2, Beryllium makes use of
(1) sp^3 orbitals (2) 2s and 2p orbitals
(3) dsp^2 hybrid orbital (4) sp hybrid orbitals

28. The Cannizzaro reaction is not given by
(1) trimethyl acetaldehyde (2) acetaldehyde
(3) formaldehyde (4) benzaldehyde

29. The lowest ionization potential in a periodic table is shown by
(1) representative elements (2) lanthanides
(3) noble gases (4) alkali metals

30. Hydration of butyne-1 in presence of H_2SO_4 and $HgSO_4$ yields
(1) $CH_3 - CHO$ (2) $CH_3 - COC_2H_5$
(3) $C_2H_5 - CO - C_2H_5$ (4) $C_2H_5 - CO - CH_3$

31. The atomic number of an element is related to
(1) the number of electrons in the nucleus of the atom.
(2) units of positive charge on the nucleus of the atom.
(3) the number of nucleons.
(4) its atomic weight.

32. The IUPAC name of the compound represented by the formula $(CH_3)_2\ CHCH_2 - CH_2 = CH_2$ is
(1) isopentene (2) 4-methyl pentene-1
(3) 2-methyl pentene-4 (4) 4, 4-dimethyl butane-1

33. C – C bond length is shortest in
(1) methane (2) benzene (3) acetylene (4) ethylene

34. Order of relative acidic strengths of ethane, ethene and ethyne is
(1) ethane > ethyne > ethene (2) ethyne > ethane > ethene
(3) ethene > ethane > ethyne (4) ethyne > ethene > ethane

35. The reaction $C_6H_5N_2Cl \xrightarrow{CU_2Br_2/HBr} C_6H_5Br + N_2 + HCl$ is called

(1) Sandmeyer's reaction

(2) Wurtz Fittig reaction

(3) Perkin's reaction

(4) Ethard reaction

36. The product 'C' in the following series $CH3 - CH = CH2 \xrightarrow{HBr} A \xrightarrow{KCN} B \xrightarrow{H_2O} C$ is

(1) $CH_3 . CH_2CONH_2$

(2) $CH_3 . CH_2CH_2COOH$

(3) $(CH_3)_2CHCOOH$

(4) $CH_3CH_2CH_2CONH_2$

37. Gases cannot be liquefied above their

(1) inversion temperature (2) critical temperature

(3) boiling point (4) None of these

38. Enthalpy of compound under standard condition is equal to its

(1) enthalpy of formation (2) enthalpy of combustion

(3) enthalpy of sublimation (4) enthalpy of solution

39. The most important source of helium is

(1) ozone layer (2) natural gas (3) minerals (4) radon

40. The best method to establish the purity of an organic solid is to determine its

(1) mixed melting point (2) melting point

(3) colour (4) None of these

41. Acetaldehyde when treated with ethyl alcohol in the presence of dilute HCl gives

(1) formaldehyde (2) crotonaldehyde

(3) pronanal (4) acetal

42. Fehling's solution is an alkaline solution of

(1) Cu^+ ions in the presence of tartrate ions

(2) Cu^+ ions in the presence of citrate ions

(3) Cu^{++} ions in the presence of citrate ions

(4) Cu^{++} ions in the presence of tartrate ions

43. Heisenberg test can be used to distinguish between

(1) primary amines, secondary amines and tertiary amines

(2) primary amines and secondary amines

(3) primary amines and tertiary amines

(4) All these

44. Grignard reagent does not react with

(1) tertiary amine (2) secondary amine

(3) primary amine (4) All these

45. The amount of gas dissolving in a given volume of the liquid decreases when

(1) temperature and pressure both are decreased

(2) temperature and pressure both are increased

(3) temperature is increased

(4) pressure is decreased

46. The osmotic pressure of a solution of benzoic acid in benzene is found to be half the expected value. This is due to

(1) association of benzoic acid molecules forming dimers

(2) wrong method of measurement of osmotic pressure

(3) limitation of the theory of osmotic pressure

(4) ionization of benzoic acid

47. The protective power of lyophilic colloid is

(1) determined by the size of the colloidal particles

(2) dependent on quantity of charge passed

(3) measured by nature of colloidal sol

(4) expressed by gold number

48. 2-butene on heating with alkaline $KMnO_4$ gives

(1) acetone (2) acetic acid

(3) acetaldehyde (4) propanol

49. The rate constant of a reaction depends on the

(1) temperature (2) pressure

(3) concentration (4) time

50. The quality of gasoline sample is determined by its

(1) iodine value (2) cetane number

(3) octane number (4) mass density

51. The cause of the potential barrier in a p-n junction diode is
(1) depletion of positive charges near the junction
(2) concentration of positive charges near the junction
(3) depletion of negative charges near the junction
(4) concentration of positive and negative charges near the junction

52. Light of wavelength 5000 Å falls on a sensitive plate with photoelectric work function of 1·9 eV. The kinetic energy of the photo-electron emitted will be
(1) 0·58 eV (2) 2·48 eV (3) 1·24 eV (4) 1·16 eV

53. A ball of mass 0·25 kg attached to the end of a string of length 1·96 m is moving in a horizontal circle. The string will break, if the tension is more than 25 N. What is the maximum speed with which the ball can be moved ?
(1) 3 m/s (2) 5 m/s (3) 9·8 m/s (4) 14 m/s

54. The time of flight of a projectile on an upward inclined plane depends upon
(1) angle of projection (2) angle of inclination of the plane
(3) air resistance (4) Both (1) and (2)

55. If a ladder is not in equilibrium against a smooth vertical wall, then it can be made in equilibrium by
(1) increasing the angle of inclination (2) decreasing the angle of inclination
(3) increasing the length of the ladder (4) decreasing the length of the ladder

56. In an isothermal change of an ideal gas, $\Delta U = 0$. The change in heat energy ΔQ is equal to
(1) 0·5 W (2) 2 W (3) 1·5 W (4) None of these

57. For protecting sensitive equipment from the external magnetic field, it should be
(1) placed inside an aluminium can (2) placed inside an iron can
(3) wrapped with insulation (4) surrounded with a fine copper sheet

58. A 5°C rise in temperature is observed in a conductor by passing the current. When the current is doubled, the rise in temperature will be approximately
(1) 5°C (2) 10°C (3) 20°C (4) 40°C

59. A hollow insulated conduction sphere is given a positive charge of 10μ C. What will be the electric field at the centre of the sphere, if its radius is 2 metres ?
(1) Zero (2) $5\mu\ Cm^{-2}$ (3) $20\mu\ Cm^{-2}$ (4) $32\mu\ Cm^{-2}$

60. A transverse wave is represented by the equation : $y = y_0 \sin \frac{2\pi}{\lambda} (vt - x)$. For what value of λ is the particle velocity equal to two times the wave velocity ?
(1) $\lambda = 2\pi y_0$ (2) $\lambda = \frac{\pi y_0}{3}$ (3) $\lambda = \frac{\pi y_0}{2}$ (4) $\lambda = \pi y_0$

61. The physical quantity whose dimensional formula is different from others is
(1) weight (2) force (3) thrust (4) electromotive force

62. If two bulbs, whose resistances are in the ratio of 1 : 2 are connected in series, the power dissipated in them has the ratio of
(1) 1 : 1 (2) 1 : 2 (3) 2 : 1 (4) 1 : 4

63. Which of the following statements is correct ?
(1) The current in photocell increases with increasing frequency
(2) The photocurrent is proportional to the applied voltage
(3) The photocurrent increases with intensity of light
(4) The stopping potential increases with increase of incident light

64. The centre of mass of system of particles does not depends on
(1) masses of the particles
(2) forces on the particles
(3) position of the particles
(4) relative distances between the particles

65. A ball whose kinetic energy is E is thrown at an angle of 45° with the horizontal. Its K.E. at the highest point of its flight will be
(1) E (2) $\frac{E}{2}$ (3) $\frac{E}{\sqrt{2}}$ (4) 0

66. Due to earth's magnetic field, the charged cosmic rays particles
(1) require greater kinetic energy to reach the equator than pole
(2) require less kinetic energy to reach the equator than pole
(3) can never reach the pole
(4) can never reach the equator

67. A sample of gas expands from volume V_1 to V_2. The amount of work done by gas is the greatest, when the expansion is
(1) isothermal (2) isobaric (3) adiabatic (4) equal in all cases

68. Which of the following dimensions will be the same as that of time ?
(1) LC (2) $\frac{R}{L}$ (3) $\frac{L}{R}$ (4) $\frac{C}{L}$

69. An equation is given $\left(P + \frac{a}{V^2}\right) = b\frac{\theta}{V}$, where P = Pressure, V = Volume and θ = Absolute temperature. If a and b are constants, the dimensions of 'a' will be
(1) $M L^5 T^{-2}$ (2) $M^{-1} L^5 T^2$ (3) $M L^{-5} T^{-1}$ (4) $M L^5 T^1$

70. The dimensions of impulse are equal to that of
(1) force (2) angular momentum
(3) pressure (4) linear momentum

71. An electron of mass m and charge e is accelerated from rest though a potential difference V in vacuum. Its final velocity will be
(1) $\frac{eV}{2m}$ (2) $\frac{eV}{m}$ (3) $\sqrt{\frac{2eV}{m}}$ (4) $\sqrt{\frac{eV}{m}}$

72. The refractive index of water is 1·33 N. What will be the speed of light in water ?
(1) 3×10^8 m/s (2) $2{\cdot}25 \times 10^8$ m/s (3) 4×10^8 m/s (4) $1{\cdot}33 \times 10^8$ m/s

73. Which of the following is a dimensional constant ?
(1) Refractive index (2) Poisons ratio
(3) Relative density (4) Gravitational constant

74. A 4 μF capacitor is charged to 400 V. If its plates are joined through a resistance of 2 kΩ, then heat produced in the resistance is

(1) 0·16 J (2) 0·32 J (3) 0·64 J (4) 12·8 J

75. In a simple harmonic motion, when the displacement is one-half the amplitude, what fraction of the total energy is kinetic ?

(1) Zero (2) 1/4 (3) 1/2 (4) 3/4

76. An oscillator is nothing but an amplifier with

(1) voltage gain
(2) no feedback
(3) positive feedback
(4) negative feedback

77. For measuring temperatures in the range of 200° to 2500°C, we should employ

(1) barometer
(2) pyrometer
(3) gas thermometer
(4) platinum-rhodium thermometer

78. If we consider electrons and photons of same wavelength, then they will have same

(1) energy
(2) velocity
(3) momentum
(4) angular momentum

79. In good conductors of electricity, the type of bonding that exist is

(1) ionic (2) covalent (3) metallic (4) Van der Waals

80. One watt hour equals

(1) one horse power
(2) $3{\cdot}6 \times 10^3$ joules
(3) $3{\cdot}6 \times 10^3$ calories
(4) 4·2 joules

81. If a particle moves in a circle, describing equal angles in equal times, its velocity vector

(1) changes in direction
(2) remains always constant
(3) changes both in magnitude and direction
(4) neither changes in magnitude nor in direction

82. If the distance between two masses is doubled, the gravitational attraction between them

(1) becomes double
(2) is reduced to 1/4
(3) is reduced to half
(4) gets four-times

83. Ball pen functions on the principle of

(1) Stoke's law
(2) Pascal's law
(3) Capillary action
(4) Gravitational force

84. Which of the following is a vector quantity ?

(1) Power
(2) Electrostatic potential
(3) Work
(4) Momentum

85. One atmospheric pressure is equal to

(1) 10^5 dynes/cm^2 (2) One pascal (3) 10^6 N/m (4) One bar

86. On heating a liquid of coefficient of cubical expansion γ in a container having a coefficient of linear expansion $\frac{\gamma}{3}$, the level of liquid in the container will

(1) fall
(2) rise
(3) it is difficult to say
(4) remain almost stationary

87. The slopes of isothermal and adiabatic curves are related as

(1) Isothermal curve slope = $\gamma \times$ Adiabatic curve slope
(2) Isothermal curve slope = Adiabatic curve slope.
(3) Adiabatic curve slope = $\gamma \times$ Isothermal curve slope
(4) Adiabatic curve slope = $\frac{1}{2} \times$ Isothermal curve slope

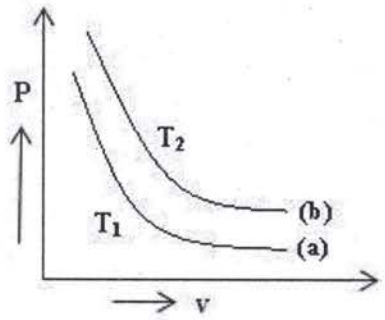
88. Coefficient of thermal conductivity depends upon

(1) temperature difference between the two sides
(2) thickness of the metal plate
(3) area of the plate
(4) All these

89. Two bodies have their thermal capacities in the ratio 1 : 4. It is found that rates of temperature are the same. Then their rates of loss of heat must be in the ratio

(1) 1 : 1 (2) 1 : 4 (3) 4 : 1 (4) 1 : 3

90. For a certain mass of gas the isothermal relations between p and v are shown by graphs (a) and (b) at the kelvin temperatures T_1 and T_2 respectively. Then



(1) $T_1 < T_2$
(2) $T_1 > T_2$
(3) $T_1 = T_2$
(4) None of these

91. In Carnot's heat engine, the total work done during the adiabatic processes is

(1) zero
(2) infinite
(3) dependent on sink temperature
(4) more than that in case of isothermal

92. The main feature of the photoelectric effect is that

(1) electrons are emitted by the heating of metals with ultraviolet rays
(2) photographic images are formed under action of light
(3) electrons are ejected when light falls on some metals
(4) metals become conducting under the action of light

93. A liquid will present a concave surface if the adhesion with the container is
(1) less than cohesion among its molecules
(2) equal to cohesion among its molecules
(3) greater than cohesion among its molecules
(4) None of these

94. Glycerin is more viscous than water and this can be ascertained from the fact that
(1) glycerin more readily sticks to the body than water.
(2) glycerin is heavier than water.
(3) a body falls through glycerin is slower than in water.
(4) a body loses more weight in glycerin than water.

95. Two charged spheres of radii 10 cm and 15 cm are connected by a thin wire. No current will flow if they have the same
(1) field on their surfaces.
(2) charge on each.
(3) potential.
(4) force.

96. In a charged capacitor, the energy is stored in
(1) the positive charges
(2) both the positive and negative charges
(3) around the edges of the capacitor
(4) the field between the plates

97. Kirchhoff's first law is related to
(1) Faraday's second law of electrolysis
(2) Law of conservation of momentum
(3) Law of conservation of energy
(4) Lenz's law

98. In a sinusoidal wave, the time required for a particular point to move from maximum displacement to zero displacement is 0·17 sec. The frequency of the wave is
(1) 1·47 Hz (2) 0·36 Hz (3) 0·73 Hz (4) 2·94 Hz

99. Heat is flowing through two cylindrical rods of same material. The diameters of the rods are in the ratio 1 : 2 and the lengths in the ratio 2 : 1. If the temperature difference between the ends is same, then ratio of the rate of flow of heat through them will be
(1) 1 : 1 (2) 1 : 8 (3) 2 : 1 (4) 8 : 1

100. Intensity of magnetization is equal to
(1) 4 times the permeability of the magnetic material
(2) the magnetic moment per unit volume
(3) the pole strength per unit volume
(4) the magnetic induction

101. From the top of a light house 60 metres high with its base at the sea-level, the angle of depression of a boat is 150°. The distance of the boat from the foot of the light house is

(1) $\left(\frac{\sqrt{3-1}}{\sqrt{3+1}}\right)60$ m (2) $\left(\frac{\sqrt{3-1}}{\sqrt{3+1}}\right)$m

(3) $\left(\frac{\sqrt{3+1}}{\sqrt{3-1}}\right)$m (4) $\left(\frac{\sqrt{3+1}}{\sqrt{3-1}}\right)$ 60 m

102. If $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \pi$, then the value of $x + y + z$ is

(1) 2xyz (2) 3xyz

(3) 4xyz (4) None of these

103. If $\begin{vmatrix} 6i & -3i & 1 \\ 4 & 3i & -1 \\ 20 & 3 & i \end{vmatrix} = x + iy$, then

(1) $x = 3, y = 1$ (2) $x = 1, y = 3$

(3) $x = 0, y = 3$ (4) $x = 0, y = 0$

104. The function $f(x) = (x^2 - 1)\left|x^2 - 3x + 2\right| + \cos(|x|)$ is not differentiable at

(1) -1 (2) 0 (3) 1 (4) 2

105. The shortest distance of (0, c) from the parabola $y = x^2$, $0 \le c \le 5$ is

(1) $\sqrt{4c+1}$ (2) $\sqrt{\frac{4c+1}{2}}$ (3) $\sqrt{\frac{4c-1}{2}}$ (4) None of these

106. The area of the figure bounded by the curves $y = |x - 1|$ and $y = 3 - |x|$ is

(1) 2 (2) 3 (3) 4 (4) 1

107. The number of vectors of unit length perpendicular to vectors $\vec{a}$ (1, 1, 0) and $\vec{b}$ (0, 1, 1) is

(1) 1 (2) 2 (3) 3 (4) infinite

108. $f(x) = \begin{cases} x^2 \sin\frac{1}{x}; x \neq 0 \\ 0; x = 0 \end{cases}$, then

(1) f and f′ are continuous at $x = 0$

(2) f is derivable at $x = 0$

(3) f is derivable at $x = 0$ and f′ is not continuous at $x = 0$

(4) f′is derivable at $x = 0$

109. A circle of radius unity is inscribed in an isosceles triangle. The least perimeter of the triangle is

(1) $2\sqrt{3}$ (2) $3\sqrt{3}$ (3) $6\sqrt{3}$ (4) 9

110. The number of ways of selecting 10 balls out of an unlimited number of white, red, blue and green balls is

(1) 270 (2) 84 (3) 286 (4) 86

111. If two unequal parabolas are having the same focus and axis in opposite directions, then the angle between them at their common point is

(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{6}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{2}$

112. If $f(x) = \left(\frac{x}{2+x}\right)^{2x}$, then $\lim_{x\to\infty} f(x)$ equals

(1) e^{-6} (2) 2 (3) e^{-4} (4) $\frac{1}{9}$

113. The curve $y - e^{xy} + x = 0$ has a vertical tangent at the point

(1) (1, 1) (2) at no point (3) (0, 1) (4) (1, 0)

114. ABCD is a square plot. The angle of elevation of the top of a pole standing at D from A or C is 30° and that from B is θ, then $\tan\theta$ is equal to

(1) $\sqrt{6}$ (2) $\frac{1}{\sqrt{6}}$ (3) $\frac{\sqrt{3}}{2}$ (4) $\frac{\sqrt{2}}{3}$

115. If $\alpha + \beta = 3$ and $\alpha^3 + \beta^3 = 27$, then α, β are the roots of

(1) $3x^2 + 9x + 7 = 0$ (2) $9x^2 - 27x + 20 = 0$

(3) $2x^2 - 6x + 15 = 0$ (4) None of these

116. If P(1, 0), Q(– 1, 0) and R(2, 0) are three given points, then the locus of point S satisfying the relation $SQ^2 + SR^2 = 2SP^2$ is

(1) a straight line parallel to x-axis

(2) a circle through origin

(3) a circle with centre at the origin

(4) a straight line parallel to y-axis

117. If $\vec{d} = \vec{a} \times (\vec{b} \times \vec{c}) + \vec{b} \times (\vec{c} \times \vec{a}) + \vec{c} \times (\vec{a} \times \vec{b})$, then

(1) $\vec{d}$ is a unit vector (2) $\vec{d} = \vec{a} + \vec{b} + \vec{c}$

(3) $\vec{d} = \vec{0}$ (4) $\vec{a}, \vec{b}, \vec{c}, \vec{d}$ are coplanar

118. If the sum of the distances of a point from two perpendicular lines in a plane is 1, then its locus is

(1) square (2) circle

(3) straight line (4) two intersecting lines

119. Value of $\int_{1/e}^{\tan x} \frac{t}{1+t^2}\,dt + \int_{1/e}^{\cot x} \frac{dt}{t(1+t^2)}$ is

(1) $\frac{1}{2}$ (2) 1 (3) $\frac{\pi}{4}$ (4) None of these

120. The vector $\vec{a} = x\hat{i} - 2\hat{j} + 5\hat{k}$ and $\vec{b} = \hat{i} + y\hat{j} - z\hat{k}$ are collinear if

(1) $x = 1, y = -2, z = -5$ (2) $x = \frac{1}{2}, y = -4, z = -10$

(3) $x = -\frac{1}{2}, y = 4, z = 10$ (4) $x = -1, y = 2, z = 5$

121. The image of the interval $[-1, 3]$ under the mapping $f(x) = 4x^3 - 12x$ is

(1) $[-2, 0]$ (2) $[-8, 72]$ (3) $[-8, 0]$ (4) None of these

122. If $\int f(x)\,dx = f(x)$, then $\int [f(x)]^2\,dx$ is equal to

(1) $\frac{1}{2}[f(x)]^2$ (2) $[f(x)]^3$ (3) $\frac{[f(x)]^3}{3}$ (4) $[f(x)]^2$

123. Let $f : R \to R$ be a differentiable function and $f(1) = 4$. Then the value of $\lim_{x\to 1} \int_4^{f(x)} \frac{2t}{x-1}\,dt$ is

(1) $8f'(1)$ (2) $4f'(1)$ (3) $2f'(1)$ (4) $f'(1)$

124. If $\cos 5A = a\cos A + b\cos^3 A + c\cos^5 A + d$, then

(1) $a = 20$ (2) $b = -20$ (3) $c = 18$ (4) $b = 15$

125. The number of all possible selections of one or more questions from 8 given questions, each question having an alternative is

(1) $2^8 - 1$ (2) $3^8 - 1$ (3) $4^8 - 1$ (4) None of these

126. If $\lim_{x\to 0} \phi(x) = a^3$, $a \neq 0$, then $\lim_{x\to 0} \phi\left(\frac{x}{a}\right)$ is

(1) a^2 (2) $\frac{1}{a^3}$ (3) $\frac{1}{a^2}$ (4) a^3

127. Let $f : R \to R$ be any function. Define $g : R \to R$ by $g(x) = |f(x)|$ for all x. Then g is

(1) onto if f is one-one (2) one-one if f is one-one

(3) continuous if f is continuous (4) differentiable if f is differentiable

128. For a triangle ABC, which of the following is true ?

(1) $\frac{\cos A}{a} = \frac{\cos B}{b} = \frac{\cos C}{c}$

(2) $\frac{\cos A}{a} + \frac{\cos B}{b} + \frac{\cos C}{c} = \frac{a^2 + b^2 + c^2}{2abc}$

(3) $\frac{\sin A}{a} + \frac{\sin B}{b} + \frac{\sin C}{c} = \frac{3}{R}$

(4) $\sin 2A/a^2 = \frac{\sin 2B}{b^2} + \frac{\sin 2C}{c^2}$

129. Area of the region bounded by $y^2 = 2x + 1$ and $x - y - 1 = 0$ is

(1) $\frac{2}{3}$ (2) $\frac{4}{3}$ (3) $\frac{8}{3}$ (4) None of these

130. The line which is parallel to x-axis and crosses the curve $y = \sqrt{x}$ at an angle of 45° is

(1) $x = \frac{1}{4}$ (2) $y = \frac{1}{4}$ (3) $y = \frac{1}{2}$ (4) $y = 1$

131. In a certain primary school, there are 60 boys of age 12 years, 40 of age 13 years, 50 of age 14 years and 50 of age 15 years. The average age in years of the boys of the school is

(1) 13·50 (2) 13 (3) 13·45 (4) 14

132. A bag contains coins of denominations one rupee, fifty paise and twenty five paise. The values of the coins of the three denominations are in the proportion of 2 : 3 : 4. If the total number of coins are 480 what is total amount of money in rupees ?

(1) 180 (2) 120 (3) 190 (4) 170

133. A boy goes to school at a speed of 3 km/h and returns to the village at a speed of 2 km/h. If he takes 5 h in all, what is the distance between the village and the school ?

(1) 5 km (2) 15 km (3) 8 km (4) 6 km

134. In a stream flowing at 2 km/h, a motorboat goes 10 km upstream and back again to the starting point in 55 minutes. What is the speed of the motorboat in still water ?

(1) 22 km/h (2) 15 km/h (3) 20 km/h (4) None of these

135. 8 children and 12 men complete a certain piece of work in 9 days. Each child takes twice the time by a man to finish the work. In how many days will 12 men finish the same work ?

(1) 8 (2) 9 (3) 12 (4) 15

136. The rate of interest for the first 2 years is 3% per annum, for the next 3 years is 8% per annum and for the period beyond 5 years 10% per annum. If a man gets ₹ 1520 as simple interest for 6 years, how much money did he deposit ?

(1) ₹ 3800 (2) ₹ 1500 (3) ₹ 1356 (4) ₹ 1920

137. A car travels a distance of 170 km in 2 hours partly at a speed of 100 km/h and partly at 50 km/h. What is the distance travelled at a speed of 100 km/h ?

(1) 140 km (2) 125 km (3) 230 km (4) 620 km

138. The ratio between the speeds of Ram and Shyam is 6 : 7. If Ram takes 30 minutes more than Shyam to cover a certain distance, then what is the actual time taken by Shyam ?

(1) 3 hours (2) 5 hours (3) 4 hours (4) 7 hours

139. A plot of land is in the shape of right angled isosceles triangle. The length of hypotenuse is $50\sqrt{2}$ m. The cost of fencing is ₹ 3 per metre. The cost of fencing the plot will be

(1) less than ₹ 300

(2) more than ₹ 300, but less than ₹ 400

(3) more than ₹ 500, but less than ₹ 600

(4) more than ₹ 600

140. Perimeter of a square and an equilateral triangle is equal. If the diagonal of the square is $12\sqrt{2}$ cm, then what is the area of the equilateral triangle ?

(1) $64\sqrt{3}$ sq cm (2) $54\sqrt{3}$ sq cm

(3) $65\sqrt{3}$ sq cm (4) $41\sqrt{3}$ sq cm

141. A room 15 m long requires 7500 tiles, each 15 cm by 12 cm, to cover the entire floor. What is the breadth of the room ?

(1) 10 m (2) 14 m (3) 6 m (4) 9 m

142. Annual income of A and B is in the ratio of 5 : 4 and their annual expenses bear a ratio of 4 : 3. If each of them saves ₹ 500 at the end of the year, then what is their annual income ?

(1) ₹ 2500 and ₹ 2000 (2) ₹ 1000 and ₹ 1500

(3) ₹ 1500 and ₹ 2000 (4) None of these

143. If a mixture contains water and alcohol in the ratio 2 : 3, what is the percentage quantity of water in the mixture ?

(1) 25% (2) 40% (3) 32% (4) 50%

144. 'A' began a business with ₹ 3750 and was joined afterwards by 'B' with ₹ 5000. When did 'B' join if the profits at the end of the year were divided equally ?

(1) After 5 months (2) After 3 months

(3) After 7 months (4) None of these

145. A person covers a distance of 100 km in 10 hours, partly by walking at 7 km per hour and rest by running at 12 km per hour. What is the distance covered in each part ?

(1) 28 km, 72 km (2) 32 km, 82 km

(3) 24 km, 68 km (4) 26 km, 70 km

146. In a mixture of 60 litres, the ratio of milk and water is 2 : 1. If the ratio of milk and water is to be 1 : 2, then the amount of water (in litres) to be further added must be

(1) 20 (2) 30 (3) 40 (4) None of these

147. Nitin can do a piece of work in 24 days. If Sapan works twice as fast as Nitin, how long would they take to finish the work working together ?

(1) 6 days (2) 9 days (3) 8 days (4) 5 days

148. Two trains of length 110 metres and 90 metres are running on parallel lines in the same direction with a speed of 35 km/h and 40 km/h, respectively. In what time will they pass each other ?

(1) 144 sec (2) 177 sec (3) 155 sec (4) 123 sec

149. A train passes a railway bridge 150 m long in 18 seconds. If the train is running at a speed of 60 km/h, then the length of the train in metres is

(1) 160 m (2) 150 m (3) 180 m (4) 170 m

150. A piece of wire 132 cm long is bent successively in the shapes of an equilateral triangle, a square, a regular hexagon and a circle. Which shape has the largest surface area ?

(1) Equilateral triangle (2) Square

(3) Circle (4) Regular hexagon

Directions (Questions 151 – 153) : *Choose the word which best expresses the meaning of the underlined word in the sentence.*

151. He was drawn into the vortex of politics at a very early age.

(1) whirlpool (2) field (3) arena (4) hell

152. He has the propensity for getting into debt.

(1) characteristic (2) quality (3) tendency (4) aptitude

153. The need of the hour is to initiate the renaissance of moral conscience and halt the rampant corruption, for it could even hasten the end of our civilization.

(1) rise (2) introduction (3) revival (4) significance

Directions (Questions 154 – 156) : *Choose the word which is opposite in meaning of the underlined word in the sentence.*

154. She is beautiful as well as frivolous.

(1) indecent (2) serious (3) insane (4) rude

155. It is obligatory for a common citizen to follow the rules.

(1) optional (2) superfluous (3) necessary (4) advisable

156. You must quote examples to support your statement.

(1) reveal (2) restrain (3) contradict (4) adduce

Directions (Questions 157– 160) : *In each of these questions, choose the option which can be substituted for the given words.*

157. Stealing from the writings of others

(1) Copying (2) Reframing

(3) Reproducing (4) Plagiarism

158. A person with full discretionary powers to act on behalf of a country

(1) Ambassador (2) Emissary

(3) Plenipotentiary (4) Envoy

159. Design made by putting together colored pieces of glass or stones

(1) Oleograph (2) Mosaic (3) Tracery (4) Relief

160. A temporary, usually brief and often surprising change from what is normal or accepted as standard

(1) Abhorrence (2) Abet (3) Abeyance (4) Aberration

Directions (Questions 161– 164) : *Choose the option which best expresses the meaning of the underlined idiom / phrase in the sentence.*

161. I just paid him <u>a left-handed</u> compliment.
(1) an honest (2) a well deserved
(3) an insincere (4) a flattering

162. The train was late and we had to <u>kick our heels</u>.
(1) run fast (2) wait eagerly
(3) waste time (4) play some game

163. A movement for the world unity is <u>in the offing</u>.
(1) at the end (2) about to start (3) on decline (4) in the air

164. It is evident from the minister's statement that <u>heads will roll</u>.
(1) government will change
(2) transfers will take place
(3) dismissals will occur
(4) heads of department will have to repent

Directions (Questions 165–167) : *A word has been written in four different ways out of which only one is correctly spelt. Choose the correctly spelt word.*

165. (1) colaberation (2) collaberation (3) colaboration (4) collaboration

166. (1) exagerate (2) exagarate (3) exaggerate (4) exeggerate

167. (1) acquiescence (2) aquicence (3) acquisence (4) acquissence

Directions (Questions 168 – 171) : *A sentence has been broken into four parts. Choose the part that has an error.*

168. (1) When dinner was done,
(2) my master went out to his labourers, and,
(3) as I could discover by his voice and gesture,
(4) gave his family strict charges to take care of me.

169. (1) Most of them, and especially those
(2) who deal in the astronomical part,
(3) have great faith in judicial astrology,
(4) although he is ashamed to own it publicly.

170. (1) From comparing notes afterwards it was but a hour and a quarter,
(2) yet it appeared to me that
(3) the night must have almost gone,
(4) and the dawn be breaking above us.

171. (1) The supper party given by Mr. Julius Hershey
(2) to a few friends at the evening of the 30th
(3) will long be remembered
(4) in catering circles.

Directions (Questions 172 – 180) : *Study the passages below and answer the questions that follow each passage.*

Passage I

Nature is like business. Business sense dictates that we guard our capital and live from the interest. Nature's capital is the enormous diversity of living things. Without it, we cannot feed ourselves, cure ourselves of illness or provide industry with the raw materials of wealth creation. Professor Edward Wilson, of Harvard University says, "The folly our descendants are least likely to forgive us is the ongoing loss of genetic and species diversity. This will take millions of years to correct." Only 150 plant species have ever been widely cultivated. Yet over 75,000 edible plants are known in the wild. In a hungry world, with a population growing by 90 million each year, so much wasted potential is tragic. Medicines from the wild are worth around 40 billion dollars a year. Over 5000 species are known to yield chemical with cancer fighting potential. Scientists currently estimate that the total number of species in the world is between 10-30 million with only around 1·4 million identified. The web of life is torn when mankind exploits natural resources in short-sighted ways. The trade in tropical hardwoods can destroy whole forests to extract just a few commercially attractive specimens. Bad agricultural practice triggers 24 billion tonnes of top soil erosion a year losing the equivalent of 9 million tonnes of grain output. Cutting this kind of unsuitable exploitation and instituting "sustainable utilisation" will help turn the environmental crisis around.

172. Why does the author compare 'nature' to business ?

(1) Because of the capital depletion in nature and business.

(2) Because of the similarity with which one should use both.

(3) Because of the same interest level yield.

(4) Because of the diversity of the various capital inputs.

173. "The folly our descendants are least likely to forgive us." What is the business equivalent of the folly the author is referring to ?

(1) Reducing the profit margin.

(2) Not pumping some money out of profits into the business.

(3) Eroding the capital lease of the business.

(4) Putting interest on capital back into the business.

174. Which of the following statements is false in context of the given passage ?

(1) The diversity of plant life is essential for human existence.

(2) Scientists know the usefulness of most plant species.

(3) Chemicals for cancer treatment are available from plants.

(4) There are around ten times the plant species undiscovered as compared to the discovered ones.

175. Which of the following correctly reflects the opinion of the author to take care of hunger in the world ?

(1) Increase the number of edible plants being cultivated.

(2) Increase cultivation of the 150 species presently under cultivation.

(3) Increase the cultivation of medical plants.

(4) Increase the potential of the uncultivated edible plants.

176. Which of the following is mentioned as the immediate cause for the destruction of plant species ?

(1) Soil Erosion (2) Destruction of habitat

(3) Cultivation (4) Agricultural practices

Passage II

Motivations for ruralism in under developed countries are understandably different from those in developed countries. There, it is a sheer physical necessity for the very act of man's survival. In the Third World countries, which are *predominantly* rural, the only *lever* that can lift human life above its present subhuman level, is rural development. Rural life in such countries has been stagnating for countries on end. Nothing worthwhile has been done to *ameliorate* the conditions of the rural population which is only slightly different from that of their quadruped counterparts. Ignorance, ill health and poverty have become synonyms of rural life in the undeveloped and underdeveloped countries. But the worst tragedy is that the concerned human populations have taken this state of affairs for granted, as something unalterable, something for which there is no remedy. Every ray of hope has gone out of their lives. In such countries, Rural Development is the inevitable condition of any material or non-material advancement. As such, *enlightened sections* of all such countries have been taking ever growing interest in the question of Rural Development. This was also part of the legacy of their freedom struggle. In countries like India, it is well-known that attempts at Rural Development were an inseparable part of the Independence movement. Leaders like Gandhiji realised quite well that Real India lived in her stagnating villages. Cities, which were mostly the products of Western colonialism, were just artificial showpieces. Even there, there were two worlds. The posh areas, where the affluent few, mostly, the products and custodians of imperial interest lived, were little islands *engulfed* by the vast ocean of dirt, represented by the vast majority of people. Cities were by no means unknown to India, but in ancient India, they were integral parts, organically related to the rest of the country and society. But, modern cities are exotic centres of commercial and industrial exploitation. Cities in ancient India were the flowers of cultural and artistic excellence of the nation, modern cities are just parasites, preying on and *debilitating* the country. Hence, Gandhiji started the 'Go to Village Movement' which alone, according to him, could bring freedom to India and sustain it. Rural Development had the pride of place in his strategy for the nation's freedom. Thus, it had its origin in the freedom struggle.

177. People are taking growing interest in Rural Development because

(1) nothing worthwhile can be done in the near future.

(2) they have now become optimistic about it.

(3) they have realised the indispensability of it.

(4) they have been suffering from severe health problems.

178. Which of the following is the worst tragedy according to the author ?

(1) Lack of realisation of the importance of rural development.

(2) Exploitation of the rural people by the city-dwellers.

(3) The subhuman condition of the people.

(4) The pessimism of the rural people about their own conditions.

179. Which of the following statements is ***not*** true in the context of the passage ?

(1 Most of the rich people dwelling in modern cities are genuinely concerned about rural development.

(2) Rural development is a pre-requisite of any other advancement and progress.

(3) The rural folk in the Third World countries feel that their subhuman condition cannot be improved.

(4) Only rural development can raise the standard of living of people in the Third World countries.

180. Which of the following best describes the two divergent worlds of the modern cities ?

(1) Commercial and industrial exploitation.

(2) Patrons of western products and custodians of imperial interests.

(3) A few rich people and many poor people.

(4) Posh area an

181. Who won the Laureus World Sportsman Award in the year 2013 ?

(1) Andy Murry (2) Usain Bolt

(3) Michael Phelps (4) Lionel Messi

182. Which trophy won by India after defeating Australia 4-0 in cricket test series played in India in 2013 ?

(1) Bradman-Pataudi (2) Warne-Kumble

(3) Waugh-Dravid (4) Border-Gavaskar

183. Oil and Natural Gas Corporation (ONGC) along with Bharat Petroleum Corporation Ltd (BPCL) and Mitsui Group of Japan, planned to invest ₹ 5400 Cr to set up a LNG terminal at

(1) Tezpur (2) Mangalore

(3) Rajahmundry (4) Jamnagar

184. Who heads the companies Grasim Ind. Ltd, Hindalco Ind. Ltd and Idea Cellular Ltd.?

(1) Anand G. Mahindra (2) Pawan Munjal

(3) Laxmi Mittal (4) Kumar Mangalam Birla

185. Who among the following has been appointed as Managing Director (MD) and Chief Executive Officer (CEO) of National Stock Exchange (NSE) in 2013 ?

(1) Ravi Narain (2) Chitra Ramkrishna

(3) Naina Lal Kidwai (4) Chandra Kochhar

186. Name the asteroid (a 150 ft rock) passed within 27,600 km of earth in 2013.

(1) 2013 AS15 (2) 2012 DA14

(3) AS14 2010 (4) AT2011 13

187. As per Knights Frank's Wealth Report 2013, which country has the highest number of billionaires in the world ?

(1) United Kingdom (2) China (3) USA (4) India

188. Who became the first non-American world editor in more than 80 years history of 'TIME International' ?

(1) Bobby Ghosh (2) Jug Suraiya

(3) Ravindra Kumar (4) None of these

189. Who among the following co-founded the recently launched popular 'MessageMe', a multimedia messaging application ?

(1) Sanjay Mehrotra (2) Arjun Sethi (3) Doug Purdy (4) Sabeer Bhatia

190. Which pharmaceutical MNC lost patent battle in India with the rejection of its plea by Supreme Court of India to restrain Indian companies from manufacturing generic drugs ?

(1) GlaxoSmithKline (2) Pfizer (3) Ranbaxy (4) Novartis AG

191. Which mobile manufacturing company slapped with a ₹ 2000 Cr notice by Government of India for an alleged tax violation ?

(1) Samsung (2) Nokia (3) BlackBarry (4) Apple

192. Pakistan People's Party set a record by becoming the first democratically elected government to complete its full _____ term in 66 years of nation's existence.

(1) five years (2) three year (3) four years (4) six years

193. China exports about 55% of its arms/weapons to which country ?

(1) North Korea (2) Iran

(3) Pakistan (4) Myanmar

194. UK froze the 'Bank Mellat' money of around € 152 million in 2009 belongs to which country ?

(1) Iran (2) Iraq

(3) Egypt (4) Libya

195. Recently, India won the legal battle at the court of Arbitration in The Hague against Pakistan regarding the construction of which Hydro Electric Projects in Kashmir ?

(1) Raavi (2) Kishenganga

(3) Chenab (4) Indus Suru

196. Which country shut down its second largest bank 'Laiki' to avert collapse of the banking system in return for a € 10 billion bailout plan of European Union and International Monitory Fund ?

(1) Greece (2) Turkey

(3) Cyprus (4) Serbia

197. Who won the 'Saraswati Samman' in 2013, instituted by KK Birla Foundation for an outstanding literary work ?

(1) Sugathakumari (2) Hariram Meena

(3) Sonika Agarwal (4) None of these

198. Which film won the 'Best Feature Film' in 60th national film award for 2012 organised by Ministry of Information and Broadcasting ?

(1) Chittagong (2) Vicky Donar

(3) Dhag (4) Paan Singh Tomar

199. RBI and Government of India decided to launch _____ plastic notes in five cities of India on a field of trial basis.

(1) ₹ 5 (2) ₹ 10 (3) ₹ 20 (4) ₹ 50

200. Mr. Hari Shankar Singhania, who died recently, was the president of which group of companies of India ?

(1) Sahara Group (2) JK Group

(3) Mahindra Group (4) Hero Group