85. Embryological support for evolution was disapproved by :
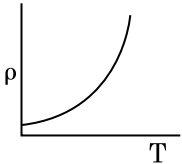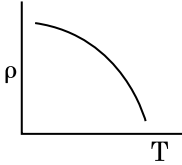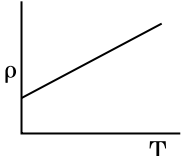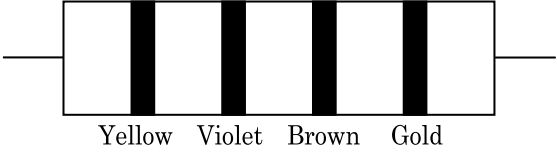
(1) Alfred Wallace

(2) Charles Darwin

(3) Oparin

(4) Karl Ernst von Baer

86. Which of the following hormone levels will cause release of ovum (ovulation) from the graffian follicle ?

(1) High concentration of Progesterone

(2) Low concentration of LH

(3) Low concentration of FSH

(4) High concentration of Estrogen

87. The body of the ovule is fused within the funicle at :

(1) Micropyle

(2) Nucellus

(3) Chalaza

(4) Hilum

88. Cuboidal epithelium with brush border of microvilli is found in :

(1) ducts of salivary glands

(2) proximal convoluted tubule of nephron

(3) eustachian tube

(4) lining of intestine

89. Which of the following statements is **not correct** ?

(1) The proinsulin has an extra peptide called C-peptide.

(2) The functional insulin has A and B chains linked together by hydrogen bonds.

(3) Genetically engineered insulin is produced in *E-Coli*.

(4) In man insulin is synthesised as a proinsulin.

90. The number of substrate level phosphorylations in one turn of citric acid cycle is :

(1) One

(2) Two

(3) Three

(4) Zero

91. An electron is accelerated from rest through a potential difference of V volt. If the de Broglie wavelength of the electron is 1.227×10^{-2} nm, the potential difference is :

(1) 10^2 V

(2) 10^3 V

(3) 10^4 V

(4) 10 V

92. The capacitance of a parallel plate capacitor with air as medium is $6 \, \mu F$. With the introduction of a dielectric medium, the capacitance becomes $30 \, \mu F$. The permittivity of the medium is :

($\epsilon_0 = 8.85 \times 10^{-12}$ C^2 N^{-1} m^{-2})

(1) 1.77×10^{-12} C^2 N^{-1} m^{-2}

(2) 0.44×10^{-10} C^2 N^{-1} m^{-2}

(3) 5.00 C^2 N^{-1} m^{-2}

(4) 0.44×10^{-13} C^2 N^{-1} m^{-2}

93. The quantities of heat required to raise the temperature of two solid copper spheres of radii r_1 and r_2 ($r_1 = 1.5 \, r_2$) through 1 K are in the ratio :

(1) $\dfrac{9}{4}$

(2) $\dfrac{3}{2}$

(3) $\dfrac{5}{3}$

(4) $\dfrac{27}{8}$

94. Which of the following graph represents the variation of resistivity (ρ) with temperature (T) for copper ?

(1)

(2)

(3)

(4)

95. Find the torque about the origin when a force of $3\hat{j}$ N acts on a particle whose position vector is $2\hat{k}$ m .

(1) $6\hat{j}$ N m

(2) $-6\hat{i}$ N m

(3) $6\hat{k}$ N m

(4) $6\hat{i}$ N m

96. Light of frequency 1.5 times the threshold frequency is incident on a photosensitive material. What will be the photoelectric current if the frequency is halved and intensity is doubled ?
(1) four times
(2) one-fourth
(3) zero
(4) doubled

97. A ray is incident at an angle of incidence i on one surface of a small angle prism (with angle of prism A) and emerges normally from the opposite surface. If the refractive index of the material of the prism is μ, then the angle of incidence is nearly equal to :

(1) $\dfrac{2A}{\mu}$

(2) μA

(3) $\dfrac{\mu A}{2}$

(4) $\dfrac{A}{2\mu}$

98. The average thermal energy for a mono-atomic gas is : (k_B is Boltzmann constant and T, absolute temperature)

(1) $\dfrac{3}{2}\,k_B T$

(2) $\dfrac{5}{2}\,k_B T$

(3) $\dfrac{7}{2}\,k_B T$

(4) $\dfrac{1}{2}\,k_B T$

99. Two particles of mass 5 kg and 10 kg respectively are attached to the two ends of a rigid rod of length 1 m with negligible mass.

The centre of mass of the system from the 5 kg particle is nearly at a distance of :
(1) 50 cm
(2) 67 cm
(3) 80 cm
(4) 33 cm

100. Two cylinders A and B of equal capacity are connected to each other via a stop cock. A contains an ideal gas at standard temperature and pressure. B is completely evacuated. The entire system is thermally insulated. The stop cock is suddenly opened. The process is :
(1) adiabatic
(2) isochoric
(3) isobaric
(4) isothermal

101. In Young's double slit experiment, if the separation between coherent sources is halved and the distance of the screen from the coherent sources is doubled, then the fringe width becomes :
(1) half
(2) four times
(3) one-fourth
(4) double

102. The color code of a resistance is given below :

Yellow Violet Brown Gold

The values of resistance and tolerance, respectively, are :
(1) 47 kΩ, 10%
(2) 4.7 kΩ, 5%
(3) 470 Ω, 5%
(4) 470 kΩ, 5%

103. In a certain region of space with volume $0.2\ \mathrm{m}^3$, the electric potential is found to be 5 V throughout. The magnitude of electric field in this region is :
(1) 0.5 N/C
(2) 1 N/C
(3) 5 N/C
(4) zero

104. The solids which have the negative temperature coefficient of resistance are :
(1) insulators only
(2) semiconductors only
(3) insulators and semiconductors
(4) metals

105. Light with an average flux of 20 W/cm² falls on a non-reflecting surface at normal incidence having surface area 20 cm². The energy received by the surface during time span of 1 minute is :

(1) 12×10^3 J

(2) 24×10^3 J

(3) 48×10^3 J

(4) 10×10^3 J

106. A short electric dipole has a dipole moment of 16×10^{-9} C m. The electric potential due to the dipole at a point at a distance of 0.6 m from the centre of the dipole, situated on a line making an angle of 60° with the dipole axis is :

$$\left(\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2 \right)$$

(1)   200 V

(2)   400 V

(3)   zero

(4)   50 V

107. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2 m is :

(1) 1.83×10^{-7} rad

(2) 7.32×10^{-7} rad

(3) 6.00×10^{-7} rad

(4) 3.66×10^{-7} rad

108. A spherical conductor of radius 10 cm has a charge of 3.2×10^{-7} C distributed uniformly. What is the magnitude of electric field at a point 15 cm from the centre of the sphere ?

$$\left(\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2 \right)$$

(1) 1.28×10^5 N/C

(2) 1.28×10^6 N/C

(3) 1.28×10^7 N/C

(4) 1.28×10^4 N/C

109. Two bodies of mass 4 kg and 6 kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless (see figure). The acceleration of the system in terms of acceleration due to gravity (g) is :
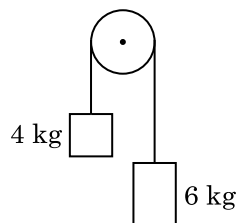
(1)   g/2

(2)   g/5

(3)   g/10

(4)   g

110. The phase difference between displacement and acceleration of a particle in a simple harmonic motion is :

(1) $\dfrac{3\pi}{2}$ rad

(2) $\dfrac{\pi}{2}$ rad

(3)   zero

(4) π rad

111. The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is : (c = speed of electromagnetic waves)

(1)   1 : 1

(2)   1 : c

(3) $1 : c^2$

(4)   c : 1

112. In a guitar, two strings A and B made of same material are slightly out of tune and produce beats of frequency 6 Hz. When tension in B is slightly decreased, the beat frequency increases to 7 Hz. If the frequency of A is 530 Hz, the original frequency of B will be :

(1)   524 Hz

(2)   536 Hz

(3)   537 Hz

(4)   523 Hz

113. The Brewsters angle i_b for an interface should be :

(1) $30° < i_b < 45°$

(2) $45° < i_b < 90°$

(3) $i_b = 90°$

(4) $0° < i_b < 30°$

114. Taking into account of the significant figures, what is the value of $9.99 \, \text{m} - 0.0099 \, \text{m}$?

(1) 9.98 m

(2) 9.980 m

(3) 9.9 m

(4) 9.9801 m

115. A resistance wire connected in the left gap of a metre bridge balances a 10 Ω resistance in the right gap at a point which divides the bridge wire in the ratio 3 : 2. If the length of the resistance wire is 1.5 m, then the length of 1 Ω of the resistance wire is :

(1) $1.0 \times 10^{-1} \, \text{m}$

(2) $1.5 \times 10^{-1} \, \text{m}$

(3) $1.5 \times 10^{-2} \, \text{m}$

(4) $1.0 \times 10^{-2} \, \text{m}$

116. The mean free path for a gas, with molecular diameter d and number density n can be expressed as :

(1) $\dfrac{1}{\sqrt{2} \, n\pi d^2}$

(2) $\dfrac{1}{\sqrt{2} \, n^2\pi d^2}$

(3) $\dfrac{1}{\sqrt{2} \, n^2\pi^2 d^2}$

(4) $\dfrac{1}{\sqrt{2} \, n\pi d}$

117. A capillary tube of radius r is immersed in water and water rises in it to a height h. The mass of the water in the capillary is 5 g. Another capillary tube of radius 2r is immersed in water. The mass of water that will rise in this tube is :

(1) 5.0 g

(2) 10.0 g

(3) 20.0 g

(4) 2.5 g

118. For which one of the following, Bohr model is **not** valid ?

(1) Singly ionised helium atom (He^+)

(2) Deuteron atom

(3) Singly ionised neon atom (Ne^+)

(4) Hydrogen atom

119. A screw gauge has least count of 0.01 mm and there are 50 divisions in its circular scale.

The pitch of the screw gauge is :

(1) 0.25 mm

(2) 0.5 mm

(3) 1.0 mm

(4) 0.01 mm

120. A long solenoid of 50 cm length having 100 turns carries a current of 2.5 A. The magnetic field at the centre of the solenoid is :

($\mu_0 = 4\pi \times 10^{-7} \, \text{T m A}^{-1}$)

(1) $3.14 \times 10^{-4} \, \text{T}$

(2) $6.28 \times 10^{-5} \, \text{T}$

(3) $3.14 \times 10^{-5} \, \text{T}$

(4) $6.28 \times 10^{-4} \, \text{T}$

121. A wire of length L, area of cross section A is hanging from a fixed support. The length of the wire changes to L_1 when mass M is suspended from its free end. The expression for Young's modulus is :

(1) $\dfrac{Mg(L_1 - L)}{AL}$

(2) $\dfrac{MgL}{AL_1}$

(3) $\dfrac{MgL}{A(L_1 - L)}$

(4) $\dfrac{MgL_1}{AL}$

122. A series LCR circuit is connected to an ac voltage source. When L is removed from the circuit, the phase difference between current and voltage is $\dfrac{\pi}{3}$. If instead C is removed from the circuit, the phase difference is again $\dfrac{\pi}{3}$ between current and voltage. The power factor of the circuit is :

(1) 0.5

(2) 1.0

(3) -1.0

(4) zero

123. An iron rod of susceptibility 599 is subjected to a magnetising field of 1200 A m^{-1}. The permeability of the material of the rod is :

($\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1})

(1) 8.0×10^{-5} T m A^{-1}

(2) $2.4\pi \times 10^{-5}$ T m A^{-1}

(3) $2.4\pi \times 10^{-7}$ T m A^{-1}

(4) $2.4\pi \times 10^{-4}$ T m A^{-1}

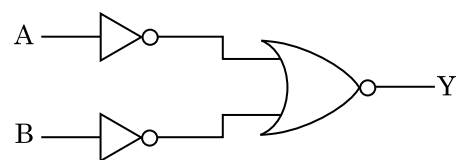**124.** A cylinder contains hydrogen gas at pressure of 249 kPa and temperature 27°C.

Its density is : (R = 8.3 J mol^{-1} K^{-1})

(1)   0.2 kg/m^3

(2)   0.1 kg/m^3

(3)   0.02 kg/m^3

(4)   0.5 kg/m^3

125. When a uranium isotope $^{235}_{92}$U is bombarded with a neutron, it generates $^{89}_{36}$Kr, three neutrons and :

(1) $^{91}_{40}$Zr

(2) $^{101}_{36}$Kr

(3) $^{103}_{36}$Kr

(4) $^{144}_{56}$Ba

126. For the logic circuit shown, the truth table is :

(1)	A	B	Y
	0	0	0
	0	1	1
	1	0	1
	1	1	1
(2)	A	B	Y
	0	0	1
	0	1	1
	1	0	1
	1	1	0
(3)	A	B	Y
	0	0	1
	0	1	0
	1	0	0
	1	1	0
(4)	A	B	Y
	0	0	0
	0	1	0
	1	0	0
	1	1	1

127. A charged particle having drift velocity of 7.5×10^{-4} m s^{-1} in an electric field of 3×10^{-10} Vm^{-1}, has a mobility in m^2 V^{-1} s^{-1} of :

(1) 2.5×10^6

(2) 2.5×10^{-6}

(3) 2.25×10^{-15}

(4) 2.25×10^{15}

128. The energy required to break one bond in DNA is 10^{-20} J. This value in eV is nearly :

(1)   0.6

(2)   0.06

(3)   0.006

(4)   6

129. The energy equivalent of 0.5 g of a substance is :

(1) 4.5×10^{13} J

(2) 1.5×10^{13} J

(3) 0.5×10^{13} J

(4) 4.5×10^{16} J

130. Dimensions of stress are :

(1) $[ML^2T^{-2}]$

(2) $[ML^0T^{-2}]$

(3) $[ML^{-1}T^{-2}]$

(4) $[MLT^{-2}]$

131. The increase in the width of the depletion region in a p-n junction diode is due to :

(1)   reverse bias only

(2)   both forward bias and reverse bias

(3)   increase in forward current

(4)   forward bias only

132. A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time with a velocity of 80 m/s. The height of the tower is : (g = 10 m/s^2)

(1)   340 m

(2)   320 m

(3)   300 m

(4)   360 m

133. A 40 μF capacitor is connected to a 200 V, 50 Hz ac supply. The rms value of the current in the circuit is, nearly :
- (1) 2.05 A
- (2) 2.5 A
- (3) 25.1 A
- (4) 1.7 A

134. For transistor action, which of the following statements is **correct** ?
- (1) Base, emitter and collector regions should have same size.
- (2) Both emitter junction as well as the collector junction are forward biased.
- (3) The base region must be very thin and lightly doped.
- (4) Base, emitter and collector regions should have same doping concentrations.

135. A body weighs 72 N on the surface of the earth. What is the gravitational force on it, at a height equal to half the radius of the earth ?
- (1) 32 N
- (2) 30 N
- (3) 24 N
- (4) 48 N

136. On electrolysis of dil.sulphuric acid using Platinum (Pt) electrode, the product obtained at anode will be :
- (1) Oxygen gas
- (2) H_2S gas
- (3) SO_2 gas
- (4) Hydrogen gas

137. The number of Faradays(F) required to produce 20 g of calcium from molten $CaCl_2$ (Atomic mass of Ca = 40 g mol^{-1}) is :
- (1) 2
- (2) 3
- (3) 4
- (4) 1

138. Elimination reaction of 2-Bromo-pentane to form pent-2-ene is :
- (a) β-Elimination reaction
- (b) Follows Zaitsev rule
- (c) Dehydrohalogenation reaction
- (d) Dehydration reaction
- (1) (a), (c), (d)
- (2) (b), (c), (d)
- (3) (a), (b), (d)
- (4) (a), (b), (c)

139. The rate constant for a first order reaction is 4.606×10^{-3} s^{-1}. The time required to reduce 2.0 g of the reactant to 0.2 g is :
- (1) 200 s
- (2) 500 s
- (3) 1000 s
- (4) 100 s

140. Which of the following set of molecules will have zero dipole moment ?
- (1) Boron trifluoride, hydrogen fluoride, carbon dioxide, 1,3-dichlorobenzene
- (2) Nitrogen trifluoride, beryllium difluoride, water, 1,3-dichlorobenzene
- (3) Boron trifluoride, beryllium difluoride, carbon dioxide, 1,4-dichlorobenzene
- (4) Ammonia, beryllium difluoride, water, 1,4-dichlorobenzene

141. The mixture which shows positive deviation from Raoult's law is :
- (1) Benzene + Toluene
- (2) Acetone + Chloroform
- (3) Chloroethane + Bromoethane
- (4) Ethanol + Acetone

142. Sucrose on hydrolysis gives :
- (1) α-D-Glucose + β-D-Glucose
- (2) α-D-Glucose + β-D-Fructose
- (3) α-D-Fructose + β-D-Fructose
- (4) β-D-Glucose + α-D-Fructose

143. Which of the following is a basic amino acid ?
- (1) Alanine
- (2) Tyrosine
- (3) Lysine
- (4) Serine