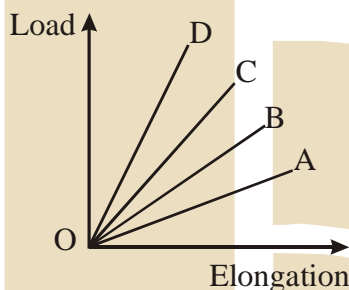


JEE-MAIN & AIEEE

ONLINE EXAM TEST PAPERS OF 2012 (PAPER-2)

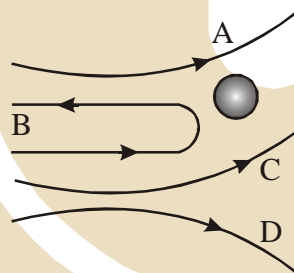
- Q.1 Two polaroids have their polarizing directions parallel so that the intensity of the transmitted light is maximum. The angle through which either polaroid must be turned if the intensity is to drop by one-half is :
- (A) 180° (B) 120° (C) 90° (D) 135°

- Q.2 The load versus elongation graphs for four wires of same length and made of the same material are shown in the figure. The thinnest wire is represented by the line:



- (A) OB (B) OA (C) OC (D) OD

- Q.3 In the Rutherford experiment, α -particles are scattered from a nucleus as shown. Out of the four paths, which path is not possible?



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

- Q.4 Following are expression for four plane simple harmonic waves:

(a) $y_1 = A \cos 2\pi \left(n_1 t + \frac{x}{\lambda_1} \right)$ (b) $y_2 = A \cos 2\pi \left(n_1 t + \frac{x}{\lambda_1} + \pi \right)$

(c) $y_3 = A \cos 2\pi \left(n_2 t + \frac{x}{\lambda_2} \right)$ (d) $y_4 = A \cos 2\pi \left(n_2 t - \frac{x}{\lambda_2} \right)$

The pairs of waves which will produce destructive interference and stationary waves respectively in a medium are:

- (A) (c, d), (a, b) (B) (a, d), (b, c) (C) (a, c), (b, d) (D) (a, b), (c, d)

Q.5 A sample originally contained 10^{20} radioactive atoms, which emit α -particles emitted in the third year to that emitted during the second year is 0.3. How many α particles were emitted in the first year?

- (A) 7×10^{19} (B) 3×10^{19} (C) 5×10^{18} (D) 3×10^{18}

Q.6 In a Young's double slit experiment with light of wavelength λ , fringe pattern on the screen has fringe width β . When two thin transparent glass (refractive index μ) plates of thickness t_1 and t_2 ($t_1 > t_2$) are placed in the path of the two beams respectively, the fringe pattern will shift by a distance :

- (A) $\frac{\beta(\mu-1)}{\lambda}(t_1-t_2)$ (B) $\frac{\beta(\mu-1)}{\lambda}\left(\frac{t_1}{t_2}\right)$ (C) $\frac{\mu\beta t_1}{\lambda t_2}$ (D) $(\mu-1)\frac{\lambda}{\beta}(t_1+t_2)$

Q.7 This question has statement-1. Statement -2. Of the four choices given after the statements, choose the one that best describes the two statements.

Statement-1 : The possibility of an electric bulb fusing is higher at the time of switching ON.

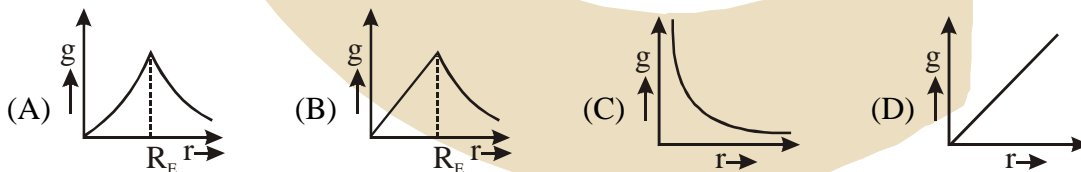
Statement-2 : Resistance of an electric bulb when it is not lit up is much smaller than when it is lit up.

- (A) Statement -1 is true, Statement -2, is true and Statement -2 is not the correct explanation of Statement -1.
 (B) Statement -1 is true, Statement-2 is false.
 (C) Statement -1 is false, Statement-2 is true.
 (D) Statement -1 is true, Statement -2, is true and Statement -2 is the correct explanation of Statement-1.

Q.8 The velocity of certain ions that pass undeflected through crossed electric field $E = 7.7$ kV/m and magnetic field $B = 0.14$ T is:

- (A) 18 km/s (B) 55 km/s (C) 1078 km/s (D) 77 km/s

Q.9 Which graph correctly presents the variation of acceleration due to gravity with the distance from the centre of the earth (radius R_E)?



Q.10 A circular hole, of diameter R is cut from a disc of mass M and radius R ; the circumference of the cut passes through the centre of the disc. The moment of inertia of the remaining portion of the disc about an axis perpendicular to the disc and passing through its centre is:

- (A) $\left(\frac{13}{32}\right)MR^2$ (B) $\left(\frac{15}{32}\right)MR^2$ (C) $\left(\frac{3}{8}\right)MR^2$ (D) $\left(\frac{1}{8}\right)MR^2$

- Q.11 The electric potential $V(x)$ in a region around the origin is given by $V(x) = 4x^2$ volts. The electric charge enclosed in a cube of 1m side with its centre at the origin is (in coulomb):
 (A) $8\epsilon_0$ (B) 0 (C) $-8\epsilon_0$ (D) $-4\epsilon_0$

- Q.12 This question has Statement-1. Statement-2. Of the four choices given after the Statement choose the one that best describes the two statements.

Statement-1 : In an adiabatic process, change in internal energy of a gas is equal to work done on/by the gas in the process.

Statement-2 : The temperature of a gas remains constant in an adiabatic process.

- (A) Statement –1 is false, Statement–2 is true.
 (B) Statement –1 is true, Statement –2, is true and Statement –2 is not the correct explanation of Statement –1.
 (C) Statement –1 is true, Statement –2, is true and Statement –2 is the correct explanation of Statement–1.
 (D) Statement –1 is true, Statement–2 is false.

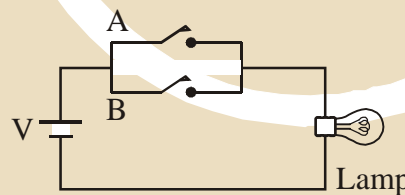
- Q.13 Given that $K =$ energy, $V =$ velocity, $T =$ Time. If they are chosen as the fundamental units, then what is dimensional formula for surface tension?

- (A) $[K^2 V^{-2} T^{-2}]$ (B) $[K^2 V^2 T^{-2}]$ (C) $[K V^2 T^2]$ (D) $[K V^{-2} T^{-2}]$

- Q.14 The electron of a hydrogen atom makes a transition from the $(n + 1)^{\text{th}}$ orbit to the n^{th} orbit. For large n the wave length of the emitted radiation is proportional to:

- (A) n^3 (B) n^2 (C) n (D) n^4

- Q.15 Which logic gate with inputs A and B performs the same operation as that performed by the following circuit?



- (A) NOR gate (B) NAND gate (C) AND gate (D) OR gate

- Q.16 Broad casting antennas are generally:

- (A) Both vertical and horizontal type (B) Horizontal type
 (C) Omni directional type (D) Vertical type

Q.17 This question has Statement-1, Statement-2. Of the four choices given after the Statement, choose the one that best describes the two statements.

Statement-1 : In the resonance tube experiment, if the tuning fork is replaced by another identical tuning fork but with its arm having been filed, the length of the air column should be increased to obtain resonance again.

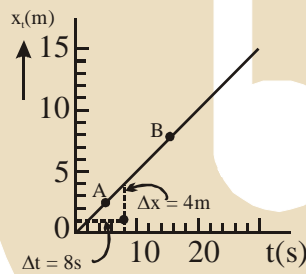
Statement-2 : On filing the arms, the frequency of a tuning fork increases.

- (A) Statement –1 is true, Statement –2, is true and Statement –2 is not the correct explanation of Statement –1.
- (B) Statement –1 is false, Statement–2 is true.
- (C) Statement –1 is true, Statement –2, is true and Statement –2 is the correct explanation of Statement–1.
- (D) Statement –1 is true, Statement–2 is false.

Q.18 A perfect gas at 27°C is heated at constant pressure so as to double its volume. The final temperature of the gas will be, close to :-

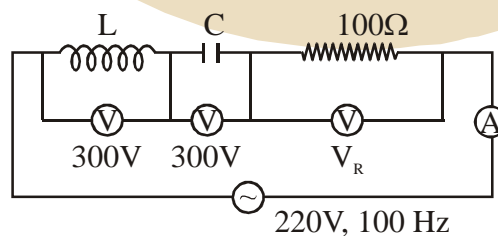
- (A) 327°C
- (B) 200°C
- (C) 300°C
- (D) 54°C

Q.19 The graph of an object's motion (along the x-axis) is shown in the figure. The instantaneous velocity of the object at points A and B are v_A and v_B respectively. Then:-



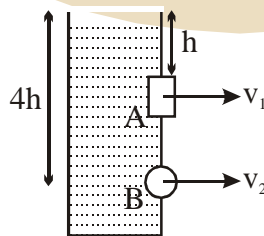
- (A) $v_A = 0.5 \text{ m/s} < v_B$
- (B) $v_A = 0.5 \text{ m/s} > v_B$
- (C) $v_A = v_B = 2 \text{ m/s}$
- (D) $v_A = v_B = 0.5 \text{ m/s}$

Q.20 In an LCR circuit shown in the following figure, what will be the readings of the voltmeter across the resistor and ammeter if an a.c. source of 220 V and 100 Hz is connected to it as shown?



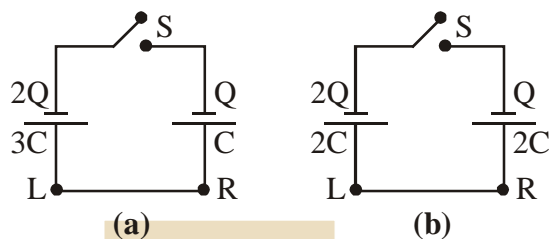
- (A) 300 V, 3 A
- (B) 800 V, 8 A
- (C) 110V, 1.1 A
- (D) 220V, 2.2 A

- Q.21 Which of the following processes play a part in the formation of a rainbow?
 (a) refraction (b) total internal reflection
 (c) dispersion (d) interference
 (A) a, b and c (B) a and b (C) c and d (D) a, b and d
- Q.22 The heat radiated per unit area in 1 hour by a furnace whose temperature is 3000 K is:
 ($\sigma = 5.7 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$)
 (A) $1.7 \times 10^{10} \text{ J}$ (B) $4.6 \times 10^6 \text{ J}$ (C) $2.8 \times 10^8 \text{ J}$ (D) $1.1 \times 10^{12} \text{ J}$
- Q.23 An engine pumps water continuously through a hose. Water leaves the hose with velocity v and m is mass per unit length of the water jet. If this jet hits a surface and came to rest instantaneously, the force on the surface is:
 (A) mv^2 (B) $1/2 mv^2$ (C) mv^3 (D) $1/2 mv^3$
- Q.24 A solid sphere having mass m and radius r rolls down an inclined plane. Then its kinetic energy is
 (A) $\frac{1}{2}$ rotational and $\frac{1}{2}$ translational (B) $\frac{2}{7}$ rotational and $\frac{5}{7}$ translational
 (C) $\frac{2}{5}$ rotational and $\frac{3}{5}$ translational (D) $\frac{5}{7}$ rotational and $\frac{2}{7}$ translational
- Q.25 A particle gets displaced by $\Delta \vec{r} = (2\hat{i} + 3\hat{j} + 4\hat{k}) \text{ m}$ under the action of a force $\vec{F} = (7\hat{i} + 4\hat{j} + 4\hat{k}) \text{ N}$. Then change in its kinetic energy is:
 (A) 126 J (B) 70 J (C) 52.5J (D) 38 J
- Q.26 A bar magnet of length 6 cm has a magnetic moment of 4 J T^{-1} . Find the strength of magnetic field at a distance of 200 cm from the centre of the magnet along its equatorial line:
 (A) $3 \times 10^{-8} \text{ tesla}$ (B) $3.5 \times 10^{-8} \text{ tesla}$ (C) $4 \times 10^{-8} \text{ tesla}$ (D) $5 \times 10^{-8} \text{ tesla}$
- Q.27 A square hole of side length l is made at a depth of h and a circular hole of radius r is made at a depth of $4h$ from the surface of water in a water tank kept on a horizontal surface. If $l \ll h, r \ll h$ and the rate of water flow from both the holes is the same, then r is equal to:



- (A) $\frac{l}{\sqrt{3\pi}}$ (B) $\frac{l}{3\pi}$ (C) $\frac{l}{\sqrt{2\pi}}$ (D) $\frac{l}{2\pi}$

- Q.28 Two circuits (a) and (b) have charged capacitors of capacitance C , $2C$ and $3C$ with open switches. Charges on each of the capacitor are as shown in the figure. On closing the switches:-



- (A) Charge flow from L to R in both (a) and (b)
 (B) No charge flows in (a) but charge flows from R to L in (b)
 (C) No charge flows in (a) but charge flows L to R in (b)
 (D) Charges flow from R to L in (a) and from L to R in (b)
- Q.29 A structural steel rod has a radius of 10 mm and length of 1.0 m. A 100 kN force stretches it along its length. Young's modulus of structural steel is $2 \times 10^{11} \text{ Nm}^{-2}$. The percentage strain is about:-
 (A) 0.24% (B) 0.32% (C) 0.16% (D) 0.08%
- Q.30 A car of mass 1000 kg is moving at a speed of 30 m/s. Brakes are applied to bring the car to rest. If the net retardation force is 5000 N, the car comes to stop after travelling d m in t s. Then:
 (A) $d = 150$, $t = 5$ (B) $d = 90$, $t = 6$ (C) $d = 120$, $t = 8$ (D) $d = 180$, $t = 6$

- Q.31 In which of the following arrangements, the sequence is not strictly according to the property written against it?
- (A) $\text{CO}_2 < \text{SiO}_2 < \text{SnO}_2 < \text{PbO}_2$: increasing oxidizing power
 (B) $\text{B} < \text{C} < \text{O} < \text{N}$: increasing first ionization enthalpy
 (C) $\text{NH}_3 < \text{PH}_3 < \text{AsH}_3 < \text{SbH}_3$: increasing basic strength
 (D) $\text{HF} < \text{HCl} < \text{HBr} < \text{HI}$: increasing acid strength
- Q.32 K_1 , K_2 and K_3 are the equilibrium constants of the following reactions (I), (II) and (III) respectively:-
 (I) $\text{N}_2 + 2\text{O}_2 \rightleftharpoons 2\text{NO}_2$ (II) $2\text{NO}_2 \rightleftharpoons \text{N}_2 + 2\text{O}_2$ (III) $\text{NO}_2 \rightleftharpoons \frac{1}{2}\text{N}_2 + \text{O}_2$
 The correct relation from the following is:
- (A) $K_1 = \sqrt{K_2} = K_3$ (B) $K_1 = \frac{1}{K_2} = \frac{1}{K_3}$ (C) $K_1 = \frac{1}{K_2} = K_3$ (D) $K_1 = \frac{1}{K_2} = \frac{1}{(K_3)^2}$
- Q.33 Which of the oxide groups among the following cannot be reduced by carbon :-
 (A) $\text{Fe}_2\text{O}_3, \text{ZnO}$ (B) $\text{PbO}, \text{Fe}_2\text{O}_4$ (C) $\text{Cu}_2\text{O}, \text{SnO}_2$ (D) $\text{CaO}, \text{K}_2\text{O}$
- Q.34 The most basic compound among the following is :-
 (A) Acetanilide (B) Benzylamine (C) p-Nitro aniline (D) Aniline
- Q.35 The entropy of a sample of a certain substance increases by 0.836 JK^{-1} on adding reversibly 0.3344 J of heat at constant temperature. The temperature of the sample is:
 (A) 0.4 K (B) 2.5 K (C) 0.016 K (D) 0.3 K
- Q.36 Which one of the following compounds is an anti fertility drug?
 (A) Penicillin (B) Saheli (C) Chloromycetin (D) Aspirin
- Q.37 The concentrated sulphuric acid that is peddled commercially is 95% H_2SO_4 by weight. If the density of this commercial acid is 1.834 g cm^{-3} , the molarity of this solution is:
 (A) 17.8 M (B) 15.7 M (C) 10.5 M (D) 12.0 M
- Q.38 If x is the mass of the gas adsorbed on mass m of the absorbent at pressure p , Freundlich adsorption isotherm gives a straight line on plotting:
- (A) $\frac{x}{m}$ vs p (B) $\log \frac{x}{m}$ vs $\log p$ (C) $\log \frac{x}{m}$ vs p (D) $\frac{x}{m}$ vs $\frac{1}{p}$
- Q.39 For 1 mol of an ideal gas at constant temperature T , the plot of $(\log P)$ against $(\log V)$ is a (P : Pressure, V : Volume):
 (A) Straight line parallel to x-axis (B) Curve starting at origin
 (C) Straight line with a negative slope (D) Straight line passing through origin

- Q.40 Among the following, the species having the smallest bond is:-
 (A) NO (B) NO⁺ (C) O₂ (D) NO⁻
- Q.41 Which is not the correct statement ? (At nos. Ce = 58, Lu = 71, La = 57, Yb = 70)
 (A) Ce⁴⁺ has f⁰ configuration (B) Lu³⁺ has f¹⁴ configuration
 (C) Colour of Yb³⁺ ion is pink (D) La³⁺ is diamagnetic
- Q.42 $C_2H_5Br \xrightarrow{AgCN} X \xrightarrow[Zn-Hg/HCl]{Reduction} Y$, Here, Y is:-
 (A) n-propylamine (B) Isopropylamine
 (C) Ethyl methyl amine (D) Ethylamine
- Q.43 Which one of the following is a chain growth polymerization?
 (A) Starch (B) Polystyrene (C) Protein (D) Nucleic acid
- Q.44 The electron affinity of chlorine is 3.7 eV. 1 gram of chlorine is completely converted to Cl⁻ ion in a gaseous state. (1 eV = 23.06 kcal mol⁻¹). Energy released in the process is:
 (A) 2.4 kcal (B) 8.2 kcal (C) 7.2 kcal (D) 4.8 kcal
- Q.45 The d-electron configuration of Cr²⁺, Mn²⁺, Fe²⁺ and Co²⁺ are d⁴, d⁵, d⁶ and d⁷ respectively. Which one of the following will exhibit the lowest paramagnetic behavior?
 (At. nos. Cr = 24, Mn = 25, Fe = 26, Co = 27)
 (A) [Cr(H₂O)₆]²⁺ (B) [Co(H₂O)₆]²⁺ (C) [Mn(H₂O)₆]²⁺ (D) [Fe(H₂O)₆]²⁺
- Q.46 Reaction rate between two substances A and B is expressed as following : rate = k[A]ⁿ [B]^m If the concentration of A is doubled and concentration of B is made half of initial concentration, the ratio of the new rate to the earlier rate will be :-
 (A) m + n (B) $\frac{1}{2^{(m+n)}}$ (C) 2^(n-m) (D) n - m
- Q.47 A solid, has 'bcc' structure. If the distance of nearest approach between two atoms is 1.73 Å, the edge length of the cell is:-
 (A) 314.20 pm (B) 216 pm (C) 200 pm (D) 1.41 pm
- Q.48 Copper wire test for halogens is known as:
 (A) Duma's Test (B) Beilstein's Test (C) Lassigne's Test (D) Liebig's Test

- Q.49 A battery is constructed of Cr and $\text{Na}_2\text{Cr}_2\text{O}_7$. The unbalanced chemical equation when such a battery discharges is following : $\text{Na}_2\text{Cr}_2\text{O}_7 + \text{Cr} + \text{H}^+ \rightarrow \text{Cr}^{3+} + \text{H}_2\text{O} + \text{Na}^+$. If one Faraday of electricity is passed through the battery during the charging, the number of moles of Cr^{3+} removed from the solution is:-
- (A) $\frac{3}{3}$ (B) $\frac{2}{3}$ (C) $\frac{1}{3}$ (D) $\frac{4}{3}$
- Q.50 Green house gases can be arranged in 'Global Warming Potential' sequence as:
- (A) $\text{CFC} > \text{N}_2\text{O} > \text{CH}_4 > \text{CO}_2$ (B) $\text{N}_2\text{O} > \text{CFC} > \text{CH}_4 > \text{CO}_2$
 (C) $\text{CFC} > \text{CO}_2 > \text{N}_2\text{O} > \text{CH}_4$ (D) $\text{CO}_2 > \text{CFC} > \text{N}_2\text{O} > \text{CH}_4$
- Q.51 Among the following which is the best description of water in the solid phase?
- (A) Covalent solid (B) Ionic solid (C) Molecular solid (D) Network solid
- Q.52 The solubility (in mol L^{-1}) of AgCl ($K_{\text{sp}} = 1.0 \times 10^{-10}$) in a 0.1 M KCl solution will be:
- (A) 1.0×10^{-9} (B) 1.0×10^{-5} (C) 1.0×10^{-11} (D) 1.0×10^{-10}
- Q.53 Which of the following cannot be represented by resonance structures?
- (A) Dimethyl ether (B) Carboxylate anion (C) Toluene (D) Nitrate anion
- Q.54 All of the following statements apply to proteins EXCEPT:
- (A) Proteins generally have no definite melting point
 (B) Proteins contain the grouping $-\text{CO.NH}-$ (C) Proteins have high molecular weight
 (D) Proteins can only contain the elements C, H, O and N
- Q.55 How many cyclic structures are possible for C_4H_6 :
- (A) 3 (B) 5 (C) 4 (D) 6
- Q.56 Among the following the order of reactivity toward nucleophilic addition is:
- (A) $\text{HCHO} > \text{CH}_3\text{CHO} > \text{CH}_3\text{COCH}_3$ (B) $\text{CH}_3\text{CHO} > \text{HCHO} > \text{CH}_3\text{COCH}_3$
 (C) $\text{CH}_3\text{CHO} > \text{CH}_3\text{COCH}_3 > \text{HCHO}$ (D) $\text{CH}_3\text{COCH}_3 > \text{CH}_3\text{CHO} > \text{HCHO}$
- Q.57 The limiting line in Balmer series will have a frequency of:
 (Rydberg constant, $R_\infty = 3.29 \times 10^{15}$ cycles/s)
- (A) $3.65 \times 10^{14} \text{ s}^{-1}$ (B) $8.22 \times 10^{14} \text{ s}^{-1}$ (C) $3.29 \times 10^{15} \text{ s}^{-1}$ (D) $5.26 \times 10^{13} \text{ s}^{-1}$
- Q.58 Based on lattice energy and other considerations, which one of the following alkali metal chloride is expected to have the highest melting point?
- (A) RbCl (B) LiCl (C) KCl (D) NaCl
- Q.59 The ratio of number of oxygen atom (O) in 16.0 g ozone (O_3), 28.0 g carbon monoxide (CO) and 16.0 g oxygen (O_2) is (Atomic mass : C = 12, O = 16 and Avogadro's constant $N_A = 6.0 \times 10^{23} \text{ mol}^{-1}$):
- (A) 3 : 1 : 1 (B) 1 : 1 : 2 (C) 3 : 1 : 2 (D) 1 : 1 : 1
- Q.60 The IUPAC name of the compound $\text{H}_2\text{C} \begin{array}{c} \diagup \text{O} \diagdown \\ \text{---} \end{array} \text{CH} - \text{CH}$ is:
- (A) 1,2-Epoxy propane (B) Propylene oxide (C) 1, 2-Oxo propane (D) 1, 2-Propoxide

- Q.61 The statement that is TRUE among the following is :-
 (A) The contra positive of $3x + 2 = 8 \Rightarrow x = 2$ is $x \neq 2 \Rightarrow 3x + 2 \neq 8$.
 (B) $p \vee q$ and $p \wedge q$ have the same truth value
 (C) The converse of $\tan x = 0 \Rightarrow x = 0$ is $x \neq 0 \Rightarrow \tan x = 0$
 (D) $p \Rightarrow q$ is equivalent to $p \wedge \sim q$
- Q.62 Let $y(x)$ be a solution of $\frac{(2 + \sin x) dy}{(1 + y) dx} = \cos x$. If $y(0) = 2$, then $y\left(\frac{\pi}{2}\right)$ equals:
 (A) 2 (B) $5/2$ (C) $7/2$ (D) 3
- Q.63 Let Z_1 and Z_2 be any two complex numbers.
 Statement-1 : $|Z_1 - Z_2| \geq |Z_1| - |Z_2|$.
 Statement-2 : $|Z_1 + Z_2| \leq |Z_1| + |Z_2|$.
 (A) Statement-1 is true, Statement-2 is true and Statement-2 is the correct explanation of Statement-1.
 (B) Statement-1 is true, Statement-2 is true and Statement-2 is not the correct explanation of statement-1.
 (C) Statement-1 is true, Statement-2 is false
 (D) Statement-1 is false, Statement-2 is true
- Q.64 ABCD a parallelogram The position vectors of A and Care respectively, $3\hat{i} + 3\hat{j} + 5\hat{k}$ and $\hat{i} - 5\hat{j} - 5\hat{k}$
 If M is the mid-point of the diagonal DB, then the magnitude of projection of \overline{OM} on \overline{OC} , where O is the origin is:
 (A) $\frac{7}{\sqrt{50}}$ (B) $7\sqrt{50}$ (C) $\frac{7}{\sqrt{51}}$ (D) $7\sqrt{51}$
- Q.65 If the straight lines $x + 3y = 4$, $3x + y = 4$ and $x + y = 0$ form a triangle, then the triangle is:-
 (A) Scalene (B) Equilateral (C) Isosceles (D) Right angled isosceles
- Q.66 Let X and Y are two events such that $P(X \cap Y) = P(X \cup Y)$.
 Statement-1 : $P(X \cap Y') = P(X' \cap Y) = 0$.
 Statement-2 ; $P(X) + P(Y) = 2P(X \cap Y)$.
 (A) Statement-1 is true, Statement-2 is true and Statement-2 is the correct explanation of Statement-1.
 (B) Statement-1 is true, Statement-2 is true and Statement-2 is not the correct explanation of statement-1.
 (C) Statement-1 is true, Statement-2 is false
 (D) Statement-1 is false. Statement-2 is true
- Q.67 If the number of 5-element subsets of the set $A = \{a_1, a_2, \dots, a_{20}\}$ of 20 distinct elements is k times the number of 5-element subsets containing a_4 then k is :-
 (A) 5 (B) $20/7$ (C) 4 (D) $10/3$

- Q.68 The parabola $y^2 = x$ divides the circle $x^2 + y^2 = 2$ into two parts whose areas are in the ratio :-
 (A) $9\pi - 2 : 3\pi + 2$ (B) $9\pi + 2 : 3\pi - 2$ (C) $7\pi - 2 : 2\pi - 3$ (D) $7\pi + 2 : 3\pi + 2$
- Q.69 If $x + |y| = 2y$ then y as a function of x , at $x = 0$ is:
 (A) Neither continuous nor differentiable (B) Continuous as well as differentiable
 (C) Differentiable but not continuous (D) Continuous but not differentiable

- Q.70 If $A = \begin{pmatrix} \alpha - 1 \\ 0 \\ 0 \end{pmatrix}$, $B = \begin{pmatrix} \alpha + 1 \\ 0 \\ 0 \end{pmatrix}$ be two matrices, then AB^T is a non-zero matrix for $|\alpha|$ not equal to:

(A) 1 (B) 3 (C) 0 (D) 2

- Q.71 A line with positive direction cosines passes through the point $P(2, -1, 2)$ and makes equal angles with the coordinate axes. If the line meets the plane $2x + y + z = 9$ at point Q , then the length PQ equals:

(A) 2 (B) $\sqrt{3}$ (C) 1 (D) $\sqrt{2}$

- Q.72 Let $f(x) = \sin x$, $g(x) = x$.

Statement-1 : $f(x) \leq g(x)$ for x in $(0, \infty)$.

Statement-2 : $f(x) \leq 1$ for x in $(0, \infty)$ but $g(x) \rightarrow \infty$ as $x \rightarrow \infty$.

- (A) Statement-1 is true, Statement-2 is true and Statement-2 is the correct explanation of Statement-1.
 (B) Statement-1 is true, Statement-2 is true and Statement-2 is not the correct explanation of statement-1.
 (C) Statement-1 is true, Statement-2 is false.
 (D) Statement-1 is false, Statement-2 is true.

- Q.73 The point of intersection of the lines $(a^3 + 3)x + ay + a - 3 = 0$ and $(a^5 + 2)x + (a + 2)y + 2a + 3 = 0$ (a real) lies on the y-axis for :-

(A) No value of a (B) Exactly two values of a
 (C) More than two values of a (D) Exactly one value of a

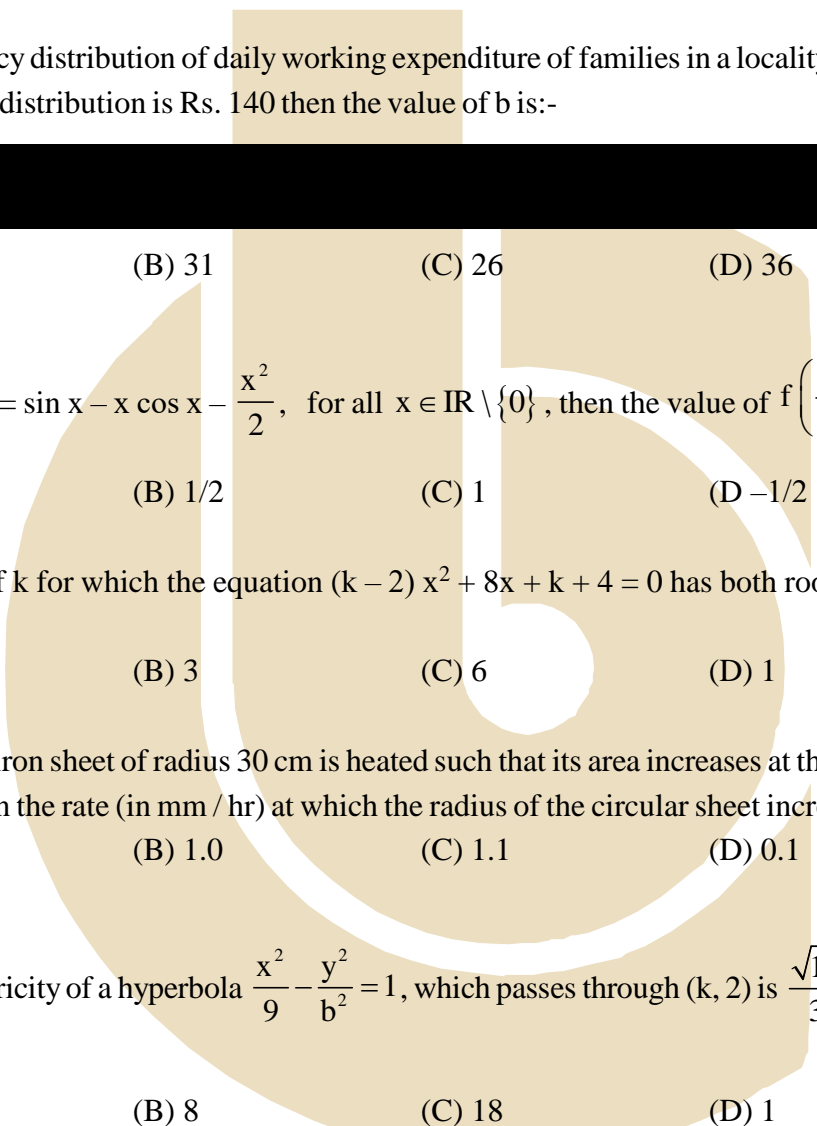
- Q.74 $\lim_{x \rightarrow 0} \left(\frac{x - \sin x}{x} \right) \sin \left(\frac{1}{x} \right)$

(A) Equals -1 (B) Equals 1 (C) Does not exist (D) Equals 0

- Q.75 If two vertical poles 20 m and 80 m high stand apart on a horizontal plane, then the height (in m) of the point of intersection of the lines joining the top of each pole to the foot of other is:

(A) 16 (B) 15 (C) 50 (D) 18

- Q.76 If $f(y) = 1 - (y - 1) + (y - 1)^2 - (y - 1)^3 + \dots - (y - 1)^{17}$ then the coefficient of y^2 in it is:
 (A) ${}^{17}C_3$ (B) ${}^{18}C_3$ (C) ${}^{17}C_2$ (D) ${}^{18}C_2$
- Q.77 The difference between the fourth term and the first term of a Geometric Progression is 52. If the sum of its first three terms is 26, then the sum of the first six terms of the progression is:
 (A) 189 (B) 364 (C) 63 (D) 728
- Q.78 The sum of the series $1^1 + 2.2^2 + 3^2 + 2.4^2 + 5^2 + 2.6^2 + \dots + 2(2m)^2$ is:
 (A) $m^2(2m + 1)$ (B) $m(m + 2)^2$ (C) $m^2(m + 2)$ (D) $m(2m + 1)^2$
- Q.79 If $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$, $\vec{b} = 2\hat{i} + 3\hat{j} - \hat{k}$ and $\vec{c} = \lambda\hat{i} + \hat{j} - (2\lambda - 1)\hat{k}$ are coplanar vectors, then λ is equal to:
 (A) 1 (B) 2 (C) -1 (D) 0
- Q.80. Statement-1 : $y - mx - \frac{1}{m}$ is always a tangent to the parabola, $y^2 = -4x$ for all non-zero values of m .
 Statement-2 : Every tangent to the parabola, $y^2 = -4x$ will meet its axis at a point whose abscissa is non-negative.
 (A) Statement-1 is true, Statement-2 is true and Statement-2 is the correct explanation of Statement-1.
 (B) Statement-1 is true, Statement-2 is true and Statement-2 is not the correct explanation of statement-1.
 (C) Statement-1 is true, Statement-2 is false.
 (D) Statement-1 is false, Statement-2 is true.
- Q.81 The equation of the circle passing through the point (1, 2) and through the points of intersection of $x^2 + y^2 - 4x - 6y - 21 = 0$ and $3x + 4y + 5 = 0$ is given by :-
 (A) $x^2 + y^2 + 2x + 2y + 11 = 0$ (B) $x^2 + y^2 + 2x + 2y - 11 = 0$
 (C) $x^2 + y^2 - 2x + 2y - 7 = 0$ (D) $x^2 + y^2 + 2x - 2y - 3 = 0$
- Q.82 If the system of equations
 $x + y + z = 6$
 $x + 2y + 3z = 10$
 $x + 2y + \lambda z = 0$
 has a unique solution, then λ is not equal to :-
 (A) 0 (B) 3 (C) 1 (D) 2
- Q.83 Let $f(x)$ be an indefinite integral of $\cos^3 x$
 Statement-1 : $f(x)$ is a periodic function of period π .
 Statement-2 : $\cos^3 x$ is a periodic function.
 (A) Statement-1 is true, Statement-2 is true and Statement-2 is the correct explanation of Statement-1.
 (B) Statement-1 is true, Statement-2 is true and Statement-2 is not the correct explanation of statement-1.
 (C) Statement-1 is true, Statement-2 is false (D) Statement-1 is false, Statement-2 is true

- Q.84 The range of the function $f(x) = \frac{x}{1+|x|}$, $x \in \mathbf{R}$, is:
 (A) $[-1, 1]$ (B) \mathbf{R} (C) $\mathbf{R} - \{0\}$ (D) $(-1, 1)$
- Q.85 The values of a for which the two points $(1, a, 1)$ and $(-3, 0, a)$ lie on the opposite sides of the plane $3x + 4y - 12z + 13 = 0$, satisfy:-
 (A) $0 < a < 1/3$ (B) $a = 0$ (C) $-1 < a < 0$ (D) $a < -1$ or $a > 1/3$
- Q.86 The frequency distribution of daily working expenditure of families in a locality is as follows. If the mode of the distribution is Rs. 140 then the value of b is:-

 (A) 34 (B) 31 (C) 26 (D) 36
- Q.87 If $\int_e^x t f(t) dt = \sin x - x \cos x - \frac{x^2}{2}$, for all $x \in \mathbf{IR} \setminus \{0\}$, then the value of $f\left(\frac{\pi}{6}\right)$ is:
 (A) 0 (B) $1/2$ (C) 1 (D) $-1/2$
- Q.88 The value of k for which the equation $(k-2)x^2 + 8x + k + 4 = 0$ has both roots real, distinct and negative is:
 (A) 4 (B) 3 (C) 6 (D) 1
- Q.89 If a circular iron sheet of radius 30 cm is heated such that its area increases at the uniform rate of 6π cm^2/hr , then the rate (in mm / hr) at which the radius of the circular sheet increases is:
 (A) 2.0 (B) 1.0 (C) 1.1 (D) 0.1
- Q.90 If the eccentricity of a hyperbola $\frac{x^2}{9} - \frac{y^2}{b^2} = 1$, which passes through $(k, 2)$ is $\frac{\sqrt{13}}{3}$, then the value of k^2 is:
 (A) 2 (B) 8 (C) 18 (D) 1

ANSWER KEY										PAPER-2
Q.	1	2	3	4	5	6	7	8	9	10
A.	D	B	C	D	A	A	D	B	B	A
Q.	11	12	13	14	15	16	17	18	19	20
A.	C	D	D	A	D	A	B	A	D	D
Q.	21	22	23	24	25	26	27	28	29	30
A.	A	A	A	B	D	D	C	D	C	B
Q.	31	32	33	34	35	36	37	38	39	40
A.	C	D	D	B	B	B	A	B	C	B
Q.	41	42	43	44	45	46	47	48	49	50
A.	C	C	B	A	B	C	C	B	C	D
Q.	51	52	53	54	55	56	57	58	59	60
A.	C	A	A	D	C	A	B	D	D	A
Q.	61	62	63	64	65	66	67	68	69	70
A.	A	C	B	C	C	B	C	A	D	A
Q.	71	72	73	74	75	76	77	78	79	80
A.	B	A	B	D	A	B	D	D	D	B
Q.	81	82	83	84	85	86	87	88	89	90
A.	B	B	D	D	D	D	D	B	B	C