Q.1     Which of the following are used for running magnetically levitated superfast trains?

(a)Diamagnets                          (b) Paramagnets

(c)Ferromagnets                        (d) Superconducting magnets

Q.2     If a is the length of the side of a cube, the distance between the body center atom and one corner atom in the cube will be

(a) $\frac{2}{\sqrt{3}}$a                          (b) $\frac{4}{\sqrt{3}}$a

(c) $\frac{\sqrt{3}}{4}$a                          (d) $\frac{\sqrt{3}}{2}$a

Q.3     $6.02 \times 10^{20}$ molecules of urea are present in 100mL of its solution. The concentration of solution is

(a)0.02M                                (b)0.01 M

(c)0.001 M                              (d) 0.1M

Q.4     Resistance of 0.2M Solution of an electrolyte is 50Ω. The Specific conductance of the solution is $1.3 Sm^{-1}$ If resistance of the 0.4M solution of the same electrolyte is 260 Ω, its molar Conductivity is

(a) 625 S $m^2$ $mol^{-1}$

(b) $6.25 \times 10^{-4}$ S $m^2$ $mol^{-1}$

(c) $625 \times 10^{-4}$ S $m^2$ $mol^{-1}$

(d) 62.5 S $m^2$ $mol^{-1}$

Q.5     For the elementary reaction M→N, the rate or disappearance of M increases by a factor of 8 upon doubling the concentration of M. The oder of the reaction with respect to M is

(a)4                                    (b)3

(c) 2                                    (d) 1

Q.6     Which property of colloidal solutions is independent of charge on the colloidal particles?

(a) Coagulation                        (b) Electrophoresis

(c) Electroosmosis                     (d) Tyndall effect

Q.7     In the extraction of copper from its sulphide ore, the metal finally obtained by the reduction of cuprous oxide with

(a) Copper (I) sulphide($Cu_2S$)        (b) Sulphur dioxide($SO_2$)

(c) iron sulphide(FeS)                  (d)carbon Monoxide(CO)

Q.8     The Correct order of the basic strength of amines in aqueous medium is

(a) $C_2H_5NH_2 > (C_2H_5)_2NH > (C_2H_5)_3N$

(b) $C_2H_5NH_2 > (C_2H_5)_3N > (C_2H_5)_2NH$

(c)$(C_2H_5)_2NH>(C_2H_5)_3N>C_2H_5NH_2$

(d) $(C_2H_5)_2NH>C_2H_5NH_2>(C_2H_5)_3N$
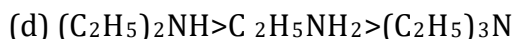
Q.9    Potentiometer measures the potential difference more accurately than a voltmeter because

(a) It has a wire of high resistance

 (b) It has a wire of low resistance

(c) It does not draw current from external circuit

(d) It draws a heavy current from external circuit

Q.10   The graph show the variation of voltage V across the plates of tow capacitors A and B versus increase of charge Q stored in them. Which of the capacitors has higher capacitance?

(a) Capacitor A                          (b) Capacitor B

(c) Both (a) and (b)                     (d) None of these
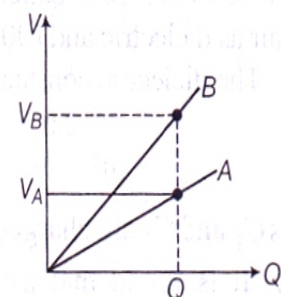
Q.11   A conductor with rectangular cross-section has dimensions ($a\times 2a \times 4a$) as shown in figure. Resistance across AB is $R_1$, Across CD is $R_2$ and across EF is $R_3$.Then,
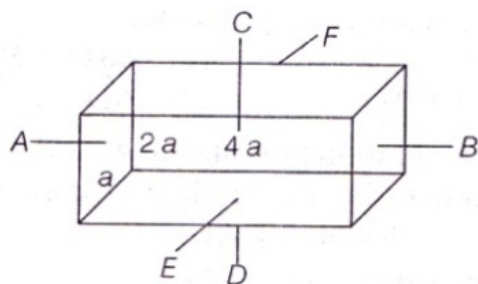
(a) $R_1=R_2=R_3$                         (b) $R_1>R_3>R_2$

(c) $R_2>R_3>R_1$                         (d) None of these.

Q.12   A inductor L and a capacitor C are connected in the circuit as shown in the figure. The frequency of the power supply is equal to the resonant frequency of the circuit. Which ammeter will read zero ampere?

$E=E_0 \sin \omega t$
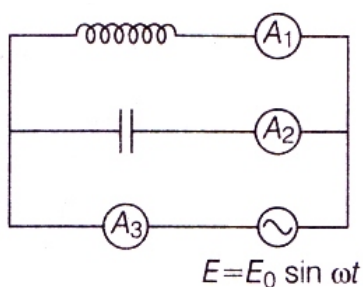
(a) $A_1$                     (b) $A_2$

(c) $A_3$                     (d) None of these

Q.13   If the potential energy of the electron in the hydrogen atom is $\frac{-Ke^2}{r}$, its kinetic energy

is

(a) $\frac{-Ke^2}{2r}$                   (b) $\frac{-Ke^2}{r}$

(c) $\frac{Ke^2}{2r}$                   (d) $\frac{Ke^2}{r}$

Q.14   A Square of side L meters lies in the x-y plane in a region, Where the magnetic field is given by $B=B_0(2\hat{i}+3\hat{j}+4\hat{k})$ T, where $B_0$ is Constant, The magnitude of flux Passing through the square is

(a) $2B_0 L^2$ Wb                (b) $3B_0 L^2$ Wb

(c) $4B_0 L^2$ Wb                (d) $\sqrt{29}\, B_0 L^2$ Wb

Q.15   Two Conducting wires X and Y of diameter ratio 2:1 but different materials are joined in series across a battery. If number density of electrons in X is twice that in Y, find the ratio of electrons in the two wires.

(a)   $\frac{1}{8}$                     (b)   $\frac{1}{5}$

(c)   $\frac{5}{8}$                     (d)   $\frac{3}{2}$

Q.16   If $z = (\lambda+3) + i\sqrt{3-\lambda^2}$, then locus of z is
(A) circle                     (B) parabola
(C) line                       (D) none of these

Q.17   The determinant $\Delta = \begin{vmatrix} a & b & a\alpha+b \\ b & c & b\alpha+c \\ a\alpha+b & b\alpha+c & 0 \end{vmatrix}$ is equal to zero if :

(A) a, b, c are in A.P.            (B) a, b, c are in G.P.
(C) a, b, c are in H.P.            (D) none of these

Q.18   Let $f(x) = (1 + b^2)x^2 + 2bx + 1$ and let m(b) be the minimum value of f(x). As b varies, the range of m(b) is

(A) [0, 1]                   (B) $\left[0, \frac{1}{2}\right]$

(C) $\left[\frac{1}{2}, 1\right]$                  (D) (0, 1]

Q.19   Let $r^{th}$ term of a series be given by $t_r = \dfrac{r}{1-3r^2+r^4}$. Then $\lim\limits_{n\to\infty}\sum\limits_{r=1}^{n} t_r$ is

(A) 3/2                    (B) 1/2
(C) -1/2                   (D) −3/2

Q.20　Let g(x) = 1+ x − [x] and f(x) = $\begin{cases} -1 & x < 0 \\ 0 & x = 0 \\ 1 & x > 1 \end{cases}$. Then for all x, f {g(x)} is equal to :

　　　(A) x　　　　　　　　　　　　　　　　(B) 1
　　　(C) f(x)　　　　　　　　　　　　　　　(D) g(x)

Q.21　Derivative of $\sec^{-1}\left(\dfrac{1}{2x^2-1}\right)$ w.r.t. $\sqrt{1-x^2}$ at $x = \dfrac{1}{2}$ is :

　　　(A) 2　　　　　　　　　　　　　　　　(B) 4
　　　(C) 1　　　　　　　　　　　　　　　　(D) −2

Q.22　A ladder 5 m in length is resting against vertical wall. The bottom of the ladder is pulled along the ground away from the wall at the rate of 1.5 m/sec. The length of the highest point of the ladder when the foot of the ladder is 4.0 m away from the wall decreases at the rate of

　　　(A) 2 m/sec　　　　　　　　　　　　　(B) 3 m/sec
　　　(C) 2.5 m/sec　　　　　　　　　　　　(D) 1.5 m/sec

Q.23　$\displaystyle\int_{-1}^{1}\{[x]+|x|\}dx$ has the value is :

　　　(A) 0　　　　　　　　　　　　　　　　(B) 1/2
　　　(C) 1　　　　　　　　　　　　　　　　(D) 1/4

Q.24　If $x\dfrac{dy}{dx} = y(\log y - \log x + 1)$ then the solution of the equation is :

　　　(A) $\log\dfrac{x}{y} = cy$　　　　　　　　　(B) $\log\dfrac{y}{x} = cy$

　　　(C) $\log\dfrac{x}{y} = cx$　　　　　　　　　(D) $\log\dfrac{y}{x} = cx$

Q.25　The number of solution of $|x^2-4|=2$ is :
　　　(A) 0　　　　　　　　　　　　　　　　(B) 1
　　　(C) 2　　　　　　　　　　　　　　　　(D) 3

## ANSWER KEY

| | | | | |
|---|---|---|---|---|
| 1.d | 2.c | 3.b | 4.a | 5.b |
| 6.d | 7.a | 8.c | 9.c | 10.b |
| 11.b | 12.c | 13.c | 14.d | 15.a |
| 16.a | 17.a | 18.a | 19.c | 20.b |
| 21.b | 22.a | 23.c | 24.d | 25.d |