QUESTION PAPER

Mathematics

1. If the area bounded by the curves $y = kx^2$ and $x = ky^2$ is 1, then value of k is $(k > 0)$
(A) $\frac{2}{\sqrt{3}}$
(B) $\frac{1}{\sqrt{3}}$
(C) $\sqrt{3}$
(D) $\frac{\sqrt{3}}{2}$

2. If there are 140 students numbered from 1 to 140; out of which those divisible by 2 took maths, those divisible by 3 took physics and those divisible by 5 took chemistry. Then the number of candidates those didn't take any subject
(A) 1
(B) 102
(C) 38
(D) 42

3. Let $I = \int_a^b (x^4 - 2x^2)dx$ then the ordered pair (a, b) for which the value of I is minimum. $(b > 0)$, is
(A) $(\sqrt{2}, -\sqrt{2})$
(B) $(0, \sqrt{2})$
(C) $(-\sqrt{2}, \sqrt{2})$
(D) $(\sqrt{2}, 0)$

4. Let $y(x)$ be the solution of the differential equation $\frac{dy}{dx} + \frac{3y}{\cos^2 x} = \frac{1}{\cos^2 x}$ and $y\left(\frac{\pi}{4}\right) = \frac{4}{3}$, then the value of $y\left(-\frac{\pi}{4}\right)$ is equal to
(A) $-\frac{4}{3}$
(B) $\frac{1}{3}$
(C) $e^6 + \frac{1}{3}$
(D) 3

5. A coin is tossed. If head turns up then pair of dice is thrown and sum of numbers is noted. If tail turns up then a card numbered from 1 to 9 is drawn and number is noted. The probability that the sum of numbers on dice or the number on card is 7 or 8, is:
(A) $\frac{13}{36}$
(B) $\frac{15}{72}$
(C) $\frac{19}{72}$
(D) $\frac{11}{36}$

6. If $\sum_{i=1}^{n=20}\left(\frac{{}^{20}C_{i-1}}{{}^{20}C_i+{}^{20}C_{i-1}}\right)^3=\frac{k}{21}$ then the value of k is
(A) 400
(B) 100
(C) 50
(D) 200

7. If the third term in the expansion of $\left(1+x^{\log_2 x}\right)^5$ is 2560 then the value of x is
(A) $\frac{1}{4}$
(B) $2\sqrt{2}$
(C) $\frac{1}{8}$
(D) $4\sqrt{2}$

8. Let $5, 5r, 5r^2$ be the sides of a triangle then value of r cannot be
(A) $\frac{7}{4}$
(B) $\frac{3}{2}$
(C) $\frac{5}{4}$
(D) $\frac{3}{4}$

9. Let ABC is a triangular plane such that $AB=7, AC=6, BC=5,$ and D is mid point of $AC.$ A tower stand at mid point of AC subtending angle equal to 30^o at vertex B, then height of tower is
(A) $\frac{2\sqrt{7}}{3}$
(B) $7\sqrt{3}$
(C) $2\sqrt{7}$
(D) $\frac{3}{2}\sqrt{21}$

10. The equation of tangent to the hyperbola, $4x^2-5y^2=20$, which is parallel to $x-y=2$, is
(A) $x-y-3=0$
(B) $x-y-9=0$
(C) $x-y+1=0$
(D) $x-y+5=0$

11. The shortest distance of the point $\left(\frac{3}{2},0\right)$ from the curve space $y=\sqrt{x}$ is

(A) $\frac{\sqrt{5}}{2}$

(B) $\frac{5}{4}$

(C) $\sqrt{5}$

(D) $\frac{5}{2}$

12. Let the five observations be $1, 3, 8, x, y$. If their mean the value of $\frac{x}{y}$ is and variance are 5 and 9.2 respectively.

(A) $9:4$

(B) $6:7$

(C) $5:8$

(D) $2:4$

13. If the quadratic equation $(c-5)x^2 - 2cx + c - 4 = 0$ has one root in $(0, 2)$ and the other root in $(2, 3)$ then the number of integral values of c is

(A) 18

(B) 12

(C) 11

(D) 10

14. If the system of equations, $x + y + z = 1, x + 3y + 5z = \beta$ and $3x + 4y + \alpha z = 9$ has infinite solutions then the value of $(\alpha - \beta)$ is

(A) 18

(B) 13

(C) 5

(D) 8

15. If three complex numbers z, z_1, z_2 are such that $2|z_1| = 3|z_2|$ and $\frac{2}{3}\frac{z_1}{z_2} + \frac{3}{2}\frac{z_2}{z_1} = z$ then

(A) real part of z is 0

(B) imaginary part at z is 0

(C) $|z| = \frac{\sqrt{5}}{2}$

(D) $|z| = \frac{\sqrt{17}}{2\sqrt{2}}$

16. A plane passes through the point $(4, -1, 3)$ and is parallel to the lines $\frac{x+2}{3} = \frac{y-2}{-1} = \frac{z+2}{2}$ and $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{3}$. which of the following points also lies on the plane?

(A) $(1,1,1)$

(B) $(1,1,-1)$

(C) $(1,0,-1)$

(D) $(0,1,1)$

17. If the line $4x+3y=24$ then the incentre of triangle OAB is intersects the coordinate axis at points A and B respectively.

(A) $(4,4)$

(B) $(4,3)$

(C) $(3,4)$

(D) $(2,2)$

18. If $\sin^2 2\theta+\cos^4 2\theta=\frac{3}{4}, \theta\in\left[0,\frac{\pi}{2}\right]$ then the sum of all values of θ, is

(A) π

(B) $-\pi$

(C) $\frac{5\pi}{4}$

(D) $\frac{\pi}{2}$

19. $\int \frac{(\sin^n\theta-\sin\theta)^{\frac{1}{n}}\cos\theta}{\sin^{n+1}\theta} d\theta$ is equal to (C is an arbitrary constant)

(A) $\frac{n}{n^2-1}\left(1-\frac{1}{\sin^{n-1}\theta}\right)^{\frac{n+1}{n}}+C$

(B) $\frac{n}{n^2+1}\left(1-\frac{1}{\sin^{n-1}\theta}\right)^{\frac{n}{n+1}}+C$

(C) $\frac{n}{n^2+1}\left(1+\frac{1}{\sin^{n-1}\theta}\right)^{\frac{n}{n+1}}+C$

(D) $\frac{n}{n^2-1}\left(1-\frac{1}{\sin^{n-1}\theta}\right)^{\frac{n}{n+1}}+C$

20. The value of $\lim_{x\to 1^+}\frac{(1-|x|+\sin|1-x|)\sin\left([1-x]\frac{\pi}{2}\right)}{|1-x|[1-x]}$ is equal to

(A) 0

(B) 1

(C) -1

(D) 2

21. Let $f(x) = \begin{cases} \max(|x|, x^2), & |x| < 2 \\ 8 - 2|x|, & 2 < |x| < 4 \end{cases}$ then $f(x)$ is non-differentiable at

(A) $x \in \{-1, -2, 1, 2, 0\}$

(B) $x \in \{-2, 2\}$

(C) $x \in \phi$

(D) $x \in \{-1, -2, 1, 2\}$

22. If the curves $y^2 = 4b(x - c)$ and $y^2 = 8ax$ have a common normal, then (a, b, c) can be

(A) $(1, 1, 0)$

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

(C) $(1, 1, 3)$

(D) $\left(\frac{1}{2}, 2, 3\right)$

23. If a circle C passing through $(4, 0)$ touches the circle $x^2 + y^2 + 4x - 6y - 12 = 0$ at $(1, -1)$ then radius of the circle C is

(A) $5\sqrt{2}$

(B) $\sqrt{57}$

(C) 5

(D) 4

24. Consider $p(m) = m^2 - m + 41$

(A) $P(3)$ is prime, is true and $P(5)$ is prime, is true

(B) $P(3)$ is prime, is true and $P(5)$ is prime, is false

(C) $P(3)$ is prime, is false and $P(5)$ is prime, is true

(D) $P(3)$ is prime, is false and $P(5)$ is prime, is false

25. If a two digit number which when divided by 7 leaves the remainder 2 or 5 then the sum of all such possible numbers is

(A) 1356

(B) 1256

(C) 1456

(D) 1265

26. If $f: R \to R$, $f(x) = x^3 + f'(1)x^2 + f''(2)x + f'''(3)$, then $f(2)$ is equal to

(A) -2

(B) 30

(C) -4

(D) 8

Physics

1. In SI unit density is given as $128\ \text{kg/m}^3$. In a new system of units, unit of mass is taken as $50\ gm$ and unit of length is taken as $25\ cm$. Then what would be the magnitude of new density in this system.

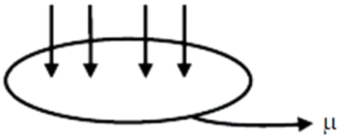
(A) 10

(B) 20

(C) 30

(D) 40

2. A floor mop cleaner of circular shape has radius R. A force F is applied uniformly on it in vertically downwards direction. Coefficient of friction between mop and floor is μ. The torque required to keep the mop rotating with constant angular velocity.



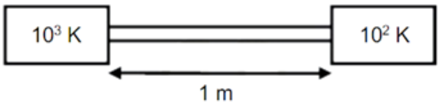
(A) μFR

(B) $\frac{2}{3}\mu FR$

(C) $\frac{\mu FR}{2}$

(D) $\frac{4\mu FR}{3}$

3. A Copper rod of length 1 meter and conductivity $K = 0.1 J/m\text{-}K$ is maintained at temperature $10^2 K$ and $10^3 K$ at its ends. The energy flux inside the rod in thermal equilibrium is.



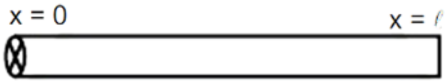
(A) 100

(B) 90

(C) 120

(D) 150

4. A rod is rotating n times per sec about an axis passing through one of its ends ($x = 0$). Its linear charge density is varying with distance as $\rho = \frac{\rho_0 x}{l}$, where ρ_o is positive constant and l is the total length of the rod. Find the net magnetic moment of the rod.



(A) $\rho_o l^3 n$

(B) $\frac{\pi n \rho_0 l^3}{3}$

(C) $\frac{\pi n \rho_0 l^3}{4}$

(D) $\frac{\pi n \rho_0 l^3}{6}$

5. Source of frequency f is moving with speed 34 m/s towards observer which is at rest. Another source of same frequency f is moving with speed 17 m/s towards the same observer. Then ratio of observed frequencies in first second case is. (Velocity of sound 340 m/s)

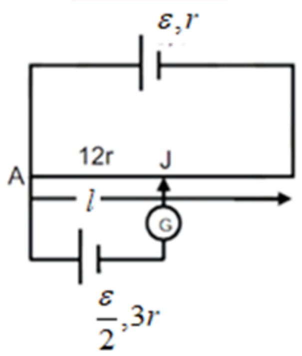
(A) $\frac{18}{17}$

(B) $\frac{19}{18}$

(C) $\frac{18}{19}$

(D) $\frac{17}{18}$

6. A potentiometer having wire of resistance $12r$ is connected to a battery of emf ε and internal resistance r. Find the balancing length if a cell of emf $\frac{\varepsilon}{2}$ and internal resistance $3r$ is connected as shown (AJ)



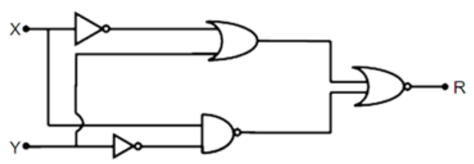
(A) $\frac{13\,l}{24}$

(B) $\frac{l}{2}$

(C) $\frac{11\,l}{24}$

(D) $\frac{3\,l}{4}$

7. In the LOGIC gate circuit, if the value of output (R) be 1 then the inputs X and Y can be.



(A) $X = 0, Y = 0$

(B) $X = 0, Y = 1$

(C) $X = 1, Y = 0$

(D) $X = 1, Y = 1$

8. Height of transmitter and receiver antenna are $140\ m$ and $40\ m$ respectively in LOS communication. Maximum possible distance between two antennas.

(A) $65\ km$

(B) $32\ km$

(C) $80\ km$

(D) $90\ km$

9. A plano convex lens has refractive index μ_1 and focal length f_1, another plano concave lens has refractive index μ_2 and focal length f_2. Radius of curvature in both lenses is same. If $f_1 = 2f_2$ then relation between μ_1 and μ_2.

(A) $2\mu_1 - \mu_2 = 2$

(B) $2\mu_1 - \mu_2 = 3$

(C) $\mu_1 - 2\mu_2 = 1$

(D) $2\mu_1 - \mu_2 = 1$

10. Resolving power of electron microscope varies with wavelength of electron. It can resolve a minimum distance wavelength upto $\lambda = 7.5 \times 10^{-12} m$. Then minimum KE of electron it is used as electron microscope.

(A) $25\ KeV$

(B) $50\ KeV$

(C) $500\ KeV$

(D) $1\ KeV$

11. A metal cube of side $2\ cm$ is travelling with a velocity $v = 6\ m/s\ \hat{j}$ in a magnetic field of $\vec{B} = 0.1\ T\hat{k}$, then find potential difference between two faces perpendicular to x –axis.

(A) $6\ mV$

(B) $12\ mV$

(C) $1\ mV$

(D) $18\ mV$

12. Two particles having maximum speed 1 km/s and 2 km/s are projected horizontally in all possible direction from the same point on ground. Find the ratio of maximum areas covered by the first to that by second.

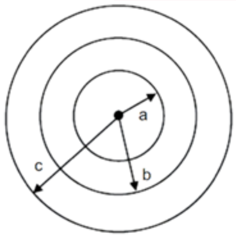
(A) $1:2$

(B) $1:16$

(C) $1:8$

(D) $1:4$

13. Q is distributed on three concentric conducting spheres of radius $a, b, c (a < b < c)$. Charge density of all three are same. Potential at $x = r (r < a)$ is.



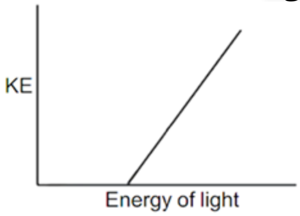
(A) $\frac{Q(a+b+c)}{4\pi\varepsilon_0(a^2+b^2+c^2)}$

(B) $\frac{Q}{4\pi\varepsilon_0}\left(\frac{ab+bc+ca}{(abc)}\right)$

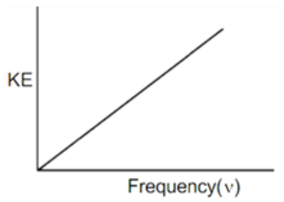
(C) $\frac{Q}{4\pi\varepsilon_0}\left(\frac{ab+bc+ca}{(a^3+b^3+c^3)}\right)$

(D) $\frac{Q}{16\pi\varepsilon_0}\left(\frac{a+b+c}{(ab+bc+ca)}\right)$

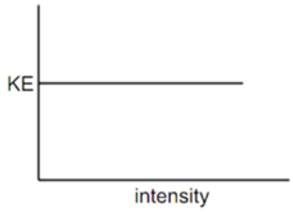
14. Which of the following graph is wrong for photo electric effect experiment?



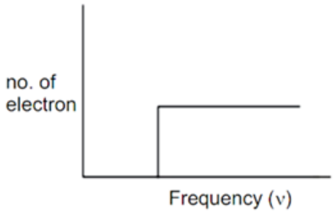
(A)



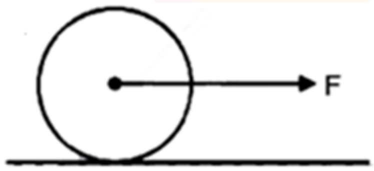
(B)



(C)

(D) 

15. Uniform solid cylindrical roller of mass m and R is rolled on ground without slipping by applying a constant horizontal force F. Find angular acceleration of cylinder.



(A) $\frac{F}{mR}$

(B) $\frac{2F}{mR}$

(C) $\frac{2F}{3mR}$

(D) $\frac{F}{3mR}$

16. A string fixed at both ends is vibrated by using a tuning fork of frequency 100 Hz. Mass of string is 5 gm and length is 1m. If tension in string is 8N, calculate distance between two consecutive nodes.

(A) 20 cm

(B) 40 cm

(C) 40 cm

(D) 30 cm

17. A block of mass m is kept on a platform. Platform starts moving upwards with an acceleration of $g/2$. Find the work done by normal force on the block in first one second?

(A) $\frac{3\,mg^2}{2}$

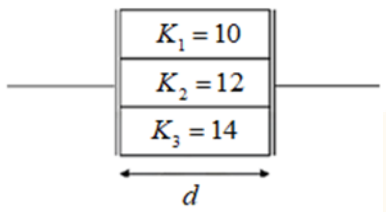
(B) zero

(C) $\frac{3mg^2}{8}$

(D) $\frac{3mg^2}{4}$

18. Figure shows a parallel plate capacitor with three dielectric slabs of same area $\frac{A}{3}$ and thickness d.

Find $K_{eq} = ?$



(A) 12

(B) 36

(C) 18

(D) 24

19. Speed of a satellite is V in its circular orbit. What is the kinetic energy of mass m, which is ejected from satellite so that it escape from gravitational field of Earth.

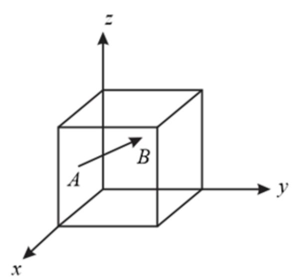
(A) $1/2\ mV^2$

(B) $2\ mV^2$

(C) mV^2

(D) $3/2\ mV^2$

20. Cube of side a is given in figure.



Equation of vector joining mid point of surface in $x - z$ plane to mid point of surface in $y - z$ plane.

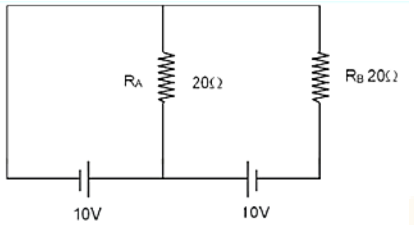
(A) $\frac{a}{2}\hat{\imath} - \frac{a}{2}\hat{\jmath}$

(B) $\frac{a}{2}\hat{\imath} + \frac{a}{2}\hat{\jmath}$

(C) $-\frac{a}{2}\hat{\imath} - \frac{a}{2}\hat{\jmath}$

(D) $-\frac{a}{2}\hat{\imath} + \frac{a}{2}\hat{\jmath}$

21. Two resistance R_A and R_B of 20Ω are connected as shown in the figure. Find current in R_A and R_B



(A) $\frac{1}{2}, 0$

(B) $0, \frac{1}{2}$

(C) $\frac{1}{2}, \frac{1}{2}$

(D) $1, 1$

22. A container has a hole at the bottom of area $1\ cm^2$. Liquid is being added at the rate $10^{-4}\ m^3/s$ into it so that height of liquid in container remains constant. The height of liquid in container at equilibrium is

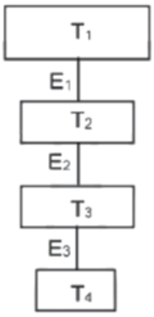
(A) $5.1\ cm$

(B) $10.2\ cm$

(C) $15.3\ cm$

(D) $20.4\ cm$

23. 3 carnot heat engines E_1, E_2 and E_3 operating from temperature T_1 and T_4 with middle temperatures T_2 and T_3. If all three engines have same efficiency calculate T_2 and T_3:



(A) $T_3 = (T_1^2 T_4)^{1/3}, T_2 = (T_1 T_4^2)^{1/3}$

(B) $T_3 = (T_1 T_4^2)^{1/3}, T_2 = (T_1^2 T_4)^{1/3}$

(C) $T_3 = (T_1 T_4)^{1/3}, T_2 = (T_1^2 T_4)^{1/3}$

(D) $T_3 = (T_1 T_4^2)^{1/3}, T_2 = (T_1 T_4)^{1/3}$

24. Two electric dipole $\overrightarrow{P_1} = -4Qa\,\hat{\imath}$ and $\overrightarrow{P_2} = -2\,Qa\,\hat{\imath}$ are at point A and B separate by distance r. Find the distance from point A where net electric potential is zero.

(A) $\left(\frac{\sqrt{2}r}{\sqrt{2}+2}\right)$

(B) $\left(\frac{\sqrt{2}r}{\sqrt{2}-2}\right)$

(C) $\left(\frac{\sqrt{2}r}{\sqrt{2}-1}\right)$

(D) $\left(\frac{\sqrt{2}r}{\sqrt{2}+1}\right)$

25. A conductive rod of total resistance $18\,\Omega$ is bent to form equilateral triangle. Find the equivalent resistance between two vertices.

(A) 4Ω

(B) 8Ω

(C) 12Ω

(D) 16Ω

26. Consider an EM wave with magnetic field $B = 10^{-4}\sin(wt - kx)$. Find maximum value of electric field

(A) 5×10^4

(B) 3×10^4

(C) 5×10^3

(D) 3×10^3

27. In $YDSE$, the slit separation is given as $d = 0.1mm$. At an angular position $\theta = \frac{1}{40}$ rad, maximum is found on the screen corresponding to two wavelengths namely, $\lambda_2$and λ_2, the value of which lies in the range of $(380 - 740\,nm)$. Then the value of λ_1 and λ_2 are

(A) $(400\,nm, 500nm)$

(B) $(380\,nm, 500nm)$

(C) $(625\,nm, 500nm)$

(D) $(740\,nm, 625nm)$

28. A particle of mass 0.03 kg is dropped from a tower of height 100 m. Simultaneously a bullet of mass 0.02 kg is fired with speed 100 m/s upwards. The bullet gets embedded into the particle. Calculate the maximum height achieved by the particle from the top of the building after the collision.

(A) 40 m

(B) 100 m

(C) 90 m

(D) 60 m

29. A carbon resistor of power $2W$ has resistance according to color codes Green, Black Red and Silver. Then max current through resistor is

(A) $1A$

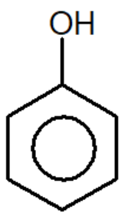
(B) 10 mA

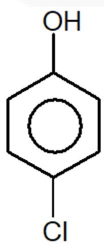
(C) 20 mA

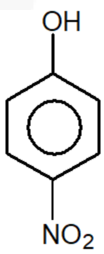
(D) 40 mA

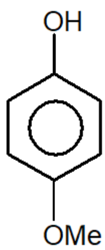
Chemistry

1. The correct order of pka values of the following compounds is:

(1) 

(2) 

(3) 

(4) 

(A) $I < II < III < IV$

(B) $III < II < I < IV$

(C) $III < I < II < IV$

(D) $II < III < I < IV$

2. Which option accurately describes the properties of two water samples A & B, having BOD 10 and 20?

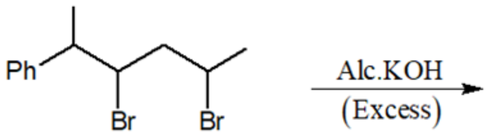
(A) A is more polluted

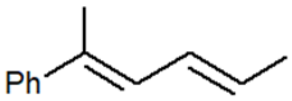
(B) B is more polluted

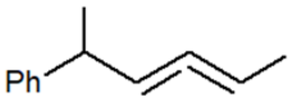
(C) A and B both are equally polluted

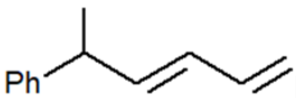
(D) A and B both are equally suitable for drinking.

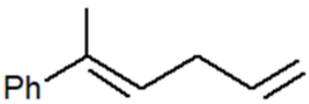
3. The major product of the following reaction is?



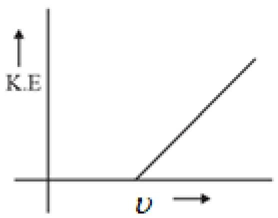
(A) 

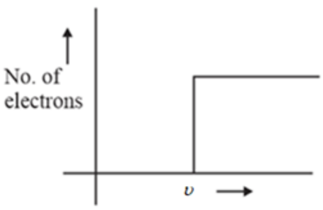
(B) 

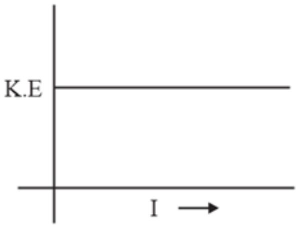
(C) 

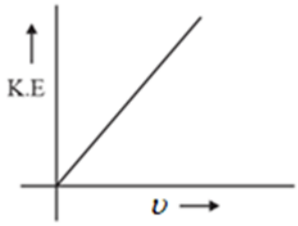
(D) 

4. Which of the following graphs is incorrect?

(A) 

(B) 

(C) 

(D) 

5. A crystal system having $a \neq b \neq c$ and $\alpha \neq \beta \neq \gamma \neq 90^o$, is called:

(A) Cubic

(B) Monoclinic

(C) Tetragonal

(D) Triclinic

6. The hybridization and no. of lone pair(s) on Xe in $XeOF_4$ are:

(A) $sp^2, 2$

(B) $sp^3, 2$

(C) $sp^3d^2, 1$

(D) $sp^3d^2, 2$

7. The total no. of possible isomers in square planar complex: $[MCl(NH_3)(NO_2)(SCN)]$ is:

(A) 14

(B) 12

(C) 8

(D) 4

8. The redox reaction which takes place in Hall Heroult's process is:

(A) $Cr_2O_3 + Al \rightarrow Al_2O_3 + Cr$

(B) $Zn + 2H^+ \rightarrow Zn^{2+} + H_2$

(C) $Al_2O_3 + C \rightarrow Al + CO_2$

(D) $ZnO + C \rightarrow CO + Zn$

9. Correct statement about the nature of H_2O_2 is:

(A) H_2O_2 acts as $O.A.$ as well as $R.A.$ in both acidic and alkaline medium.

(B) H_2O_2 acts as $O.A.$ only in acidic medium.

(C) H_2O_2 acts as $O.A.$ only in basic medium.

(D) H_2O_2 neither acts as $O.A.$ nor $R.A$ in any medium.

10. Which of following species has a 2π and a half σ bond?

(A) N_2

(B) O_2

(C) $N_2^{\oplus}$

(D) $O_2^{\oplus}$

11. The correct chemical formula of Wilkinson's catalyst is:

(A) $[RhCl(PPh_3)_3]$

(B) $[IrCl(PPh_3)_3]$

(C) $[RhCl(Et)_3]$

(D) $[IrCl(Et)_3]$

12. For given reactions

$N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$

$N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$

$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$

the value of K_P/K_C are respectively:

(A) $RT, (RT)^{-2}, 1$

(B) $1, RT, (RT)^{-2}$

(C) $1, (RT)^{-2}, RT$

(D) $(RT)^{-2}, RT, 1$

13. Liquids A and B form an ideal solution. Vapour pressure of pure A and B are $7 \times 10^3 Pa$ and $12 \times 10^3 Pa$ respectively. Find the vapour composition of A if its mole fraction in liquid solution is 0.4.

(A) $Y_A = 0.72 \;\; Y_B = 0.28$

(B) $Y_A = 0.4 \;\; Y_B = 0.6$

(C) $Y_A = 0.28 Y_B = 0.72$

(D) $Y_A = 0.56, Y_B = 0.44$

14. Which of the following processes doesn't use a heterogeneous catalyst?

(A) Combustion of Coal

(B) Vegetable oil Hydrogenation

(C) Haber's process

(D) Ostwald's process

15. For the given chemical reaction:

$Ca(OH)_2 + Na_2SO_4 \Rightarrow CaSO_4 + 2NaOH$

If 0.1 mole of $Ca(OH)_2$ and $1g$ of Na_2SO_4 are used, calculate the mass of $CaSO_4$ formed and concentration of OH^- ions for a $100ml$ of solution.

(A) $9.52g, 2M$

(B) $0.952\ g, 2M$

(C) $9.52g, 02M$

(D) $0.952g, 0.02\ M$

16. The no. of radioactive isotope(s) of Hydrogen and total no. of isotopes of Hydrogen are:

(A) $1, 3$

(B) $0, 3$

(C) $1, 2$

(D) $2, 3$

17. Which of the following is a suitable method for differential extraction of Dichloromethane and water?

(A) Dichloromethane makes water turbid.

(B) Dichloromethane settles as precipitate in water.

(C) Water and Dichloromethane form layer I and II in separating funnel.

(D) Dichloromethane and water form layer I and II in separating funnel.

18. $Ca^{2+} + 2e^{\ominus} \rightarrow Ca \quad E^o = -2.86V$

$Mg^{2+} + 2e^{\ominus} \rightarrow Mg \quad E^o = -2.17V$

$Zn^{2+} + 2e^{\ominus} \rightarrow Zn \quad E^o = -0.76V$

$Ni^{2+} + 2e^{\ominus} \rightarrow Ni \quad E^o = -0.28V$

Arrange above in increasing order of reducing power.

(A) $Ca < Mg < Zn < Ni$

(B) $Ca < Zn < Mg < Ni$

(C) $Ca < Zn < Ni < Mg$

(D) $Ni < Zn < Mg < Ca$

19. Element having similar Electronegativity to Al is:

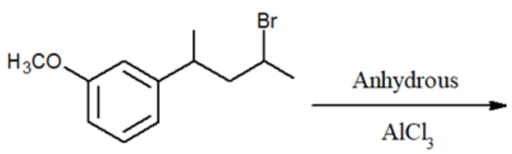
(A) Be

(B) Li

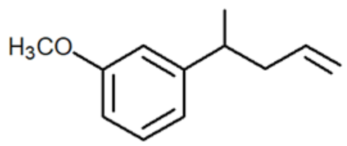
(C) B

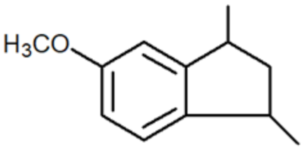
(D) C

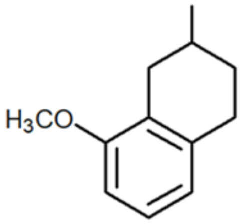
20.

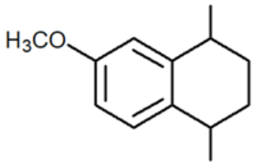


The major product will be:

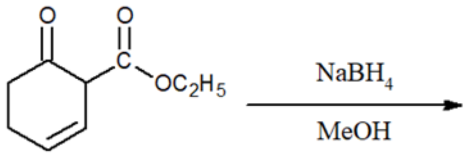
(A) 

(B) 

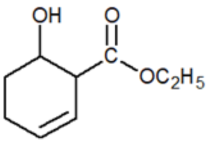
(C) 

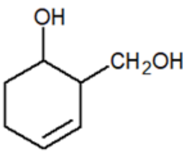
(D) 

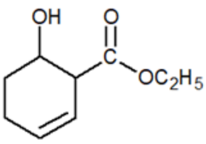
21.

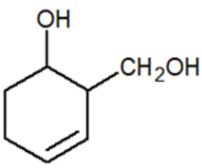


The Major product will be:

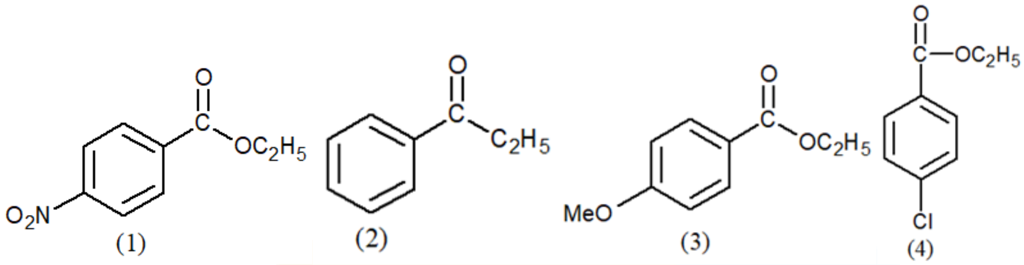
(A) 

(B) 

(C) 

(D) 

22. Arrange the following compounds in increasing order of their speed of hydrolysis in alkaline medium.



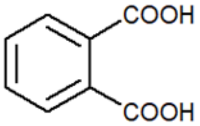
(A) $3 < 4 < 2 < 1$

(B) $3 < 2 < 4 < 1$

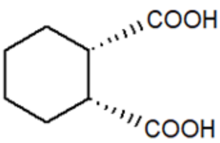
(C) $1 < 4 < 3 < 2$

(D) $4 < 1 < 2 < 3$

23. Which of the following compounds dehydrate with most difficulty?

(A) 

(B) $\begin{array}{l} CH_2-COOH \\ | \\ CH_2-COOH \end{array}$

(C) 

(D) $\begin{array}{l} CH_2-CH_2-COOH \\ | \\ CH_2-CH_2-COOH \end{array}$

24. $\overset{\delta}{C}H_3 - \overset{\gamma}{C}H_2 - \overset{\beta}{C}H = \overset{\alpha}{C}H_2 \xrightarrow{Br_2/hv}$

Most reactive position for the above substitution reaction is:

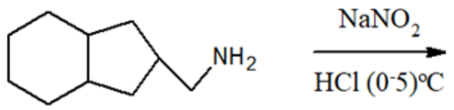
(A) α

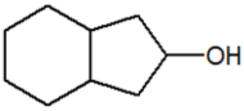
(B) β

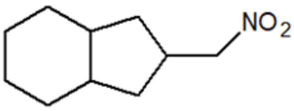
(C) γ

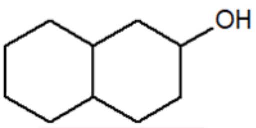
(D) δ

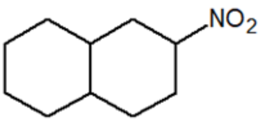
25. The main product of the given reaction is:



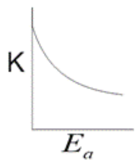
(A) 

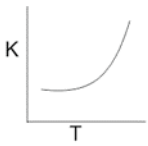
(B) 

(C) 

(D) 

26. Which of the following graph is true for Arrhenius equation in a temperature range $0^oC < T < 300^oC$?

(1) 

(2) 

(A) Both are corect.

(B) Both are incorrect

(C) 1 is correct, 2 is incorrect

(D) 1 is incorrect, 2 is correct.

27. Element used in X-ray tube is:

(A) Na

(B) Mg

(C) Be

(D) Ca

28. What is the minimum temperature required for a process with $\Delta H = 200\ J\ mol^{-1}$ and $\Delta S = 40\ j\ mol^{-1} k^{-1}$ to become spontaneous?

(A) $5K$

(B) $4K$

(C) $10K$

(D) $20K$