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KCET 2022 Question Paper with Solution

The Karnataka Common Entrance Test

KCET 2022 Solved Paper

Mathematics

Question 1

If all permutations of the letters of the word MASK are arranged in the order as in dictionary with or without meaning, which one of the following is 19^{th} word?

Options:

A. KAMS

B. AKMS

C. SAKM

D. AMSK

Answer: C

Solution:

Solution:

$AKMS$

$A \rightarrow 3!$

$K \rightarrow 3!$

$M \rightarrow 3!$

$SAKM \rightarrow \frac{1}{19}$

Question 2

If $a_1, a_2, a_3, \ldots, a_{10}$ is a geometric progression and $\frac{a_3}{a_1} = 25$, then $\frac{a_9}{a_5}$ equals

Options:

A. $3(5^2)$

B. 5^3

C. 5^4

D. $2(5^2)$

Answer: C

Solution:

Solution:

$$\frac{a_3}{a_1} = 25$$

$$\frac{ar^2}{a} = 25$$

$$r^2 = 5^2$$

$$\frac{a_4}{a_5} = \frac{ar^8}{ar^4} = r^4 = 5^4$$

Question 3

If the straight line 2x − 3y + 17 = 0 is perpendicular to the line passing through the points (7, 17) and (15, β), then β equals

Options:

A. -5

B. 29

C. 5

D. -29

Answer: C

Solution:

Solution:

The slope of the line $2x - 3y + 17 = 0$ is m_1.

The slope of line joining the points $(7, 17)$ and $(15, \beta)$ is $\frac{\beta - 17}{15 - 7} = \frac{\beta - 17}{8} = \mathrm{m}_2$

From the question given,

$m_1 m_2 = -1$

Now,

$$\Rightarrow \frac{2}{3} \times \frac{\beta - 17}{8} = -1$$

$$\Rightarrow \beta - 17 = -12$$

$$\therefore \beta = 5$$

Question 4

The octant in which the point (2, −4, −7) lies is

Options:

A. Eighth

B. Fourth

C. Third

D. Fift

Answer: A

Solution:

Solution:

Here x is positive, y is negative and z is negative.

So, it lies in VIII octant.

Question 5

If f (x) = $\begin{cases} x^2 - 1 & 0 < x < 2 \\ 2x + 3 & 2 \le x < 3. \end{cases}$ the quadratic equation whose roots are $\lim_{x \to 2^-} f(x)$ and $\lim_{x \to 2^+} f(x)$ is

Options:

A. $x^2 - 14x + 49 = 0$

B. $x^2 - 6x + 9 = 0$

C. $x^2 - 10x + 21 = 0$

D. $x^2 - 7x + 8 = 0$

Answer: C

Solution:

Solution:

$$\alpha = \lim_{x \to 2^-} f(x) = \lim_{x \to 2} x^2 - 1 = 3$$

$$\beta = \lim_{x \to 2^-} f(x) = \lim_{x \to 2} 2x + 3 = 7$$

$$x^2 - (\alpha + \beta)x + \alpha\beta = 0$$

$$x^2 - 10x + 21 = 0$$

Question 6

If 3x + i(4x − y) = 6 − i where x and y are real numbers, then the values of x and y are respectively,

Options:

A. 3,9

B. 2,9

C. 2,4

D. 3,4

Answer: B

Solution:

Solution:

$3x = 6$

$x = 2$

$4x - y = -1$

$8 - y = -1$

$9 = y$

Question 7

If the standard deviation of the numbers −1, 0, 1, k is $\sqrt{5}$ where k > 0, then k is equal to

Options:

A. $4\sqrt{\frac{5}{3}}$

B. $2\sqrt{\frac{10}{3}}$

C. $\sqrt{6}$

D. $2\sqrt{6}$

Answer: D

Solution:

Solution:

$\sigma^2 = 5, \bar{x} = \frac{k}{4}$

$\frac{1}{4}(1+0+1+k^2) - \frac{k^2}{16} = 5$

$\frac{k^2+2}{4} \frac{-k^2}{16} = 5$

$\frac{4k^2+8-k^2}{16} = 5$

$\Rightarrow 3k^2 + 8 = 80$

$3k^2 = 72$

$k^2 = 24$

$k = \pm\sqrt{24} = 2\sqrt{6}$

Question 8

If the set x contains 7 elements and set y contains 8 elements, then the number of bijections from x to y is

Options:

A. 0

B. 7!

C. $8P_7$

D. 8 !

Answer: A

Solution:

Solution:

$n(A) \neq n(B)$

Number of bijections is zero

Question 9

If f : R → R be defined by

$$\mathbf{f(x)} = \begin{cases} 2x & : x > 3 \\ x^2 & : 1 < x \leq 3 \\ 3x & : x \leq 1. \end{cases}$$

then f (−1) + f (2) + f (4) is

Options:

A. 5

B. 9

C. 10

D. 14

Answer: B

Solution:

Solution:

$f(-1) = 3(-1) = -3$

$f(2) = 2^2 = 4$

$f(4) = 2(4) = 8$

$f(-1) + f(2) + f(4)$

$= -3 + 4 + 8 = 9$

Question 10

Let the relation R is defined in N by aRb, if 3a + 2b = 27 then R is

Options:

A. {(1, 12)(3, 9)(5, 6)(7, 3)}

B. {(1, 12)(3, 9)(5, 6)(7, 3)(9, 0)}

C. $\left\{ \left(0, \frac{27}{2}\right)(1, 12)(3, 9)(5, 6)(7, 3) \right\}$

D. {(2, 1)(9, 3)(6, 5)(3, 7)}

Answer: A

Solution:

Solution:

$2b = 27 - 3a$

$b = \frac{27 - 3a}{2}$

$R = \{(1, 2), (3, 9), (5, 6), (7, 3)\}$

Question 11

$\lim_{y \to 0} \frac{\sqrt{3 + y^3} - \sqrt{3}}{y^3} =$

Options:

A. $\frac{1}{2\sqrt{3}}$

B. $2\sqrt{3}$

C. $\frac{1}{3\sqrt{2}}$

D. $3\sqrt{2}$

Answer: A

Solution:

Solution:

$$\lim_{y \to 0} \frac{3+y^3-3}{y(\sqrt{3+y^3}+\sqrt{3})} = \frac{1}{2\sqrt{3}}$$

Question 12

If A is a matrix of order 3 × 3, then $(A^2)^{-1}$ is equal to

Options:

A. $(-A^2)^2$

B. A^2

C. $(A^{-1})^2$

D. $(-A)^{-2}$

Answer: C

Solution:

Solution:

$(A^2)^{-1} = (A^{-1})^2$

Question 13

If A = $\begin{bmatrix} 2 & -1 \\ 3 & -2 \end{bmatrix}$, then the inverse of the matrix A^3 is

Options:

A. A

B. 1

C. -1

D. −A

Answer: A

Solution:

Solution:

$$A = \begin{bmatrix} 2 & -1 \\ 3 & -2 \end{bmatrix}$$

$$A^{-1} = \frac{1}{-1}\begin{bmatrix} -2 & 1 \\ -3 & 2 \end{bmatrix} = \begin{bmatrix} 2 & -1 \\ 3 & -2 \end{bmatrix} = A$$

$$A^2 = \begin{bmatrix} 2 & -1 \\ 3 & -2 \end{bmatrix}\begin{bmatrix} 2 & -1 \\ 3 & -2 \end{bmatrix}$$

$$= \begin{bmatrix} 4-3 & -2+2 \\ 6-6 & -3+4 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = I$$

$$\therefore A^3 = A$$

$$(A^3)^{-1} = A^{-1} = \begin{bmatrix} 2 & -1 \\ 3 & -2 \end{bmatrix}^{-1} = \begin{bmatrix} -2 & 1 \\ -3 & 2 \end{bmatrix}$$

$$= -A$$

$$\therefore (A^3)^{-1} = -A$$

Question 14

If A is a skew symmetric matrix, then A^{2021} is

Options:

A. Row matrix

B. Symmetric matrix

C. Column matrix

D. Skew symmetric matrix

Answer: D

Solution:

Solution:

$A^T = -A$ or A^n is slow symmetric if n is odd

$$P = A^{2021}$$

$$P^T = [A^{2021}]^T = [A^T]^{2021} = (-A)^{2021} = -P$$

Question 15

If A = $\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$ then $(aI + bA)^n$ is (where I is the identity matrix of order 2)

Options:

A. $a^2I + a^{n-1}b \cdot A$

B. $a^nI + na^nbA$

C. $a^nI + n \cdot a^{n-1}b \cdot A$

D. $a^nI + b^nA$

Answer: C

Solution:

Solution:

$$A = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$$

$$[aI + bA]^1 = \begin{bmatrix} a & 0 \\ 0 & a \end{bmatrix} + \begin{bmatrix} 0 & b \\ 0 & 0 \end{bmatrix} = \begin{bmatrix} a & b \\ 0 & a \end{bmatrix}$$

$$[aI + IA]^2 = \begin{bmatrix} a & b \\ 0 & a \end{bmatrix} \begin{bmatrix} a & b \\ 0 & a \end{bmatrix} = \begin{bmatrix} a^2 & 2ab \\ 0 & a^2 \end{bmatrix}$$

$$[aI + bA]^3 = \begin{bmatrix} a^2 & 2ab \\ 0 & a^2 \end{bmatrix} \begin{bmatrix} a & b \\ 0 & a \end{bmatrix} = \begin{bmatrix} a^3 & 3^2b \\ 0 & a^3 \end{bmatrix}$$

$$\therefore [aI + bA]^n = \begin{bmatrix} a^n & naa^{n-1}b \\ 0 & a^n \end{bmatrix}$$

$$= a^nI + n \cdot a^{n-1}bA$$

Question 16

If A is a 3 × 3 matrix such that |5· adj A| = 5 then |A| is equal to

Options:

A. ±1

B. ±1 / 5

C. ±1 / 25

D. ±5

Answer: B

Solution:

Solution:

$A_{3\times 3}$ matrix $|5 \cdot \text{Adj}\, A| = 5$

$\Rightarrow 5^3 |A|^2 = 5$

$\Rightarrow \left|A^2\right| = \frac{1}{5^2}$

$|A| = \pm \frac{1}{5}$

Question 17

If there are two values of ' a ' which makes determinant

$\Delta = \begin{vmatrix} 1 & -2 & 5 \\ 2 & a & -1 \\ 0 & 4 & 2a \end{vmatrix}$ = 86 Then the sum of these numbers is

Options:

A. -4

B. 4

C. 9

D. 5

Answer: A

Solution:

Solution:

$\Delta = 1(2a^2+4)+2(4a-0)+5(8)=86$

$2a^2+8a+44-86=0$

$2a^2+8a-42=0$

$a^2+4a-21=0$

Sum of numbers $=-4\left(\because -\frac{b}{a}=\alpha+\beta\right)$

Question 18

If the vertices of a triangle are $(-2, 6)(3, -6)$ and $(1, 5)$, then the area of the triangle is

Options:

A. 40 sq. units

B. 30 sq. units

C. 15.5 sq. units

D. 35 sq. units

Answer: C

Solution:

Solution:

$$\Delta = \frac{1}{2}\begin{vmatrix} -2-3 & -2-1 \\ 6+6 & 6-5 \end{vmatrix} = \frac{1}{5}\begin{vmatrix} -5 & -3 \\ 12 & 1 \end{vmatrix}$$

$$= \frac{1}{2}\left|-5+36\right| = \frac{31}{2} = 15.5$$

Question 19

Domain of $\cos^{-1}[x]$ is, where [.] denotes a greatest integer function

Options:

A. $(-1, 2]$

B. $[-1, 2]$

C. $(-1, 2)$

D. $[-1, 2)$

Answer: D

Solution:

Solution:

$\cos^{-1}[x]$

$-1 \le [x] \le 1$

$\Rightarrow [x] = \{-1, 0, 1\}$

$x \in [-1, 2)$

Question 20

If $y = (1 + x^2)\tan^{-1}x - x$ then $\frac{dy}{dx}$ is

Options:

A. $2x\tan^{-1}x$

B. $x^2\tan^{-1}x$

C. $\frac{\tan^{-1}x}{x}$

D. $x\tan^{-1}x$

Answer: A

Solution:

Solution:

$y=(1+x^2)\tan^{-1}x-x$

$\frac{dy}{dx}=\frac{(1+x^2)}{1+x^2}+\tan^{-1}x\cdot(2x)-1$

$=2x\tan^{-1}x$

Question 21

If $x = e^{\theta}\sin\theta$, $y = e^{\theta}\cos\theta$ where θ is a parameter, then $\frac{dy}{dx}$ at (1, 1) is equal to

Options:

A. 0

B. $-\frac{1}{2}$

C. $\frac{1}{2}$

D. $-\frac{1}{4}$

Answer: A

Solution:

Solution:

$x=e^{\theta}\sin\theta=1$

$y=e^{\theta}\cos\theta=1,\ \frac{x}{y}=\tan\theta=1$

$\Rightarrow\theta=\frac{\pi}{4}$

$\frac{dy}{dx}=\left|\frac{dy/d\theta}{dx/d\theta}\right|=\frac{-e^{\theta}\sin\theta+\cos\theta\cdot e^{\theta}}{e^{\theta}\cos\theta+\sin\theta e^{\theta}}=\frac{\cos\theta-\sin\theta}{\cos\theta+\sin\theta}$

$=\tan\left(\frac{\pi}{4}-\theta\right)=0$

Question 22

If $y = e^{\sqrt{x\sqrt{x\sqrt{x}}}}$ $x > 1$ then $\frac{d^2y}{dx^2}$ at $x = \log_e 3$ is

Options:

A. 3

B. 0

C. 5

D. 1

Answer: A

Solution:

Solution:

$$e^{x^{\frac{1}{2}\left[1+\frac{1}{2}+\frac{1}{4}+\cdots\right]}}=e^{x^{\frac{1}{2}}}=e^{x^{1}}=e^{x}$$

$$\frac{dy}{dx}=e^{x}$$

$$\frac{d^2y}{dxx^2}=e^{x}x\log_{e}{}^{3}=e^{\log_{e}{}^{3}}=$$

Question 23

If f (1) = 1, f ′(1) = 3 then the derivative of f (f (f (x))) + (f (x))^2 at x = 1 is

Options:

A. 10

B. 35

C. 33

D. 12

Answer: C

Solution:

Solution:

$$f(1)=1, f'(1)=3$$

$$\frac{d}{dx}[f(f(f(x)))+(f(x))^2]$$

$$[f'(f(f(x)))\cdot f'f(x)\cdot f'(x)+2f(x)\cdot f'(x)]$$

$$=f'(f(f(1)))f'(f(1))\cdot f'(1)+2f(1)\cdot f'(1)$$

$$f'(f(1))f'(1)\cdot 3+2\cdot(1)3$$

$$=f'(1)\cdot 3\cdot 3+6$$

$$=27+6=33$$

Question 24

If y = $x^{\sin x}$ + $(\sin x)^x$ then $\frac{dy}{dx}$ at x = $\frac{\pi}{2}$ is

Options:

A. $\frac{4}{\pi}$

B. 1

C. $\pi \log \frac{\pi}{2}$

D. $\frac{\pi^2}{2}$

Answer: B

Solution:

Solution:

$y = x^{\sin x} + (\sin x)^x$

$\frac{dy}{dx} = [x^{\sin x}]\left[\frac{\sin x}{x} + \cos x \cdot \log x\right] +$

$(\sin x)^x [x \cos x + \log \sin x]$

$x = \frac{\pi}{2}$

$= \frac{\pi}{2}\left[\frac{2}{\pi}\right] + 1[0 + 0] = 1$

Question 25

If $A_n = \begin{bmatrix} 1-n & n \\ n & 1-n \end{bmatrix}$ then $A_1| + A_2| + \ldots + A_{2021}| =$

Options:

A. -2021

B. $(2021)^2$

C. $-(2021)^2$

D. 4042

Answer: C

Solution:

Solution:

$A_n = \begin{bmatrix} 1-n & n \\ n & 1-n \end{bmatrix}$

$|A_n| = (1-n)^2 - n^2$

$= 1 + n^2 - 2n - n^2$

Question 26

The function f (x) = log(1 + x) − $\frac{2x}{2+x}$ is increasing on

Options:

A. $(-\infty, \infty)$

B. $(-1, \infty)$

C. $(\infty, -1)$

D. $(-\infty, 0)$

Answer: B

Solution:

Solution:

$$f'(x) = \frac{x^2}{(x+1)(2+x)^2} > 0$$

$$x+1>0 \Rightarrow x>-1$$

Question 27

The co-ordinates of the point on the $\sqrt{x} + \sqrt{y} = 6$ at which the tangent is equally inclined the axes is

Options:

A. (4, 4)

B. (9, 9)

C. (1, 1)

D. (6, 6)

Answer: B

Solution:

Solution:

$$\frac{dy}{dx} = -\sqrt{\frac{y}{x}} = -1$$

$$y = x$$

$$\sqrt{x} + \sqrt{x} = 6$$

$$x = 9, y = 9$$

Question 28

The function $f(x) = 4\sin^3 x - 6\sin^2 x + 12\sin x + 100$ is strictly

Options:

A. decreasing in $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$

B. increasing in $\left(\pi, \frac{3\pi}{2}\right)$

C. decreasing in $\left[0, \frac{\pi}{2}\right]$

D. decreasing in $\left(\frac{\pi}{2}, \pi\right)$

Answer: D

Solution:

Solution:

$f'(x) = (12\sin^2 x - 12\sin x + 12)\cos x$

$f'(x) = 12(\sin^2 x - \sin x + 1)\cos x$

$\sin^2 x - \sin x + 1 > 0$

$x \in \left(\frac{\pi}{2}, \pi\right) \cos x < 0$

Question 29

If [x] is the greatest integer function not greater than x then $\int_0^8 [x]dx$ is equal to

Options:

A. 28

B. 29

C. 30

D. 20

Answer: A

Solution:

Solution:

$\int_0^8 [x]dx = 1 + 2 + 3 + \ldots + 7$

$= \frac{7(7+1)}{2} = 28$

Question 30

$\int_0^{\pi/2} \sqrt{\sin\theta}\cos^3\theta d\theta$ is equal to

Options:

A. $\frac{8}{23}$

B. $\frac{8}{21}$

C. $\frac{7}{23}$

D. $\frac{7}{21}$

Answer: B

Solution:

Solution:

Put $\sin\theta = t$

$\int_0^1 t^{1/2}(1-t^2)dt = \frac{8}{21}$

Question 31

If $e^y + xy = e$ the ordered pair $\left(\frac{dy}{dx}, \frac{d^2y}{dx^2}\right)$ at x = 0 is equal to

Options:

A. $\left(\frac{1}{e}, \frac{1}{e^2}\right)$

B. $\left(\frac{1}{e}, \frac{-1}{e^2}\right)$

C. $\left(\frac{-1}{e}, \frac{-1}{e^2}\right)$

D. $\left(\frac{-1}{e}, \frac{1}{e^2}\right)$

Answer: D

Solution:

Solution:

$x = 0 \Rightarrow y = 1$

$\frac{dy}{dx} = \frac{-y}{e^y + x}$

$\left(\frac{dy}{dx}\right)_{(0,1)} = -\frac{1}{e}$

$\left(\frac{d^2y}{dx^2}\right)_{(0,1)} = \frac{1}{e^2}$

Question 32

$\int \frac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha} dx$ is equal to

Options:

A. $2(\sin x - x\cos\alpha) + c$

B. $2(\sin x - 2x\cos\alpha) + c$

C. $2(\sin x + x\cos\alpha) + c$

D. $2(\sin x + 2x\cos\alpha) + c$

Answer: C

Solution:

Solution:

$2\int \frac{\cos^2 x - \cos^2\alpha}{\cos x - \cos\alpha} dx = 2\int (\cos x + \cos\alpha) dx$

$= 2[\sin x + x\cos\alpha]$

Question 33

$\int_0^1 \frac{xe^x}{(2+x)^3} dx$ is equal to

Options:

A. $\frac{1}{27}, e - \frac{1}{8}$

B. $\frac{1}{9} \cdot e + \frac{1}{4}$

C. $\frac{1}{27} \cdot c + \frac{1}{8}$

D. $\frac{1}{9} \cdot e - \frac{1}{4}$

Answer: D

Solution:

Solution:

$$\int_0^1 e^x\left[\frac{1}{(x+2)^2}-\frac{2}{(x+2)^3}\right]dx$$

$$=\left[\frac{e^x}{(x+2)^2}\right]_0^1=\frac{e}{9}-\frac{1}{4}$$

Question 34

If $\int \frac{dx}{(x+2)(x^2+1)} = a\log|1+x^2| + b\tan^{-1}x + \frac{1}{5}\log|x+2| + c$, then

Options:

A. $a = \frac{-1}{10} b = \frac{2}{5}$

B. $a = \frac{-1}{10} b = \frac{-2}{5}$

C. $a = \frac{1}{10}$ $b = \frac{2}{5}$

D. $a = \frac{1}{10}$ $b = \frac{-2}{5}$

Answer: A

Solution:

Solution:

$$\frac{1}{(x+2)(x^2+1)}=\frac{A}{x+2}+\frac{Bx+C}{x^2+1}$$

$$A=\frac{1}{5}, B=\frac{-1}{5}, C=\frac{2}{5}$$

Question 35

Area of the region bounded by the curve y = tan x, the x-axis and the line $x = \frac{\pi}{3}$ is

Options:

A. $\log_2 \frac{1}{2}$

B. 0

C. $\log 2$

D. $-\log 2$

Answer: C

Solution:

Solution:

$$A = \int_0^{\pi/3} \tan x \, dx = \log \left| \sec x \right|_0^{\pi/3} = \log 2$$

Question 36

Evaluate $\int_2^3 x^2 dx$ as the limit of a sum

Options:

A. $\frac{72}{6}$

B. $\frac{25}{7}$

C. $\frac{53}{9}$

D. $\frac{19}{3}$

Answer: D

Solution:

Solution:

$$I = \left[\frac{x^3}{3} \right]_2^3 = \frac{1}{3}(27 - 8) = \frac{19}{3}$$

Question 37

$\int_0^{\pi/2} \frac{\cos x \sin x}{1 + \sin x} dx$ is equal to

Options:

A. $\log 2 - 1$

B. $-\log 2$

C. $\log 2$

D. $1 - \log 2$

Answer: D

Solution:

Solution:

$\sin x = t$

$\frac{\pi}{2} \frac{\cos x \sin x}{1+\sin x} dx$

$\Rightarrow \int_0^1 \frac{t}{1+t} dt = 1 - \log 2$

Question 38

If $\frac{dy}{dx} + \frac{y}{x} = x^2$, then $2y(2) - y(1) =$

Options:

A. $\frac{11}{4}$

B. $\frac{9}{4}$

C. $\frac{15}{4}$

D. $\frac{13}{4}$

Answer: C

Solution:

Solution:

$y \cdot x = \frac{x^4}{4} + C$

$2y(2) - y(1) = \frac{15}{4}$

Question 39

The solution of the differential equation $\frac{dy}{dx} = (x + y)^2$ is

Options:

A. $\tan^{-1}(x + y) = x + c$

B. $\cot^{-1}(x + y) = c$

C. $\tan^{-1}(x + y) = 0$

D. $\cot^{-1}(x + y) = x + c$

Answer: A

Solution:

Solution:

$x+y=z \Rightarrow \frac{dz}{dx}=1+z^2$

$\int \frac{1}{1+z^2}dz=\int 1dx$

$\text{Tan}^{-1}(x+y)=x+c$

Question 40

If y(x) be the solution of differential equation $x\log x\frac{dy}{dx}+y=2x\log x$, y(e) is equal to

Options:

A. e

B. 2

C. 0

D. 2e

Answer: D

Solution:

Solution:

$I.F=\log x$

$y\log x=2x(\log x-1)+c$

If $x=e$ then $y=c$ then $y(e)=2e$

Question 41

If $\left|\vec{a}\right|$ = 2 and $\left|\vec{b}\right|$ = 3 and the angle between $\vec{a}$ and $\vec{b}$ is 120˚, then the length of the vector $\left|\frac{1}{2}\vec{a}-\frac{1}{3}\vec{b}\right|^2$ is

Options:

A. 2

B. $\frac{1}{6}$

C. 3

D. 1

Answer: C

Solution:

Solution:

$$\left|\frac{\bar{a}}{2}-\frac{\bar{b}}{3}\right|^2=\frac{|\bar{a}|^2}{4}+\frac{|\bar{b}|^2}{9}-2\frac{\bar{a}}{2}.\frac{\bar{b}}{3}=3$$

Question 42

If $\left|\vec{a}\times\vec{b}\right|+\left|\vec{a}\cdot\vec{b}\right|^2=36$ and $\left|\vec{a}\right|=3$ then $\left|\vec{b}\right|$ is equal to

Options:

A. 9

B. 4

C. 36

D. 2

Answer: B

Solution:

Solution:

$$=|a\times b|^2+|a-b|^2=36$$

$$|a|^2|b|^2=36\Rightarrow b^2=4,|b|=2$$

Question 43

If $\vec{\alpha}=\hat{i}-3\hat{j}$, $\vec{\beta}=\hat{i}+2\hat{j}-\hat{k}$ then express $\vec{\beta}$ in the form $\vec{\beta}=\vec{\beta}_1+\vec{\beta}_2$ where $\vec{\beta}_1$ is parallel to $\vec{\alpha}$ and $\vec{\beta}_2$ is perpendicular to $\vec{\alpha}$ then $\vec{\beta}_1$ is given by

Options:

A. $\frac{5}{8}\left(\hat{i}-3\hat{j}\right)$

B. $\hat{i}-3\hat{j}$

C. $\frac{5}{8}\left(\hat{i}+3\hat{j}\right)$

D. $\hat{i}+3\hat{j}$

E. $-\frac{1}{2}\left(\hat{i}-3\hat{j}\right)$

Answer: E

Solution:

Solution:

$\vec{\beta} = (\vec{\beta}_1 + \vec{\beta}_2)$

$(\vec{\beta} = \lambda\vec{\alpha} + \vec{\beta}_2) \cdot \vec{\alpha}$

$\vec{\alpha} \cdot \vec{\beta} = \lambda|\vec{\alpha}|^2 + 0$

Question 44

The sum of the degree and order of the differential equation $(1 + y_1^2)^{2/3} = y_2$ is

Options:

A. 4

B. 5

C. 6

D. 7

Answer: B

Solution:

Solution:

$(1 + y_1^2) = (y_2)^3$

$2 + 3 = 5$

Question 45

The co-ordinates of foot of the perpendicular drawn from the origin to the plane 2x − 3y + 4z = 29 are

Options:

A. (2, 3, 4)

B. (2, −3, 4)

C. (2, −3, −4)

D. (−2, −3, 4)

Answer: B

Solution:

Solution:

verification (2, −3, 4)

Question 46

The angle between the pair of lines $\frac{x+3}{3} = \frac{y-1}{5} = \frac{z+3}{4}$ and $\frac{x+1}{1} = \frac{y-4}{4} = \frac{z-5}{2}$ is

Options:

A. $\theta = \cos^{-1}\left[\frac{27}{5}\right]$

B. $\theta = \cos^{-1}\left[\frac{19}{21}\right]$

C. $\theta = \cos^{-1}\left[\frac{8\sqrt{3}}{15}\right]$

D. $\theta = \cos^{-1}\left[\frac{5\sqrt{3}}{16}\right]$

E. $\theta = \cos^{-1}\frac{31}{5\sqrt{42}}$

Answer: E

Solution:

Solution:

$$\cos\theta = \frac{3\times1+5\times4+4\times2}{\sqrt{3^2+5^2+4^2}\times\sqrt{1^2+4^2+2^2}} = \frac{31}{5\sqrt{42}}$$

$$\theta = \cos^{-1}\frac{31}{5\sqrt{42}}$$

Question 47

The corner points of the feasible region of an LPP are (0, 2), (3, 0), (6, 0), (6, 8) and (0, 5), then the minimum value of z = 4x + 6y occurs at

Options:

A. finite number of points

B. only one point

C. infinite number of points

D. only two points

Answer: D

Solution:

Solution:

At (0, 2), (3, 0), $z = 12$

Hence minimum at 2 points.

Question 48

A dietician has to develop a special diet using two foods X and Y . Each packet (containing 30g) of food. X contains 12 units of calcium, 4 4 units of cholesterol and 3 units of vitamin A. The diet requires atleast 240 units of calcium, atleast 460 units of iron and atmost 300 units of cholesterol. The corner points of the feasible region are

Options:

A. (2, 72), (40, 15), (15, 20)

B. (0, 23), (40, 15), (2, 72)

C. (2, 72), (15, 20), (0, 23)

D. (2, 72), (40, 15), (115, 0)

Answer: A

Question 49

The distance of the point whose position vector is $\left(2\hat{i} + \hat{j} - \hat{k}\right)$ from the plane $\vec{r} \cdot \left(\hat{i} - 2\hat{j} + 4\hat{k}\right) = 4$ is

Options:

A. $\frac{8}{\sqrt{21}}$

B. $\frac{-8}{\sqrt{21}}$

C. $8\sqrt{21}$

D. $\frac{-8}{21}$

Answer: A

Solution:

Solution:

$$\text{Distance} = \frac{|2-2-4-4|}{\sqrt{1+4+16}} = \frac{(8)}{\sqrt{21}}$$

Question 50

Find the mean number of heads in three tosses of a fair coin :

Options:

A. 1.5

B. 2.5

C. 4.5

D. 3.5

Answer: A

Solution:

Solution:

X	0	1	2	3
P(x)	1/8	3/8	3/8	1/8

Mean $= \frac{3}{8} + \frac{6}{8} + \frac{3}{8} = \frac{12}{8} = \frac{3}{2} = 1.5$

Question 51

If A and B are two events such that P(A) = $\frac{1}{2}$, P(B) = $\frac{1}{3}$ and P$\left(\frac{A}{B}\right)$ = $\frac{1}{4}$, then P($A' \cap B'$) is

Options:

A. $\frac{1}{4}$

B. $\frac{1}{12}$

C. $\frac{3}{16}$

D. $\frac{3}{4}$

Answer: A

Solution:

Solution:

$P(A) = \frac{1}{2}, P(B) = \frac{1}{3}, P(A \cap B) = \frac{1}{4} \times \frac{1}{3} = \frac{1}{12}$

$P(A \cap B) = P(\overline{A \cup B})$

$P(A \cap B) = 1 - P(A \cup B)$

$P(A \cap B) = 1 - \left[\frac{1}{2} + \frac{1}{3} - \frac{1}{12} \right]$

$P(A \cap B) = 1 - \left[\frac{6+4-1}{12} \right]$

$P(A \cap B) = 1 - \frac{9}{12}$

$P(A \cap B) = \frac{1}{4}$

Question 52

A pandemic has been spreading all over the world. The probabilities are 0.7 that there will be a lockdown, 0.8 that the pandemic is controlled in one month if there is a lockdown and 0.3 that it is controlled in one month if there is no lockdown. The probability that the pandemic will be controlled in one month is

Options:

A. 0.65

B. 1.46

C. 1.65

D. 0.46

Answer: A

Solution:

Solution:

$P(E_1)$ = probability of there is lockdown = 0.7

$P(E_2)$ = probability of there is lockdown = 0.3

A is the event controlled in one month

$P(A / E_1) = 0.8$, $P(A / E_2) = 0.3$

$P(A) = 0.7(0.8) + (0.3)(0.3)$

$= 0.56 + 0.09 = 0.65$

Question 53

If A and B are two independent events such that $P(\overline{A}) = 0.75$, $P(A \cup B) = 0.65$, and $P(B) = x$, then find the value of x

Options:

A. $\frac{5}{14}$

B. $\frac{9}{14}$

C. $\frac{8}{15}$

D. $\frac{7}{15}$

Answer: C

Solution:

Solution:

$P(A) = \frac{1}{4}, P(B) = \frac{3}{4}, P(A \cup B) = \frac{13}{20}$

$\frac{1}{4} + x - \frac{1}{4} \cdot x = \frac{13}{20}$

$\frac{3}{4}x - \frac{13}{20} - \frac{5}{20} = \frac{8}{20}$

$x = \frac{8}{20} \times \frac{4}{3} = \frac{8}{15}$

Question 54

Q54. Suppose that the number of elements in set A is p, the number of elements in set B is q and the number of elements in A × B is 7 then $p^2 + q^2$ =

Options:

A. 50

B. 42

C. 51

D. 49

Answer: A

Solution:

Solution:

$n(A) = p$, $n(B) = q$

$n(A \times B) = 7$

$pq = 7$

$p^2 + q^2 = 7^2 + 1^2$ or $1^2 + 7^2$

$p^2 + q^2 = 50$

Question 55

The domain of the function f (x) = $\frac{1}{\log_{10}(1-x)} + \sqrt{x+2}$ is

Options:

A. $[-2, 0) \cap (0, 1)$

B. $[-2, 0)$

C. $[-2, 1)$

D. $[-2, 0) \cup (0, 1)$

Answer: D

Solution:

Solution:

$1 - x > 0, 1 - x \neq 1$

$x - 1 < 0 \;\; x \neq 0 \;\; x + 2 \geq 0$

$x < 1 \;\; x \geq -2$

$\therefore x \in [-2, 0) \cup (0, 1)$

Question 56

The trigonometric function y = tan x in the II quadrant

Options:

A. decreases from 0 to ∞

B. increases from 0 to ∞

C. decreases from −∞ to 0

D. increases from −∞ to 0

Answer: D

Question 57

The degree measure of $\frac{\pi}{32}$ is equal to

Options:

A. $5^\circ 30' 20''$

B. $5^\circ 37' 30''$

C. $5^\circ 37' 20''$

D. $4^\circ 30' 30''$

Answer: B

Solution:

Solution:

$\frac{\pi}{32} = \frac{180^\circ}{32} = 5^0 37' 30''$

Question 58

The value of $\sin \frac{5\pi}{12} \sin \frac{\pi}{12}$ is

Options:

A. 0

B. $\frac{1}{2}$

C. 1

D. $\frac{1}{4}$

Answer: D

Solution:

Solution:

$\sin \frac{5\pi}{12} \cdot \sin \frac{\pi}{12}$

$= \frac{1}{2} \sin \frac{\pi}{6}$

$= \frac{1}{2} + \frac{1}{2} = \frac{1}{4}$

Question 59

$\sqrt{2 + \sqrt{2 + \sqrt{2 + 2\cos 8\theta}}} =$

Options:

A. $\sin 2\theta$

B. $2 \sin \theta$

C. $2 \cos \theta$

D. $2 \cos \frac{\theta}{2}$

Answer: C

Solution:

Solution:

$1+\cos\theta = 2\cos^2\left(\frac{\theta}{2}\right)$

$\sqrt{2+\sqrt{2+\sqrt{2+2\cos 8\theta}}} = 2\cos\theta$

Question 60

If A = {1, 2, 3, ... 10} then number of subsets of A containing only odd numbers is

Options:

A. 31

B. 32

C. 27

D. 30

Answer: B

Solution:

Solution:

Odd number = {1, 3, 5, 7, 9}

No. of sub sets = $2^5 = 32$

Physics

Question 1

The centre of mass of an extended body on the surface of the earth and its centre of gravity

Options:

A. Can never be at the same point

B. Centre of mass coincides with the centre of gravity of a body if the size of the body is negligible as compared to the size (or radius) of the earth

C. Are always at the same point for any size of the body

D. Are always at the same point only for spherical bodies

Answer: B

Solution:

Solution:

Question 2

A metallic rod breaks when strain produced is 0.2%. The Young's modulus of the material of the rod is $7 \times 10^9 N / m^2$. The area of section of support a load of $10^4 N$ is

Options:

A. $7.1 \times 10^{-4} m^2$

B. $7.1 \times 10^{-2} m^2$

C. $7.1 \times 10^{-8} m^2$

D. $7.1 \times 10^{-6} m^2$

Answer: A

Solution:

Solution:
Stress = Strain $\times$ Y
Thus, maximum stress $= \frac{0.2}{100} \times 7 \times 10^9 = 1.4 \times 10^7$
Now, F orce = Stress $\times$ Area
Thus, $10^4 = 1.4 \times 10^7 \times A$, or, $A = 7.14 \times 10^{-4} m^2$

Question 3

A tiny spherical oil drop carrying a net charge q is balanced in still air, with a vertical uniform electric field of strength $\frac{81}{7} \pi \times 10^5 V / m$. When the field is switched off, the drops is observed to fall with terminal velocity $2 \times 10^{-3} ms^{-1}$. Here $g = 9.8 m / s^2$, Viscosity of air is $1.8 \times 10^{-5} Ns / m^2$ and the density of oil is $900 kg m^{-3}$. The magnitude of $' q'$ is

Options:

A. $1.6 \times 10^{-19} C$

B. $3.2 \times 10^{-19} C$

C. $0.8 \times 10^{-19} C$

D. $8 \times 10^{-19} C$

Answer: D

Solution:

Solution:
Here,
$E = \frac{81\pi}{7} \times 10^5 Vm^{-1}$
$v = 2 \times 10^{-3} ms^{-1}$
$\eta = 1.8 \times 10^5 Nsm^{-2}$
$\rho = 900 kgm^{-3}$
When the electric field is switched off, let the drop falls with terminal velocity v, then
$v = \frac{2r^2(\rho - \sigma)g}{9\eta}$ or $r = \left[\frac{9v\eta}{2(\rho - \sigma)g}\right]\frac{1}{2}$
$\therefore q = \frac{1}{E} \times \frac{4}{3}\pi\rho g\left[\frac{9v\eta}{2(\rho - \sigma)g}\right]$
$= \frac{7}{81\pi \times 10^5} \times \frac{4}{3} \times \pi \times 900 \times 9.8 \times \left[\frac{9 \times 8 \times 10^{-5} \times 2 \times 10^{-3}}{2 \times 900 \times 9.8}\right]\frac{3}{2}$
On solving we get, $q = 8 \times 10^{-19} C$

Question 4

"Heat cannot be itself flow from a body at lower temperature to a body at higher temperature". This statement corresponds to

Options:

A. Conservation of mass

B. First law of thermodynamics

C. Second law of Thermodynamics

D. Conservation of momentum

Answer: C

Solution:

Solution:

Question 5

A smooth chain of length 2m is kept on a table such that its length of 60 cm hangs freely from the edge of the table. The total mass of the chain is 4 kg. The work done in pulling the entire chain on the table is, (Take $g = 10 m/s^2$)

Options:

A. 3.6J

B. 2.0J

C. 12.9J

D. 6.3J

Answer: A

Solution:

Solution:

Mass of the chain lying freely from the table $= \mathrm{M}\ \frac{1}{\mathrm{L}}$

$= 4\mathrm{kg} \times \frac{0.6}{2}$

$= 1.2\mathrm{kg}$

The distance of center of mass of chain from the table $= \frac{1}{2} \times 0.6\mathrm{m} = 0.3\mathrm{m}$ Thus the work done in pulling the chain

$= \mathrm{mgh} = 1.2 \times 10 \times 0.3\mathrm{J} = 3.6\mathrm{J}$

Question 6

The angular speed of a motor wheel is increased from 1200 rpm to 3120 rpm in 16 seconds. The angular acceleration of the moto wheel is

Options:

A. $6\pi\ \mathrm{rad}/\mathrm{s}^2$

B. $8\pi\ \mathrm{rad}/\mathrm{s}^2$

C. $2\pi\ \mathrm{rad}/\mathrm{s}^2$

D. $4\pi\ \mathrm{rad}/\mathrm{s}^2$

Answer: D

Solution:

Solution:

$\alpha = \frac{\mathrm{W}_2 - \mathrm{W}_1}{\mathrm{t}} = \frac{2\pi \mathrm{n}_2 - 2\pi \mathrm{n}_1}{\mathrm{t}}$

Question 7

Four charges $+a$, $+2q$, $+q$ and $-2q$ are placed at the corners of a square ABCD respectively. The force on a the positive charge kept the centre O´ is

Options:

A. Along the diagonal AC

B. Perpendicular to side AB

C. Zero

D. Along the diagonal BD

Answer: B

Solution:

Solution:

Force due to charge at D and B is along $\vec{F}_O\vec{D}$ towards $\vec{B}$

Force due to charge at A and C is along $\vec{F}_A O$ towards $\vec{A}$.

$\therefore$ Resultant

displacement will be along $\vec{F}$ which is perpendicular to AB.

Question 8

An electric dipole with dipole moment 4×10^{-9} Cm is aligned at 30° with the direction of a uniform electric field of magnitude 5×10^{4} N C^{-1}, the magnitude of the torque acting on the dipole is

Options:

A. 10^{-5} N m

B. 10×10^{-3} Nm

C. 10^{-4} Nm

D. $\sqrt{3} \times 10^{-4}$ Nm

Answer: C

Solution:

Solution:

$\tau = $ P.E. $\sin\theta$

Question 9

A charged particle of mass ' m ' and charge ' q ' is released from rest in an uniform electric field $\vec{E}$. Neglecting the effect of gravity, the kinetic energy of the charged particle after ' t ' seconds is

Options:

A. $\frac{Eqm}{t}$

B. $\frac{E^2q^2t^2}{2m}$

C. $\frac{2E^2t^2}{mq}$

D. $\frac{E^2q^2m}{2t^2}$

Answer: B

Solution:

Solution:

$K.E = \frac{1}{2}mv^2$

$= \frac{1}{2}m\left(0 + \frac{Eq}{m}t\right)^2$

Question 10

The electric field and the potential of an electric dipole vary with distance r as

Options:

A. $\frac{1}{r^2}$ and $\frac{1}{r^3}$

B. $\frac{1}{r^3}$ and $\frac{1}{r^2}$

C. $\frac{1}{r}$ and $\frac{1}{r^2}$

D. $\frac{1}{r^2}$ and $\frac{1}{r}$

Answer: B

Solution:

Solution:

$E = K\frac{2p}{r^3} \propto \frac{1}{r^3}$

$V = K\frac{p\cos\theta}{r^2} \propto \frac{1}{r^2}$

Question 11

The displacement of a particle executing SHM is given by $X = 3\sin\left[2\pi t + \frac{\pi}{4}\right]$ where ' x ' is in meters and ' t ' is in seconds. The amplitude and maximum speed of the particle is

Options:

A. 3m, $6\pi ms^{-1}$

B. 3m, $8\pi ms^{-1}$

C. 3m, $2\pi ms^{-1}$

D. 3m, $4\pi ms^{-1}$

Answer: A

Solution:

Solution:
A = 3m
$V_{max} = A\omega = 3 \times 2\pi = 6\pi$

Question 12

Electric as well as gravitational affects can be thought to be caused by fields. Which of the following is true for an electrical or gravitational field?

Options:

A. Fields are useful for understanding forces acting through a distance

B. There is no way to verify the existence of a force field since it is just a concept

C. The field concept is often used to describe contact forces

D. Gravitational or Electric fields does not exist in the space around an object

Answer: A

Solution:

Solution:

Question 13

A charged particle is moving in an electric field of $3 \times 10^{-10} Vm^{-1}$ with mobility $2.5 \times 10^{-6} m^2$ / v / s, its drift velocity is

Options:

A. $2.5 \times 10^4 m / s$

B. $1.2 \times 10^{-4} m / s$

C. $7.5 \times 10^{-4} m / s$

D. $8.33 \times 10^{-4} m / s$

Answer: C

Solution:

Solution:
$\mu = \frac{V_d}{E} \Rightarrow V_d = \mu E$

Question 14

Wire bound resistors are made by

Options:

A. Winding the wires of an alloy of Ge, Au, GA

B. Winding the wires of an alloy of Manganin, constantan, Nichrome

C. Winding the wires of an alloy of Cu, Al, Ag

D. Winding the wires of an alloy of Si, T u, F e

Answer: B

Solution:

Solution:

Question 15

Ten identical cells each of potential ' E ' and internal resistance ' r ', are connected in series to form a closed circuit. An ideal voltmeter connected across three cells, will read

Options:

A. 13E

B. 7E

C. 10E

D. 3E

Answer: D

Solution:

Solution:
10 identical cells connected in series.
Potential of each cell $= E$
Internal resistance of each cell $= r$
Total voltage of ten cells $= 10E$
Total resistance of ten cells $= 10r$
Current in the circuit, $I = \frac{10E}{10r} = \frac{E}{r}$
Potentiol difference across 3 cells, $V = I \times 3r = \frac{E}{2} \times 3r = 3E$
Hence, ideal voltmeter will read $3E$.

Question 16

In an atom electron revolve around the nucleus along a path of radius $0.72\mathring{A}$ making 9.4×10^{18} revolutions per second. The equivalent current is [Given e = 1.6×10^{-19}C]

Options:

A. 1.4A

B. 1.8A

C. 1.2A

D. 1.5A

Answer: D

Solution:

Solution:

$i = \frac{e}{T} = ef$

Question 17

When a metal conductor connected to left gap of a meter bridge is heated, the balancing point

Options:

A. Remains unchanged

B. Shifts to the center

C. Shifts towards right

D. Shifts towards left

Answer: C

Solution:

Solution:

$\frac{R}{\ell} = \frac{S}{100 - \ell}$

If temperature increases, resistance increases.
As R increases, balancing length also increases. It will shift towards Right

---

Question 18

Two tiny spheres carrying charges 1.8μC and 2.8μC are located at 40 cm apart. The potential at the mid-point of the line joining the two charges is

Options:

A. 4.3×10^4V

B. 3.6×10^5V

C. 3.8×10^4V

D. 2.1×10^5V

Answer: D

Solution:

Solution:

$V = \frac{kq_1}{r_1} + \frac{kq_2}{r_2}$

Question 19

A parallel plate capacitor is charged by connecting a 2V battery across it. It is then disconnected form the battery and a glass slab is introduced between plates. Which of the following pairs of quantities decrease?

Options:

A. Energy stored and capacitance

B. Capacitance and charge

C. Charge and potential difference

D. Potential difference and energy stored.

Answer: D

Solution:

Solution:

Question 20

A proton moves with a velocity of $5 \times 10^6 \hat{j} ms^{-1}$ through the uniform electric field, $\vec{E} = 4 \times 10^6 \left[2\hat{i} + 0.2\hat{j} + 0.1\hat{k}\right] V\,m^{-1}$ and the uniform magnetic field $\vec{B} = 0.2\left[\hat{i} + 0.2\hat{j} + \hat{k}\right] T$. The approximate net force acting on the proton is

Options:

A. 2.2×10^{-13}N

B. 20×10^{-13}N

C. 5×10^{-13}N

D. none

Answer: D

Solution:

Solution:

Question 21

A solenoid of length 50 cm having 100 turns carries a current of 2.5A. The magnetic field at one end of the solenoid is

Options:

A. 1.57×10^{-4}T

B. 9.42×10^{-4}T

C. 3.14×10^{-4}T

D. 6.28×10^{-4}T

Answer: C

Solution:

Solution:

Question 22

A galvanometer of resistance 50Ω is connected to a battery of 3V along with a resistance 2950Ω in series. A full scale deflection of 30 divisions is obtained in the galvanometer. In order to reduce this deflection to 20 divisions, the resistance in series should be

Options:

A. 5050Ω

B. 4450Ω

C. 6050Ω

D. 5550Ω

Answer: B

Solution:

Solution:

$R' = (n-1)(G+R)$

$= \left(\frac{30}{20} - 1\right) 3000 = 1500\Omega$

Total resistance $= 2950 + 1500 = 4450\Omega$

Question 23

A circular coil of wire of radius ' r ' has ' n ' turns and carries a current ' I '. The magnetic induction ' B ' at a point on the axis of the coil at a distance $\sqrt{3}r$ from its centre is

Options:

A. $\frac{\mu_0 nI}{16r}$

B. $\frac{\mu_0 nI}{4r}$

C. $\frac{\mu_0 nI}{32r}$

D. $\frac{\mu_0 nI}{8r}$

Answer: A

Solution:

Solution:

$B = \frac{\mu_0 nir^2}{2(x^2 + r^2)^{3/2}}$

Question 24

If voltage across a bulb rated 220V, 100W drops by 2.5% of its rated value, the percentage of the rated value by which the power would decrease is

Options:

A. 5%

B. 10%

C. 20%

D. 2.5%

Answer: A

Solution:

Solution:

$P = \frac{V^2}{R}$

$P \propto V^2$

$\frac{\Delta P}{P} \times 100 = 2\frac{\Delta V}{V} \times 100$

$= 2 \times 2.5 = 5\%$

Question 25

A wore of certain material is stretched slowly by 10%. Its new resistance and specific resistance becomes respectively

Options:

A. 1.21 times, same

B. both remains the same

C. 1.1 times, 1.1 times

D. 1.2 times, 1.1 times

Answer: A

Solution:

Solution:

Let $1_1 = 100$, $1_2 = 110$

$R \propto 1^2$

$\frac{R_2}{R_1} = \left(\frac{1_2}{1_1}\right)^2 = \left(\frac{110}{100}\right)^2 = 1.21$

$R_2 = 1.21R_1$

Specific resistance remains same

Question 26

A fully charged capacitor ' C' with initial charge ' q_0 ' is connected to a coil of self inductance ' L ' at t = 0. The time at which the energy is stored equally between the electric and the magnetic field is

Options:

A. $\pi\sqrt{LC}$

B. $\frac{\pi}{4}\sqrt{LC}$

C. $2\pi\sqrt{LC}$

D. $\sqrt{LC}$

Answer: B

Solution:

Solution:

$\frac{1}{2}LI_{max}^{2} = \frac{q^2}{2C}$

$\frac{1}{2}LI^{2} = \frac{1}{2} \times \frac{1}{2}LI_{max}^{2}$

$I = \frac{I_{max}}{\sqrt{2}}$

$I_{max} \sin \omega t = \frac{I_{max}}{\sqrt{2}}$

$\omega t = \frac{\pi}{4}$

$t = \frac{\pi}{4}\sqrt{LC}$

Question 27

A magnetic field of flux density $1.0\,Wbm\,m^{-2}$ acts normal to a 80 turn coil of $0.01m^2$ area. If this coil is removed from the field in 0.2 second, the emf induced in it is

Options:

A. 0.8V

B. 5V

C. 4V

D. 8V

Answer: C

Solution:

Solution:

$\varphi_1 = BAN = 1 \times 0.01 \times 80$

$\varphi_1 = 0.8wb$

$\varphi_2 = 0$

$e = -\frac{(\varphi_2 - \varphi_1)}{t}$

$= -\left(\frac{0 - 0.8}{2}\right) = 4V$

Question 28

An alternating current is given by $i = i_1 \sin \omega t + i_2 \cos \omega t$. The r.m.s current is given by

Options:

A. $\sqrt{\frac{i_1^2 + i_2^2}{2}}$

B. $\sqrt{\frac{i_1^2 + i_2^2}{\sqrt{2}}}$

C. $\frac{i_1 + i_2}{\sqrt{2}}$

D. $\frac{i_1 - i_2}{\sqrt{2}}$

Answer: A

Solution:

Solution:

Question 29

Which of the following statements proves that Earth has a magnetic field?

Options:

A. Earth is surrounded by ionosphere

B. A large quantity of iron-ore is found in the Earth

C. The intensity of cosmic rays stream of charged particles is more at the poles than at the equator.

D. Earth is a planet rotating about the North south axis

Answer: C

Solution:

Solution:

Question 30

A long solenoid has 500 turns, When a current of 2A is passed through it, the resulting magnetic flux linked with each turn of the solenoid is 4×10^{-3} Wb, then self induction of the solenoid is

Options:

A. 2.0 henry

B. 1.0 henry

C. 4.0 henry

D. 2.5 henry

Answer: B

Solution:

Solution:
$\varphi = 500 \times 4 \times 10^{-3} = 2\text{W b}$
$\text{Li} = \text{N}\,\varphi$
$\text{L} = \frac{2}{2} = 1\text{H}$

Question 31

Which of the following radiations of electromagnetic waves has the highest wavelength?

Options:

A. IR-rays

B. Microwaves

C. X-rays

D. UV-rays

Answer: B

Solution:

Solution:

Question 32

The power of a equi-concave lens is −4.5 and is made of an material of R.I. 1.6, the radii of curvature of the lens is

Options:

A. $-2.66\,\text{cm}$

B. $115.44\,\text{cm}$

C. $-26.6\,\text{cm}$

D. $+36.6$ cm

Answer: C

Solution:

Solution:

$p = \frac{1}{f} = (\mu - 1)\left(\frac{1}{-R} - \frac{1}{R}\right)$

Question 33

A ray of light passes through an equilateral glass prism in such a manner that the angle of incidence is equal to the angle of emergence and each of these angles is equal to $\frac{3}{4}$ of the angle of the prism. The angle of deviation is

Options:

A. 20°

B. 30°

C. 45°

D. 39°

Answer: B

Solution:

Solution:

Question 34

A convex lens of focal length ' f ' is placed somewhere in between an object and a screen, the distance between the object and the screen is ' x '. If the numerical value of the magnification produced by the lens is ' m ', then the focal length of the lens is

Options:

A. $\frac{(m+1)^2 x}{m}$

B. $\frac{(m-1)^2 x}{m}$

C. $\frac{mx}{(m+1)^2}$

D. $\frac{mx}{(m-1)^2}$

Answer: C

Solution:

Solution:

$u + v = x$

$m = \frac{v}{u}$

$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

Question 35

A series resonant ac circuit contains a capacitance 10^{-6}F and an inductor of 10^{-4}H. The frequency of electrical oscillations will be

Options:

A. $\frac{10^5}{2\pi}$ Hz

B. $\frac{10}{2\pi}$H z

C. 10^5 Hz

D. 10 Hz

Answer: A

Solution:

Solution:

Question 36

In a series LCR circuit R = 300Ω, L = 0.9H , C = 2.0μF and ω = 1000 rad / sec, then impedance of the circuit is

Options:

A. 500Ω

B. 400Ω

C. 1300Ω

D. 900Ω

Answer: A

Solution:

Solution:

Question 37

For light diverging form a finite point source

Options:

A. The wave front is parabolic

B. The intensity at the wave front does not depend on the distance

C. the wave front is cylindrical

D. the intensity decreases in proportion to the distance squared.

Answer: D

Solution:

Solution:

Question 38

The fringe width for red colour as compared to that for violet colour is approximately

Options:

A. 4 times

B. 8 times

C. 3 times

D. Double

Answer: D

Solution:

Solution:

Question 39

In case of Fraunhoffer diffraction at a single slit the diffraction pattern on the screen is correct for which of the following statements?

Options:

A. Central dark band having uniform brightness on either side.

B. Central bright band having dark bands on either side.

C. Central dark band having alternate dark and bright bands of decreasing intensity on same side.

D. Central bright band having alternate dark and bright bands of decreasing intensity on either side.

Answer: D

Solution:

Solution:

Question 40

When a Compact Disc (CD) is illuminated by small source of white light coloured bands observed. This due to

Options:

A. Interference

B. Reflection

C. Scattering

D. Diffraction

Answer: D

Solution:

Solution:

Question 41

Consider a glass slab which is silvered at one side and the other side is transparent. Given the refractive index of the glass slab to be 1.5. If slab is

Options:

A. 120°

B. 45°

C. 90°

D. 180°

Answer: C

Solution:

Solution:

Question 42

Focal length of a convex lens will be maximum for

Options:

A. Green light

B. Red light

C. Blue light

D. Yellow light

Answer: B

Solution:

Solution:

Question 43

The de-Broglie wavelength of a particle of kinetic energy ' K ' is λ; the wavelength of the particle, if its kinetic energy is $\frac{K}{4}$ is

Options:

A. $\frac{\lambda}{2}$

B. 4λ

C. λ

D. 2λ

Answer: D

Solution:

Solution:

$\lambda \propto \frac{1}{\sqrt{k}}$

$\frac{\lambda_1}{\lambda_2} = \sqrt{\frac{k_2}{k_1}}, = \sqrt{\frac{k}{4k}} = \frac{1}{2}$

$\lambda_2 = 2\lambda$

Question 44

The radius of hydrogen atom in the ground state is 0.53Å. After collision with an electron, it is found to have a radius of 2.12Å, the principle quantum number ' n ' of the final state of the atom is

Options:

A. n = 3

B. n = 4

C. n = 1

D. n = 2

Answer: D

Solution:

Solution:

$r \propto n^2$

$\frac{r_1}{r_2} = \left(\frac{n_1}{n_2}\right)^2$

$0.25 = \frac{1}{n_2^2}$

$n_2^2 = \frac{1}{0.25} = \frac{100}{25} = 4$

$n_2 = 2$

Question 45

In accordance with the Bohr's model, the quantum number that characterises the Earth's revolution around the sun in orbit of radius 1.5×10^{11}m with orbital speed $3 \times 10^4 ms^{-1}$ is
[given mass of Earth $= 6 \times 10^{24}$ kg]

Options:

A. 8.57×10^{64}

B. 2.57×10^{74}

C. 5.98×10^{86}

D. 2.57×10^{38}

Answer: B

Solution:

Solution:

Question 46

If an electron is revolving in its Bohr orbit having Bohr radius of 0.529Å, then the radius of third orbit is

Options:

A. 4.761Å

B. 5125 nm

C. 4234 nm

D. 4496Å

Answer: A

Solution:

Solution:

$r_n = 0.529 \times \frac{n^2}{z}$ n = 3

$= 0.529 \times 9 = 4.761$Å

Question 47

Binding energy of a Nitrogen nucleus [$_7{}^{14}N$], given m[$_7{}^{14}N$] = 14.00307u

Options:

A. 206.5 MeV

B. 78 MeV

C. 104.7 MeV

D. 85 MeV

Answer: C

Solution:

Solution:

$BE = [Z\,m_p + (A - Z)m_n - m_X] \times 931.5$

$Be = [7.05481 + 7.06069 - 14.0030] \times 931.5$

$= 104.7$ MeV

Question 48

In a photo electric experiment, if both the intensity and frequency of the incident light are doubled, then the saturation photo electric current

Options:

A. Is doubled

B. Becomes four times

C. Remains constant

D. Is halved

Answer: A

Solution:

Solution:

Question 49

The kinetic energy of the photoelectrons increases by 0.52 eV when the wavelength of incident light is changed from 500 nm to another wavelength which is approximately

Options:

A. 1250 nm

B. 1000 nm

C. 700 nm

D. 400 nm

Answer: C

Solution:

Solution:

$$KE_1 - KE_2 = \frac{hc}{\lambda_1} - \frac{hc}{\lambda_2}$$

$$\Delta KE = hc\left[\frac{1}{\lambda_1} - \frac{1}{\lambda_2}\right]^2$$

Question 50

The resistivity of a semiconductor at room temperature is in between

Options:

A. 10^6 to $10^8 \Omega\,cm$

B. 10^{10} to $10^{12} \Omega\,cm$

C. 10^{-2} to $10^{-5} \Omega\,cm$

D. 10^{-3} to $10^6 \Omega\,cm$

Answer: D

Solution:

Solution:

Question 51

The forbidden energy gap for ' Ge´ crystal at ' 0 ' K is

Options:

A. 2.57 eV

B. 6.57 eV

C. 0.071 eV

D. 0.71 eV

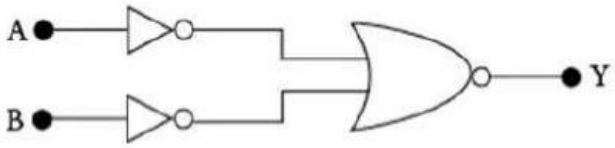
Answer: D

Solution:

Solution:

Question 52

Which logic gate is represented by the following combination of logic gates?



Options:

A. AND

B. NOR

C. OR

D. NAND

Answer: A

Solution:

Solution:
This is a case of AND gate. Input and output are shown below
$\therefore y = \overline{\overline{A} + \overline{B}} = \overline{A} \cdot \overline{B} = AB$(since $\overline{A} + \overline{B} = \overline{A} \cdot \overline{B}$)

Question 53

A metallic rod of mass unit length $0.5\,\mathrm{kg\,m^{-1}}$ is lying horizontally on a smooth inclined plane which makes an angle of 30° with the horizontal. A magnetic field of strength 0.25T is acting on it in the vertical direction. When a current ' T ' is flowing through it, the rod is not allowed to slide down. The quantity of current required to keep the rod stationary is

Options:

A. 14.76A

B. 11.32A

C. 7.14A

D. 5.98A

Answer: B

Solution:

Solution:
F = Bil
$\mathrm{Bil}\cos\theta = \mathrm{mg}\sin\theta$
$0.25 \times \mathrm{I} \times \frac{\sqrt{3}}{2} = 0.5 \times 10 \times \frac{1}{2}$
$\mathrm{I} = \frac{5 \times 100}{25 \times \sqrt{3}} = \frac{20}{\sqrt{3}}\mathrm{A}$
I = 11.32A

Question 54

A nuclear reactor delivers a power of 10^{9}W, the amount of fuel consumed by the reactor in one hour is

Options:

A. 0.72g

B. 0.96g

C. 0.04g

D. 0.08g

Answer: C

Solution:

Solution:

$P = \frac{E}{t} = \frac{mv^2}{t} \Rightarrow 10^9 = \frac{m \times 9 \times 10^{16}}{3600}$
$m = 4 \times 10^{-5}\,kg$
$m = 4 \times 10^{-5} \times 10^3 g$
$m = 4 \times 10^{-2} g$
$m = 0.04g$

Question 55

Which of the following radiations is deflected by electric field?

Options:

A. γ-rays

B. α-particles

C. X -rays

D. Neutrons

Answer: B

Solution:

Solution:

Question 56

Two objects are projected at an angle 0° and $(90 - \theta)^\circ$, to the horizontal with the same speed. The ratio of their maximum vertical heights is

Options:

A. $1 : \tan\theta$

B. $\tan^2\theta : 1$

C. $1 : 1$

D. $\tan\theta : 1$

Answer: B

Solution:

Solution:

Question 57

A car is moving in a circular horizontal track of radius 10m with a

constant speed of $10ms^{-1}$. A bob is suspended from the roof of the car by a light wire of length 1.0m. The angle made by the wire with the vertical is (in radian)

Options:

A. 0

B. $\frac{\pi}{3}$

C. $\frac{\pi}{6}$

D. $\frac{\pi}{4}$

Answer: D

Solution:

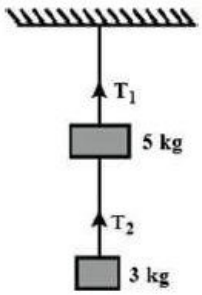
Solution:

$\tan\theta = \frac{V^2}{2g} = \frac{10 \times 10}{10 \times 10} = 1$

$\theta = \frac{\pi}{4}$

Question 58

Two masses of 5 kg and 3 kg are suspended with the help of massless inextensible strings as shown in figure, when whole system is going upwards with acceleration $2m / s^2$, the value of T_1 is (use $g = 9.8m / s^2$)



Options:

A. 23.6N

B. 59N

C. 94.4N

D. 35.4N

Answer: C

Solution:

Solution:

Question 59

The Vernier scale of a travelling microscope has 50 divisions which coincides with 49 main scale divisions. If each main scale division is 0.5 mm, then the lease count of the microscope is

Options:

A. 0.01 mm

B. 0.5 cm

C. 0.01 cm

D. 0.5 mm

Answer: A

Solution:

Solution:
L. C = 1M SD − 1V SD
or L.C $= \frac{\text{1M SD}}{\text{No.of.vernier scale division}} = \frac{0.05\,\text{mm}}{50}$ L.C $= 0.01\,\text{mm}$

Question 60

The displacement ' x ' (in meter) of a particle of mass ' m ' (in kg) moving in one dimension under the action of a force, is related to time ' t ' (in sec) by, $t = \sqrt{x} + 3$. The displacement of the particle when its velocity is zero, will be

Options:

A. 6m

B. 2m

C. 4m

D. 0m

Answer: D

Solution:

Solution:
$t = \sqrt{x} + 3$
$\Rightarrow x = (t-3)^2$
$v = \frac{dx}{dt} = 2(t-3)$
$v = 0 \Longrightarrow t = 3$
At $t = 3$, $x = (3-3)^2 = 0$

Chemistry

Question 1

A first order reaction is half completed in 45 min. How long does it need 99.9% of the reaction to be completed?

Options:

A. 10 Hours

B. 20 Hours

C. 5 Hours

D. 7.5 Hours

Answer: D

Solution:

Solution:
$t_{99.9\%} = 10t_{50\%}$
$= 10 \times 45\,\text{min} = 450\,\text{min} = 7.5$ hours

Question 2

The rate of the reaction $CH_3COOC_2 + NaOH \rightarrow CH_3COONa + C_2H_5OH$ is given by the equation, Rate $= K[CH_3COOC_2H_5][NaOH]$. If concentration is expressed in mol L^{-1}, the unit of K is

Options:

A. $Lmol^{-1}s^{-1}$

B. s^{-1}

C. $mol^{-2}L^2s^{-1}$

D. $mol\,L^{-1}\,s^{-1}$

Answer: A

Solution:

Solution:
2^{nd} order reaction

Question 3

Colloidal solution commonly used in the treatment of skin disease is

Options:

A. Colloidal Gold

B. Colloidal Antimony

C. Colloidal Sulphur

D. Colloidal Silver

Answer: C

Solution:

Solution:

Question 4

Specific conductance of 0.1MHNO_3 is $6.3 \times 10^{-2} ohm^{-1} cm^{-1}$. The molar conductance of the solution is

Options:

A. $6.300 ohm^{-1} cm^2 mol^{-1}$

B. $63.0 ohm^{-1} cm^2 mol^{-1}$

C. $630 ohm^{-1} cm^2 mol^{-1}$

D. $315 ohm^{-1} cm^2 mol^{-1}$

Answer: C

Solution:

Solution:

$$\lambda_m = \frac{1000k}{C} = \frac{1000 \times 6.3 \times 10^{-2}}{0.1}$$
$$= 630 ohm^{-1} cm^2 mol^{-1}$$

Question 5

For spontaneity of a cell, which is correct?

Options:

A. ΔG = +ve, ΔE = +ve

B. $\Delta G = -ve$

C. $\Delta G = 0, \Delta E = 0$

D. $\Delta G = -ve, \Delta E = 0$

Answer: B

Solution:

Solution:

Question 6

For n th of reaction, Half-life period is directly proportional to

Options:

A. a^{n-1}

B. a^{1-n}

C. $\frac{1}{a^{n-1}}$

D. $\frac{1}{a^{1-n}}$

Answer: C

Solution:

Solution:

$t_{1/2} \propto \frac{1}{a^{n-1}}$

Question 7

Half-life of a reaction is found to be inversely proportional to the fifth power is initial concentration, the order of reaction is

Options:

A. 5

B. 6

C. 3

D. 4

Answer: B

Solution:

Solution:

$t_{1/2} \propto \frac{1}{a^{n-1}}$; n = 6

Question 8

The strong reducing property of hypophosphorous acid is due to

Options:

A. Two P-H bonds

B. Presence of phosphorus in its highest oxidation state

C. Its concentration

D. The positive valency of phosphorus

Answer: A

Solution:

Solution:

Question 9

A transition metal exists in its highest oxidation state. It is expected to behave as

Options:

A. An oxidizing agent

B. A reducing agent

C. A chelating agent

D. A central metal in a co-ordination compound

Answer: A

Solution:

Solution:

Question 10

What will be the value of x in $F e^{x+}$, if the magnetic moment $\mu = \sqrt{24}BM$?

Options:

A. 0

B. +1

C. +2

D. +3

Answer: C

Solution:

Solution:
n = 4 ∴ F e^{2+}
If BM $= \sqrt{24} = \sqrt{4(+2)}$
number of uparied e = 4
Then Fe must have +2 charge

Question 11

Which can adsorb larger of hydrogen gas?

Options:

A. Finely divided platinum

B. Colloidal $Fe(OH)_3$

C. Finely divided nickel

D. Colloidal solution of palladium

Answer: D

Solution:

Solution:

Question 12

The property of halogens which is not correctly matched is

Options:

A. I > Br > Cl > F (density)

B. F > Cl > Br > I (electron gain enthalpy)

C. F > Cl > Br > I (ionization enthalpy)

D. F > Cl > Br > I (electronegativity)

Answer: B

Solution:

Solution:

Question 13

Which noble gas has least tendency to form compounds?

Options:

A. Ar

B. Kr

C. He

D. Ne

Answer: C

Solution:

Solution:

Question 14

$(NH_4)_2Cr_2O_7$ on heating liberates a gas. The same gas will be obtained by

Options:

A. Treating H_2O_2 with $NaNO_2$

B. Treating Mg_3N_2 with H_2O

C. Heating NH_4NO_3

D. Heating NH_4NO_2

Answer: D

Solution:

Solution:

$(NH_4)_2Cr_2O_7 \xrightarrow{heat} Cr_2O_3 + 4H_2O + N_2$

$NH_4NO_2 \xrightarrow{\Delta} 2H_2O + N_2$

Question 15

The complex hexamine platinum (IV) chloride will give number of ions on ionization.

Options:

A. 3

B. 2

C. 5

D. 4

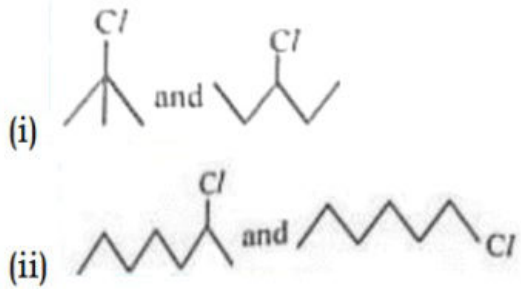
Answer: C

Solution:

Solution:
$[Pt(NH_3)_6]Cl_4 \rightarrow [Pt(NH_3)_6]^{+4} + 4Cl^-$
Five ions are produced

Question 16

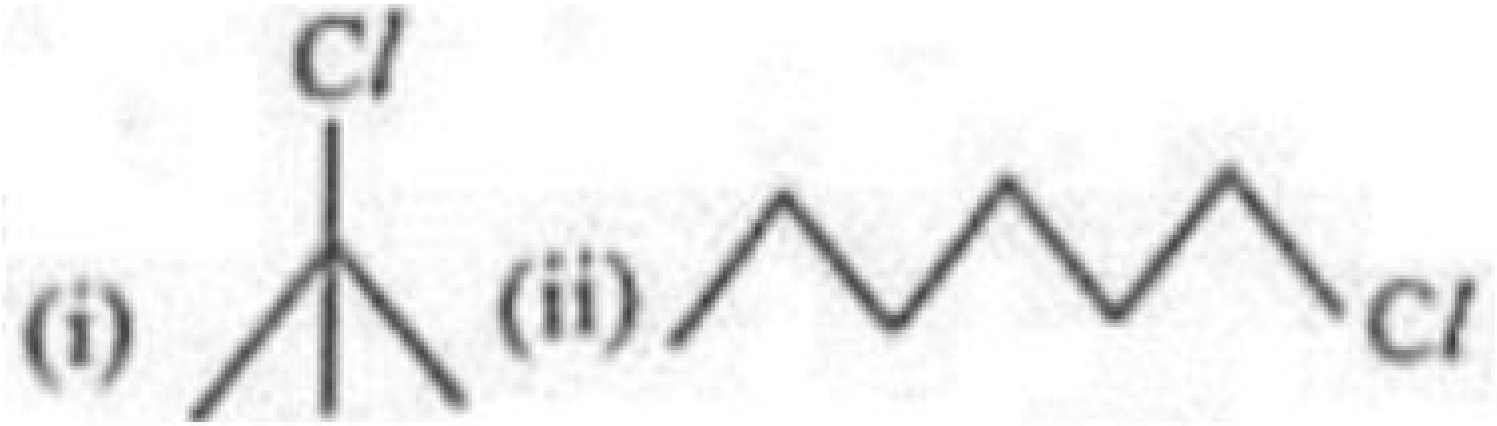
In the following pairs of halogen compounds, which compound undergoes faster SN ^{1} reaction?



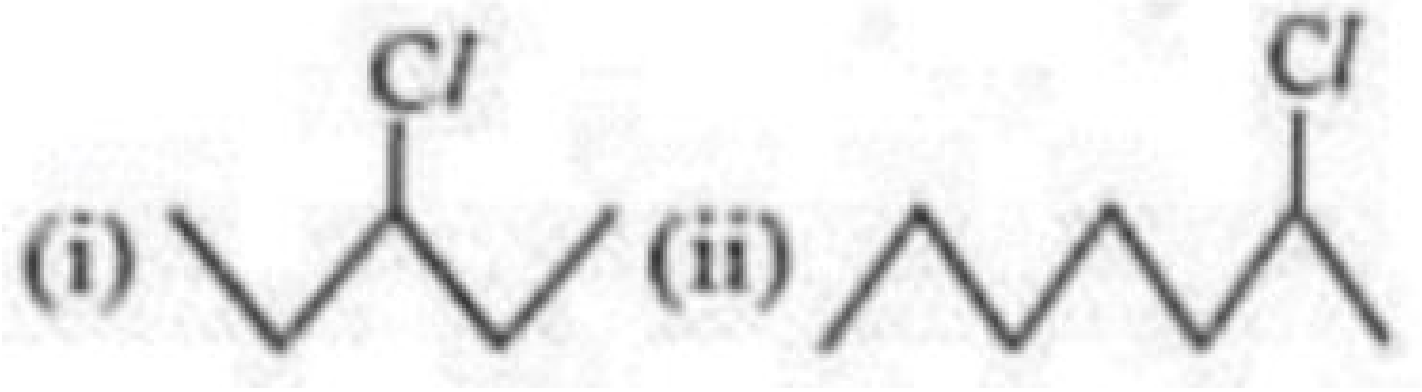
Options:

A.

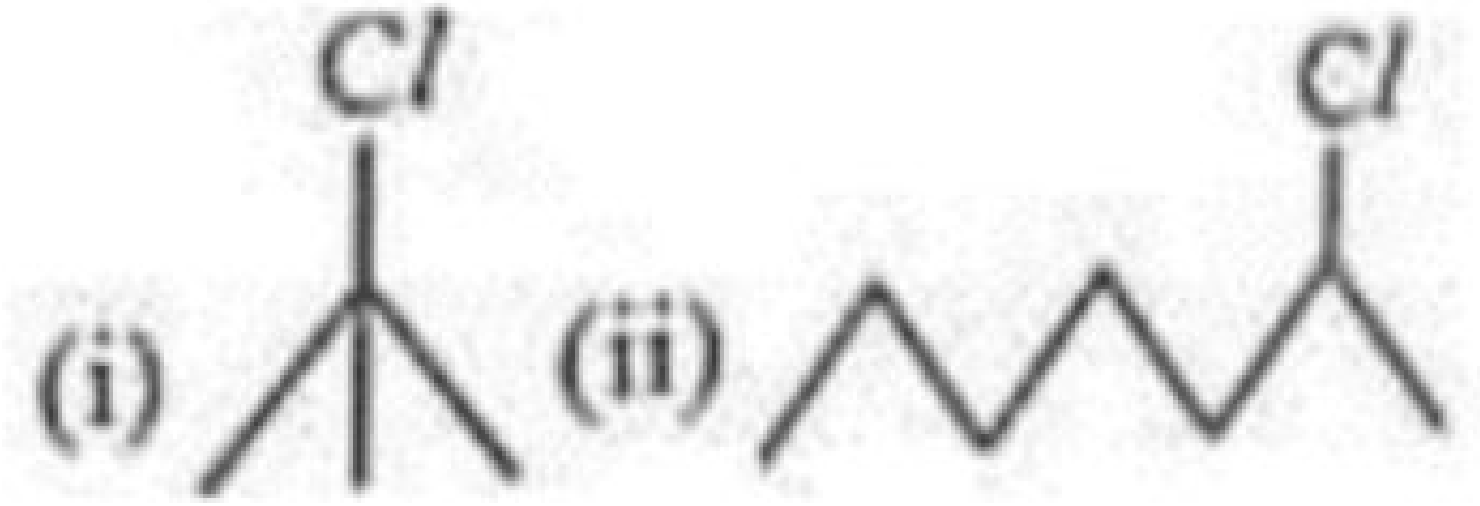
B.



C.



D.



Answer: D

Solution:

Solution:
S_N1 reaction proceeds via formation of carbocation. In option B, the alkyl halide (1) is 3° while (2) is 2°.
Therefore greater the stability of the carbocation, faster is the rate of S_N1 reaction.
Therefore option D, the compound pair of 2-chloro-2 methylpropane and 2chloroheptane is the correct option.

Question 17

The only Lanthanoid which is radioactive

Options:

A. Promethium

B. Praseodymium

C. Lanthanum

D. Cerium

Answer: A

Solution:

Solution:

Question 18

All Cu(I I) halides are known, except the iodide, the reaction for it is that

Options:

A. Cu^{+2} has much more negative hydration enthalpy

B. Cu^{+2} ion has smaller size

C. Iodide is bulky ion

D. Cu^{+2} oxidises iodide to iodine

Answer: D

Solution:

Solution:
All Cu (II) halides are known except the iodine because Cu^{2+} oxidizes iodine to iodine
$2Cu^{2+} + 4I^{-1} \rightarrow 2CuI_{(S)} + I_2$

Question 19

The correct IUPAC name of cis-platin is

Options:

A. Diammine dichloride platinum (O)

B. Dichlorido diammine platinum (IV)

C. Diammine dichlorido platinum (II)

D. Diammine dichloride platinum (IV)

Answer: C

Solution:

Solution:
$[Pt(NH_3)_2Cl_2]$ = cis-platin

Question 20

Crystal Field Splitting Energy (CFSE) for $[CoCl_6]^{4-}$ is $18000cm^{-1}$. The Crystal Field Splitting Energy (CFSE) for $[CoCl_4]^{2-}$ will be

Options:

A. $8000cm^{-1}$

B. 10, $000cm^{-1}$

C. 18, $000cm^{-1}$

D. 16, $000cm^{-1}$

Answer: A

Solution:

Solution:
$\Delta_t = \frac{4}{9}\Delta_0 = \frac{4}{9} \times 18000cm^{-1} = 8000cm^{-1}$

Question 21

The major product obtained when ethanol is heated with excess of conc. H_2SO_4 at at 443K is

Options:

A. ethane

B. methane

C. ethene

D. ethyne

Answer: C

Solution:

Solution:
$$CH_3 - CH_2 - OH \xrightarrow[443K]{\text{Conc . } H_3SO_4} CH_2 = CH_2$$

Question 22

Among the following, the products formed by the reaction of anisole with H I are

Options:

A. Benzene + Methanol

B. Phenol + Methane

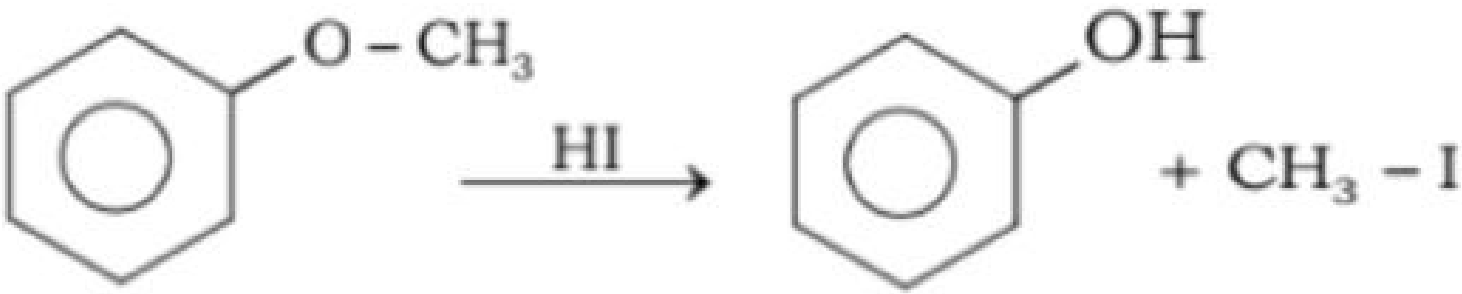
C. Phenol + lodomethane

D. Sodium phenate + Methanol

Answer: C

Solution:

Solution:

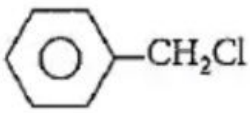


Question 23

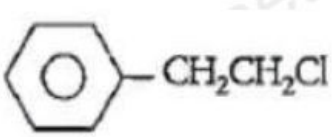
Which one of the following Chlorohydrocarbon readily undergoes solvolysis?

Options:

A.

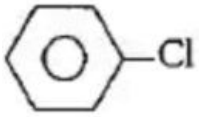


B.



C. CH_2 = CHCl

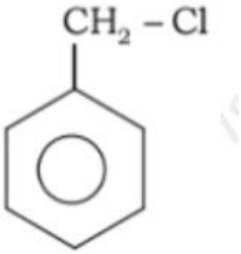
D.



Answer: A

Solution:

Solution:



on solvolysis give more stable benzyl carbocation

Question 24

Identify the products A and B in the reactions:
$R-X + AgCN \rightarrow A + AgX$
$R-X + KCN \rightarrow B + KX$

Options:

A. A = RNC; B = RCN

B. A = RNC; B = RNC

C. A = R − CN ; B = RCN

D. A = RCN ; B = RNC

Answer: A

Solution:

Solution:

$$R-X + AgCN \rightarrow \underset{(A)}{R-NC} + AgX$$

$$R-X + KCN \rightarrow \underset{(B)}{R-CN} + KX$$

Question 25

An organic compound with molecular formula C_7H_8O dissolves in NaOH and gives a characteristic colour with $FeCl_3$. On treatment with bromine, it gives a tribromo derivative $C_7H_5OB_3$. The compound is

Options:

A. m− Cresol

B. p-Cresol

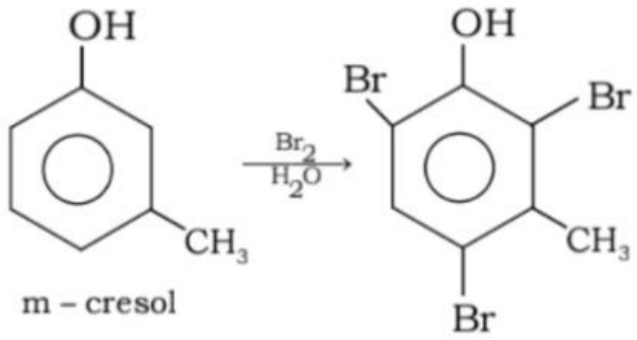
C. Benzyl alcohol

D. o-Cresol

Answer: A

Solution:

Solution:
Phenols gives characteristic colour with
$FeCl_3$



Meta-derivative of phenol only gives tribromo derivative

Question 26

In Kolbes reaction the reacting substances are

Options:

A. Sodium phenate and CCl_4

B. Phenol and $CHCl_3$

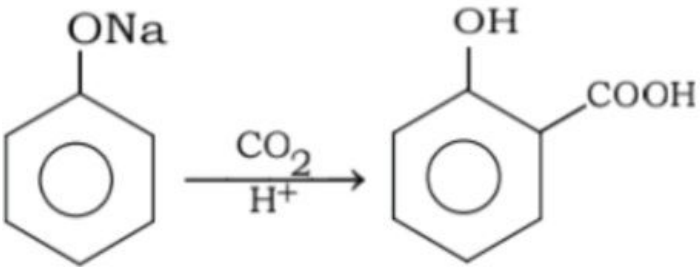
C. Sodium phenate and CO_2

D. Phenol and CCl_4

Answer: C

Solution:

Solution:



Question 27

In Carbylamine test for primary amines the resulting foul smelting product is

Options:

A. CH_3NC

B. $COCl_2$

C. CH_3NCl_2

D. CH_3CN

Answer: A

Solution:

Solution:
Carbylamine test for primary amines the resulting isocyanide

$$CH_3 - NH_2 \xrightarrow[NaOH3]{CHCl} CH_3NC$$

Question 28

Ethanoic acid undergoes Hell-Volhard Zelinsky reaction but Methanoic acid does not, because of

Options:

A. absence of $\alpha - H$ atom in ethanoic acid

B. higher acidic strength of ethanoic acid than methanoic acid

C. presence of $\alpha - H$ atom in methanoic acid

D. presence of $\alpha - H$ atom in ethanoic acid

Answer: D

Solution:

Solution:
Carboxylic acid with alpha hydrogen undergoes HVZ reaction

Question 29

The general name of the compound formed by the reaction between aldehyde and alcohol is

Options:

A. Glycol

B. Acetate

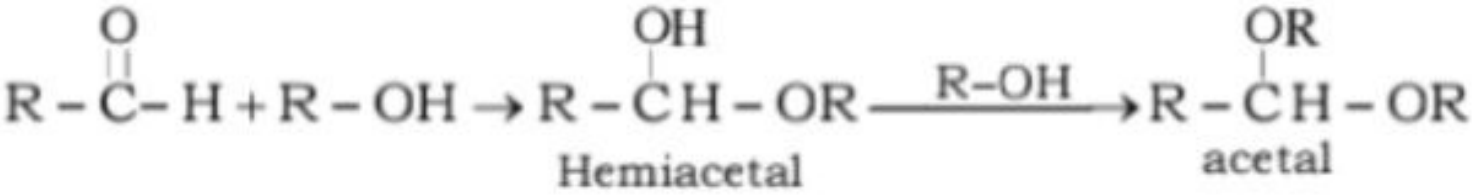
C. Ester

D. Acetal

Answer: D

Solution:

Solution:



Question 30

Reaction by which benzaldehyde can not be prepared is

Options:

A. Toulene $\xrightarrow[(ii)H_3O^+]{(i)CrO_2Cl_2 in CS_2}$

B. Benzoyl chloride $+ H_2 \xrightarrow[\Delta]{Pd - BaSO_4}$

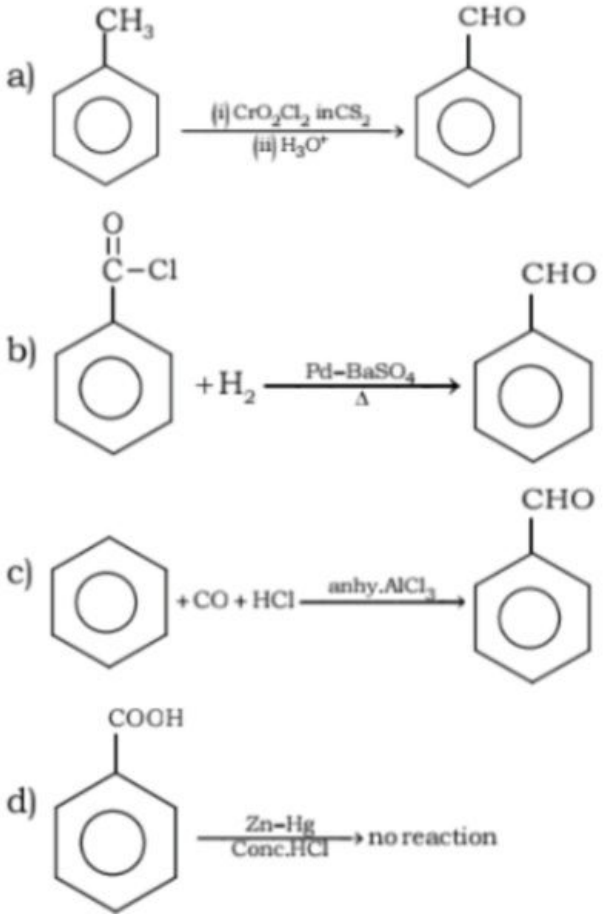
C. Benzene $+ CO + HCl \xrightarrow{anhydrous\ AlCl_3}$

D. Benzoic acid $\xrightarrow{Zn - Hg\ and\ Conc.\ HCl}$

Answer: D

Solution:

Solution:



Question 31

The test to differentiate between pentan-2-one and pentan-3-one is

Options:

A. Fehling’s test

B. Iodoform test

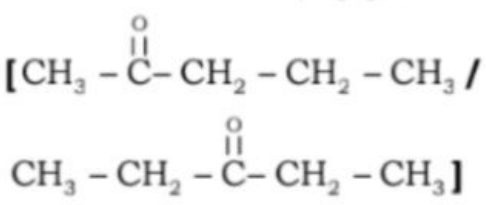
C. Baeyer’s test

D. Benedict’s test

Answer: B

Solution:

Solution:



Question 32

A secondary amine is

Options:

A. a compound with an NH_2 group on the carbon atom in number 2 position

B. a compound in which 2 of the hydrogen of N_3 have been replaced by organic groups

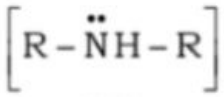
C. an organic compound with two NH_2 group

D. a compound with two carbon atom and an NH_2 group

Answer: B

Solution:

Solution:



Question 33

Which of the following is correctly matched?

Options:

A. Bakelite - Novolac

B. Polyster - tetrafluoroethene

C. Nylon - acrylonitrile

D. Teflon - copralactum

Answer: A

Solution:

Solution:

Question 34

Which institute has approved the emergency use of 2 -deoxy-D-Glucose as additive therapy for COV I D − 19 patients?

Options:

A. Ministry of Health and Family Welfare

B. Drug Controlled General of India

C. Indian Council of Medical Research

D. World Health Organisation

Answer: B

Solution:

Solution:

Question 35

A Nucleic acid, whether DNA or RNA gives on complete hydrolysis, two purines bases, two pyrimidine bases, a pentose sugar and phosphoric acid. Nucleotides which are intermediate products in the hydrolysis contain

Options:

A. purine or pyrimidine base and orthophosphoric acid

B. purine or pyrimidine base, a pentose sugar and ortho-phosphoric acid

C. purine or pyrimidine base and pentose sugar

D. a purine base, pentose sugar and orthophosphoric acid

Answer: B

Solution:

Solution:

Question 36

Which is most VISCOUS?

Options:

A. Ethylene glycol

B. Glycerol

C. Methanol

D. Ethanol

Answer: B

Solution:

Solution:

Question 37

The volume of 2.8g of CO at 27˚C and 0.821 atm, pressure is $(R - 0.08210$ lit. atm. $.K^{-1}mol^{-1})$

Options:

A. 3 litres

B. 30 litres

C. 0.3 litres

D. 1.5 litres

Answer: A

Solution:

Solution:

Question 38

The work done when 2 moles of an ideal gas expands reversibly and isothermally from a volume

Options:

A. $0.115\,kJ$

B. $58.5\,kJ$

C. $11.5\,kJ$

D. $5.8\,kJ$

Answer: C

Solution:

Solution:
$W = -2.303\,nRT\log V_2 / V_1$

Question 39

An aqueous solution of alcohol contains 18g of water and 414g of ethyl alcohol. The mole fraction of water is

Options:

A. 0.7

B. 0.9

C. 0.1

D. 0.4

Answer: C

Solution:

Solution:
Molecular weight of $C_2H_5OH = 24 + 5 + 16 + 1 = 46$
Molecular mass of $H_2O = 18$
414 g of C_2H_5OH has $\frac{414}{46} = 9$ mole (i.e. $n_1 = 9$ mole) 18g of H_2O has $= \frac{18}{18} = 1$ mole (i.e. $n_2 = 1$ mole)
mole fraction of water $= \frac{n_2}{n_1 + n_2} = \frac{1}{1 + 9}$
$= \frac{1}{10} = 0.1$

Question 40

If wavelength of photon is 2.2×10^{-11}m and h = 6.6×10^{-34}Js, then momentum of photon

Options:

A. $1.452 \times 10^{-44}\,\mathrm{kg\,ms^{-1}}$

B. $6.89 \times 10^{43}\mathrm{kgms^{-1}}$

C. $3 \times 10^{-23}\,\mathrm{kg\,ms^{-1}}$

D. $3.33 \times 10^{-22}\mathrm{kgms^{-1}}$

Answer: C

Solution:

Solution:
$\lambda = \frac{h}{mv} = \frac{h}{p}$
$p = \frac{h}{\lambda} = \frac{6.6 \times 10^{-34}}{2.2 \times 10^{-11}} = 3 \times 10^{-23}$

Question 41

Elements X , Y and Z have atomic number 19,37 and 55 respectively. Which of the following statements is true about them?

Options:

A. Z would have the highest ionization potential

B. Y would have the highest ionization potential

C. Their ionization potential would increase with increasing atomic number

D. Y would have an ionization potential between those of X and Z

Answer: D

Solution:

Solution:

Question 42

In oxygen and carbon molecule the bonding is

Options:

A. O_2 : 1σ, 1π; C_2 : 0σ, 2π

B. O_2 : 0σ, 2π; C_2 : 2σ, 0π

C. O_2 : 1σ, 1π; C_2 : 1σ, 1π

D. O_2 : 2σ, 0π; C_2 : 0σ, 2π

Answer: A

Solution:

Solution:

Question 43

Amphoteric oxide among the following:

Options:

A. Ag_2O

B. SnO_2

C. BeO

D. CO_2

Answer: B,C

Solution:

Solution:

Question 44

Which property of CO_2 makes it biologically and geo-chemically important?

Options:

A. Its low solubility in water

B. Its high compressibility

C. Its acidic nature

D. Its colourless and odourless nature

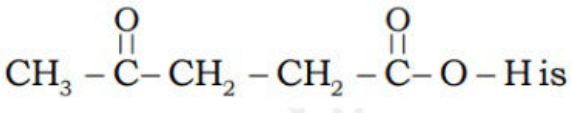
Answer: A

Solution:

Solution:

Question 45

The IUPAC name for



Options:

A. 1-carboxybutan-3-one

B. 4-oxopentanoic acid

C. 1 -hydroxy pentane-1, 4-dione

D. 1 ,4-dioxopentanol

Answer: B

Solution:

Solution:

Question 46

1 mole of HI is heated in a closed container of capacity of 2L. At equilibrium half a mole of HI is dissociated. The equilibrium constant of the reaction is

Options:

A. 0.25

B. 0.35

C. 1

D. 0.5

Answer: A

Solution:

Solution:

$2\,HI \rightleftharpoons H_2 + I_2$

1	0	0
0.5	0.25	0.25

$K_C \frac{[H_2][I_2]}{[HI]^2}$

$$K_C = \frac{\frac{0.25 \times 0.25}{2}}{\frac{0.5 \times 0.5}{2}} = \frac{1}{4} = 0.25$$

Question 47

Which among the following has highest pH ?

Options:

A. $1\,M H_2SO_4$

B. $0.1\,M NaOH$

C. $1\,M HCl$

D. $1\,M NaOH$

Answer: D

Solution:

Solution:

Question 48

In which of the following compounds, an element exhibits two different oxidation states?

Options:

A. N_2H_4

B. N_3H

C. NH_2CONH_2

D. NH_4NO_3

Answer: D

Solution:

Solution:

Question 49

Which of the following hydrides is electron deficient?

Options:

A. CH_4

B. B_2H_6

C. NaH

D. CaH_2

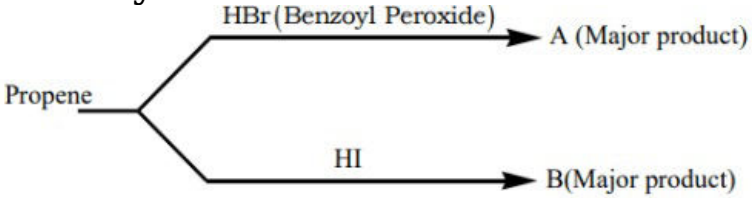
Answer: B

Solution:

Solution:

Question 50

Identify A and B in the reaction



Options:

A. A : $CH_3 - \underset{\underset{Br}{|}}{CH} - CH_3$.

$B : CH_3 - CH_2 - CH_2 - I$

B. A : $CH_3 - \underset{\underset{Br}{|}}{CH} - CH_3$,

B : $CH_3 - \underset{\underset{I}{|}}{CH} - CH_3$

C. A : $CH_3 - CH_2 - CH_2 - Br$
B : $CH_3 - CH_2 - CH_2 - I$

D. A : $CH_3 - CH_2 - CH_2 - Br$
B : $CH_3 - \underset{\underset{I}{|}}{CH} - CH_3$

Answer: D

Solution:

Solution:

Question 51

Vacant space in body centered cubic lattice unit cell is about

Options:

A. 23%

B. 46%

C. 32%

D. 10%

Answer: C

Solution:

Solution:

Question 52

How many number of atoms are there in a cube based unit cell, having one atom on each corner and 2 atom on each body diagonal of cube?

Options:

A. 4

B. 9

C. 8

D. 6

Answer: B

Solution:

Solution:

Question 53

Which of the following is NOT true about the amorphous solids?

Options:

A. Amorphous solids can be moulded by heating

B. They are anisotropic in nature

C. On heating they may become crystalline at certain temperature

D. They may become crystalline on keeping for long time.

Answer: B

Solution:

Solution:

Question 54

Which of the following colligative properties can provide molar mass of proteins, polymers, and colloids with greater precision?

Options:

A. Depression in freezing point

B. Osmotic pressure

C. Relative lowering of vapour pressure

D. Elevation in boiling point

Answer: B

Solution:

Solution:

Question 55

In Fuel cells _____ are used as catalysts.

Options:

A. Zinc - Mercury

B. Lead - Manganese

C. Platinum - Palladium

D. Nickel - Cadmium

Answer: C

Solution:

Solution:

Question 56

The molar conductivity is maximum for the solution of concentration

Options:

A. 0.005 M

B. 0.001 M

C. 0.004 M

D. 0.002 M

Answer: B

Solution:

Solution:

$\Delta_m = \frac{k \times 1000}{M}$

Lower the molarity higher the molar conductivity

Question 57

Alkali halides do not show dislocation defect because

Options:

A. Cations and anions have almost equal size

B. There is large difference in size of cations and anions

C. Cations and anions have low co-ordination number.

D. Anions cannot be accommodated in vacant spaces.

Answer: B

Solution:

Solution:

Question 58

Solubility of a gas in a liquid increases with

Options:

A. increase of P and decrease of T

B. decrease of P and decrease of T

C. increase of P and increase of T

D. decrease of P and increase of T

Answer: A

Solution:

Solution:

Question 59

The rise in boiling point of a solution containing 1.8g of glucose in 100g of solvent is 0.1˚C. The molal elevation constant of the liquid is

Options:

A. 2K kg / mol

B. 10 Kkg / mol

C. 0.1 Kkg / mol

D. 1 Kkg / mol

Answer: D

Solution:

Solution:

$\Delta T_b = K_b \cdot m \cdot i \Rightarrow 0.1 = K_b \times \frac{1.8}{180} \times \frac{1000}{100} \times 1$

$K_b = 1$

Question 60

If 3g of glucose (molar mass = 180g) is dissolved in 60g of water at 15˚C, the osmotic pressure of the solution will be

Options:

A. 6.57 atm

B. 5.57 atm

C. 0.34 atm

D. 0.65 atm

Answer: A

Solution:

Solution:

$\pi = C \cdot R \cdot T = \frac{w_2}{M_2}\frac{1000}{V(m\ell)} \times R \cdot T$

$\Rightarrow \frac{3}{180} \times \frac{1000}{60} \times 0.0821 \times 288 = 6.568\,\text{atm}$

Biology

Question 1

A series of experiments were conducted by Frederick Griffith in 1928, on transforming principle with

Options:

A. Streptococcus pneumoniae

B. Escherichia coli

C. Bacillus thuringiensis

D. Salmonella typhimurium

Answer: A

Solution:

Solution:

Question 2

The number of codons effective in coding twenty amino acids:

Options:

A. 20

B. 61

C. 32

D. 64

Answer: B

Solution:

Solution:
George Gamow in 1954, pointed out the possibility of a three-letter code i.e. triplet codon. This will give 4 x 4 x 4 = 64 codons which are more than enough to code for twenty amino acids. Out of these 64 codons, 3 codons are stop codons. Hence, 61 effective codons are there for the synthesis of twenty amino acids.

Question 3

Which aspect forms the basis of DNA finger-printing?

Options:

A. The amount of DNA found in samples of blood, saliva and skin.

B. The ratio of purines and pyrimidines present in DNA.

C. The Sequence of DNA present in the ridges and grooves of finger-prints.

D. The Satellite DNA showing high degree of repetition in DNA segments.

Answer: D

Solution:

Solution:
Variable Number of Tandem Repeat (VNTR) polymorphism is the basis of DNA fingerprinting which are short nucleotide repeats. DNA of each organism has specific sequences called restriction fragments that can be cleaved by restriction endonuclease enzymes to produce fragments of different lengths.

Question 4

Identify the most infectious and fatal type of malarial parasite:

Options:

A. Plasmodium ovale

B. Plasmodium vivax

C. Plasmodium malariae

D. Plasmodium falciparum

Answer: D

Solution:

Solution:

Question 5

The type of antibodies produced during the allergic reaction

Options:

A. IgM

B. Ig A

C. lg E

D. IgG

Answer: C

Solution:

Solution:

Question 6

One of the side-effect of the use of anabolic steroids in females

Options:

A. Masculinisation

B. Loss of memory

C. Hallucination

D. Cirrhosis of liver

Answer: A

Solution:

Solution:

Question 7

Which one of the following is a opiate narcotics ?

Options:

A. LSD

B. Barbiturates

C. Morphine

D. Amphetamines

Answer: C

Solution:

Solution:

Question 8

The large holes in 'Swiss - Cheese' are made by a

Options:

A. Fungus that releases a lot of gases during metabolic activities

B. Machine

C. Bacterium that produces methane gas

D. Bacterium producing a large amount of CO_2

Answer: D

Solution:

Solution:

Question 9

Which vitamin is increased by "LAB' in curd?

Options:

A. Vitamin E

B. Vitamin C

C. Vitamin B

D. Vitamin B_{12}

Answer: D

Solution:

Solution:

Question 10

Enzyme which is useful to remove the oily stains in laundry ?

Options:

A. Lipase

B. Renin

C. Protease

D. Amylase

Answer: A

Solution:

Solution:

Question 11

DNA replicates semi conservatively was first shown in :

Options:

A. Higher animals

B. Escherichia coli

C. Human cell

D. Plants

Answer: B

Solution:

Solution:

Question 12

What does the sample of given base sequence represent?
$5^{'} - GAATTC - 3^{'}$
$3^{'} - CTTAAG - 5^{'}$

Options:

A. Palindromic sequence

B. Initiator codon at S' end

C. Deletion mutation

D. Completion of replication

Answer: A

Solution:

Solution:

Question 13

Gel electrophoresis is used for

Options:

A. Cutting of DNA into fragments.

B. Construction of recombinant DNA by joining with cloning vectors.

C. Isolation of DNA molecule.

D. Separation of DNA fragments according to their size.

Answer: D

Solution:

Solution:

Question 14

An antibiotic resistance gene in a vector usually helps in the selection of

Options:

A. Non-competent cells

B. Competent cells

C. Transformed cells

D. Non-recombinant cells

Answer: C

Solution:

Solution:

Question 15

Silencing of specific mRNA in RNAi is by

Options:

A. dsDNA

B. SsRNA

C. dsRNA

D. ssDNA

Answer: C

Solution:

Solution:

Question 16

Cry-IAC effectively controls,

Options:

A. Ring worm

B. Cotton bollworms

C. Corn borer

D. Root nematode

Answer: B

Solution:

Solution:

Question 17

ADA deficiency can be cured by

Options:

A. Heart Transplantation

B. Bone-marrow Transplantation

C. Liver Transplantation

D. Kidney Transplantation

Answer: B

Solution:

Solution:

Question 18

Average natality rate in our village is 25 , average mortality is 24 , immigration 2 and emigration 3 and the net increase in population is :

Options:

A. 27

B. 0

C. 5

D. 10

Answer: B

Solution:

Solution:

Question 19

The term "Molecular Scissors" refers to

Options:

A. Tag polymerase

B. Polymerase-I

C. Polymerase-I

D. Restriction enzyme

Answer: D

Solution:

Solution:

Question 20

The animals which are active during day time :

Options:

A. Cresporal

B. Diurnal

C. Auroral

D. Vesporal

Answer: B

Solution:

Solution:

Question 21

Which of the following statement is incorrect related to biomes?

Options:

A. Low temperature and less rainfall is a characteristics of Tundra biomes.

B. Variation in temperature and mean precipitation accounts for the major biomes,

C. More rainfall and low temperature is the characteristics of deserts.

D. High temperature and minimum rainfall help to form grasslands.

Answer: C

Solution:

Solution:

Question 22

The amount of Photosynthetically active radiation captured by plants is

Options:

A. 12-20 percent

B. 20-30 percent

C. 2-10 percent

D. 60-70 percent

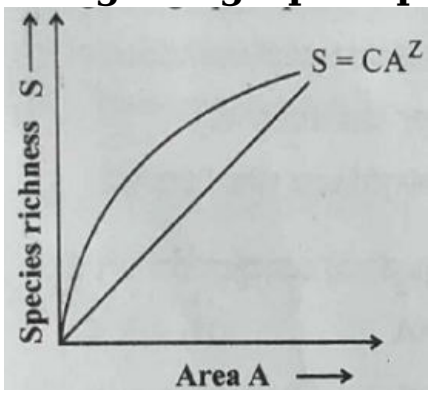
Answer: C

Solution:

Solution:

Question 23

The given graph represents



Options:

A. Population growth

B. Enzyme activity

C. Species area relationship

D. Growth of organisms

Answer: C

Solution:

Solution:

Question 24

Cuscuta is an example of

Options:

A. Predation

B. Broad Parasitism

C. Endoparasitism

D. Ectoparasitism

Answer: D

Solution:

Solution:

Question 25

Particulates of ……. size pose greatest risk to human health.

Options:

A. Less than 7.5 micrometers in diameter

B. Less than 2.5 micrometers in diameter

C. Less than 4.5 micrometers in diameter

D. Less than 3.5 micrometers in diameter

Answer: B

Solution:

Solution:

Question 26

Maintenance of constant internal environment is called as

Options:

A. Osmoregulation

B. Metastasis

C. Homeostasis

D. Thermoregulation

Answer: C

Solution:

Solution:

Question 27

Bovine spongiform encephalopathy is caused by

Options:

A. Fungi

B. Viroids

C. Prions

D. Virus

Answer: C

Solution:

Solution:

Question 28

Phycoerythrin and Floridian starch is found in

Options:

A. Red algae

B. Blue - green algae

C. Green algae

D. Brown algae

Answer: A

Solution:

Solution:

Question 29

Different types of respiratory organs like gills, book gills, book lungs and trachea are present in

Options:

A. Annelids

B. Sponges

C. Molluses

D. Arthropods

Answer: D

Solution:

Solution:

Question 30

Which of the following plant is used to extract Colchicine?

Options:

A. Tulip

B. Colchicum

C. Aloe

D. Asparagus

Answer: B

Solution:

Solution:

Question 31

Rows of S-shaped setae in the body of earthworm are present in all the segments, except

Options:

A. the first segment

B. the last segment

C. the first and last segment

D. the first, last and clitellum

Answer: D

Solution:

Solution:

Question 32

Cell theory was formulated by

Options:

A. Schwann and Robert Brown

B. Schleiden and Schwann

C. Robert Hook and Robert Brown

D. Schleiden and Robert Brown

Answer: B

Solution:

Solution:

Question 33

The type of Polysaccharide present in a cotton fibre

Options:

A. Glycogen

B. Starch

C. Insulin

D. Cellulose

Answer: D

Solution:

Solution:

Question 34

Enzyme involved in crossing over

Options:

A. Ligase

B. Recombinase

C. Polymerase

D. Endonuclease

Answer: B

Solution:

Solution:

Question 35

Kranz anatomy can be seen in

Options:

A. Maize

B. Tomato

C. Potato

D. Pea

Answer: A

Solution:

Solution:

Question 36

Respiratory quotient of glucose is

Options:

A. 1.0

B. 0

C. 0.7

D. 0.9

Answer: A

Solution:

Solution:

Question 37

A person suddenly starts coughing while swallowing food. This coughing would have been due to improper movement of

Options:

A. Tongue

B. Epiglottis

C. Diaphragm

D. Neck

Answer: B

Solution:

Solution:

Question 38

Binomial nomenclature is introduced by

Options:

A. John Ray

B. Carolus Linnaeus

C. Lamarck

D. Bentham and Hooker

Answer: B

Solution:

Solution:

Question 39

Filtration of blood during urine formation takes place in

Options:

A. Glomerulus

B. DCT

C. PCT

D. Collecting duct

Answer: A

Solution:

Solution:

Question 40

Corpus Callosum connects the

Options:

A. Spinal cord with the brain

B. Two lobes of cerebellum

C. Two cerebral hemispheres

D. Cerebrum and cerebellum

Answer: C

Solution:

Solution:

Question 41

Menstrual cycle is exhibited by:

Options:

A. Tiger

B. Cow

C. Rat

D. Apes

Answer: D

Solution:

Solution:

Question 42

An example of dioecious plant :

Options:

A. Papaya

B. Cucurbita

C. Coconut

D. Mango

Answer: A

Solution:

Solution:

Question 43

Stalk of the Stamen is:

Options:

A. Peduncle

B. Filament

C. Pedicel

D. Petiole

Answer: B

Solution:

Solution:

Question 44

The ovule of angiosperm is technically known as :

Options:

A. Megaspore

B. Megasporangium

C. Megasporophyll

D. Megaspore mother cell

Answer: B

Solution:

Solution:

Question 45

Typical mature embryosae of angiosperm is

Options:

A. 8 nucleated 1 celled structure

B. 8 nucleated 8 celled structure

C. 8 nucleated 7 celled structure

D. 7 nucleated 8 celled structure

Answer: C

Solution:

Solution:

Question 46

One of the 2000 years old viable seed, discovered during the archeological excavation at King Herold's near dead sea.

Options:

A. Lupin

B. Sunflower

C. Phoenix dactylifera

D. Maize

Answer: C

Solution:

Solution:

Question 47

The testis are situated outside the abdominal cavity in scortum as it helps to

Options:

A. Regulates hormone secretion

B. Store sperm

C. Release sperm

D. Maintain the low temperature

Answer: D

Solution:

Solution:

Question 48

Identify the odd one from the following :

Options:

A. Isthamus

B. Fimbriae

C. Labia minora

D. Infundibulum

Answer: C

Solution:

Solution:
"Isthmus," "Fimbriae," and "Infundibulum" are anatomical terms related to the female reproductive system.
The isthmus refers to a narrow portion or constriction, often found in the fallopian tubes.
Fimbriae are finger-like projections at the end of the fallopian tubes, responsible for capturing the released egg during ovulation and guiding it into the fallopian tube.
The infundibulum is the funnel-shaped opening of the fallopian tube near the ovary, which receives the egg from the ovary.
On the other hand, "Labia minora" is a term related to the external genitalia of the female reproductive system. It refers to the inner folds of skin located on either side of the vaginal opening. It is different from the other options, which are specific anatomical structures within the reproductive system.

Question 49

In which month of gestation, the first movements of foetus and appearance of hair on its head is observed?

Options:

A. 8^{th} month

B. 1^{st} month

C. 4^{th} month

D. 5^{th} month

Answer: D

Solution:

Solution:
The first movements of the fetus, known as "quickening," and the appearance of hair on its head, occur at different times during gestation.
The first movements of the fetus are usually felt by the mother between 18 to 25 weeks of gestation. This can vary from woman to woman and pregnancy to pregnancy. Initially, the movements may feel like flutters or gentle taps, and as the fetus grows, the movements become more pronounced and noticeable.
As for the appearance of hair on the fetus's head, it typically occurs around the 14th to 16th week of gestation. This is a developmental milestone when the hair follicles start forming, and fine hair, known as lanugo, begins to grow on the fetus's body, including the scalp. The lanugo hair helps regulate the fetus's body temperature and usually sheds before birth.

Therefore, the appearance of hair on the fetus's head is observed earlier in gestation compared to the first movements, which are felt later in the second trimester.

Question 50

The most abundant type of WBC cells

Options:

A. Monocytes

B. Basophils

C. Neutrophils

D. Eosinophils

Answer: C

Solution:

Solution:

Question 51

Which of the following is correctly matched ?

Options:

A. Spores - Sponge

B. Conidia - Hydra

C. Gemmules - Amoeba

D. Bulbil - Agave

Answer: D

Solution:

Solution:

Question 52

The technique advised by a doctor to overcome the problem of infertility :

Options:

A. RTI

B. MTP

C. ART

D. RCH

Answer: C

Solution:

Solution:

Question 53

Amniocentesis is a process to:

Options:

A. Determine the sex of the foetus

B. Determine any disease of heart

C. Know about the disease of brain

D. To grow cell on culture medium

Answer: A

Solution:

Solution:

Question 54

The first human like being is

Options:

A. Homo menthus

B. Homo erectus

C. Homo habilis

D. Homo sapiens

Answer: C

Solution:

Solution:

Question 55

XO type of sex determination and XY type of sex determination are the examples of

Options:

A. Female Homogamety

B. Male Heterogamety

C. Female Heterogamety

D. Male Homogamety

Answer: B

Solution:

Solution:

Question 56

Example for Non-Mendelian disorder:

Options:

A. Cystic fibrosis

B. Haemophilia

C. Down's syndrome

D. Thalassemia

Answer: C

Solution:

Solution:

Question 57

Gynecomastia is a symptom of

Options:

A. Cri-du-chat syndrome

B. Down's syndrome

C. Kline Felter's syndrome

D. Turner's syndrome

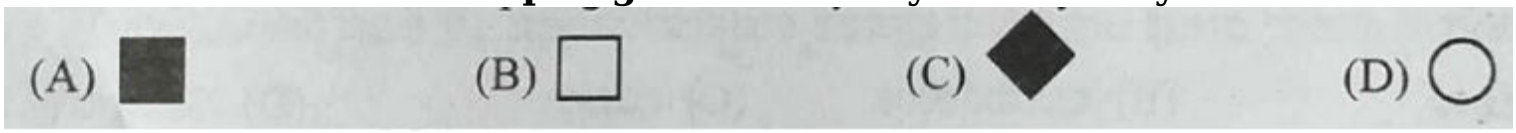
Answer: C

Solution:

Solution:

Question 58

The affected male in the pedigree chart is symbolized by :



Options:

A. (A)

B. (B)

C. (C)

D. (D)

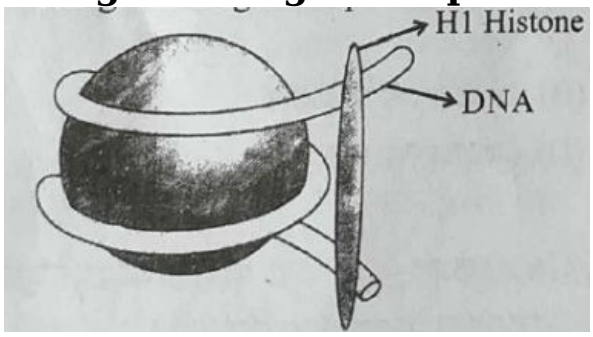
Answer: A

Solution:

Solution:

Question 59

The given diagram represents :Biology Question Image



Options:

A. Mesosome

B. Chromosome

C. Ribosome

D. Nucleosome

Answer: D

Solution:

Solution:

Question 60

Which of the following hormones is not secreted by human placenta ?

Options:

A. FSH

B. hCG

C. Relaxin

D. Progestogen

Answer: C

Solution:

Solution:
