

# Telangana State Council Higher Education

## Notations :

- Options shown in green color and with ✓ icon are correct.
- Options shown in red color and with ✗ icon are incorrect.

<b>Question Paper Name :</b>	EngineeringEnglish 19th Jul 2022 Shift 2
<b>Subject Name :</b>	Engineering (English)
<b>Creation Date :</b>	2022-07-21 14:41:23
<b>Duration :</b>	180
<b>Total Marks :</b>	160
<b>Display Marks:</b>	No
<b>Calculator :</b>	None
<b>Magnifying Glass Required? :</b>	No
<b>Ruler Required? :</b>	No
<b>Eraser Required? :</b>	No
<b>Scratch Pad Required? :</b>	No
<b>Rough Sketch/Notepad Required? :</b>	No
<b>Protractor Required? :</b>	No
<b>Show Watermark on Console? :</b>	Yes
<b>Highlighter :</b>	No
<b>Auto Save on Console?</b>	Yes
<b>Change Font Color :</b>	No
<b>Change Background Color :</b>	No
<b>Change Theme :</b>	No
<b>Help Button :</b>	No
<b>Show Reports :</b>	No
<b>Show Progress Bar :</b>	No

## Engineering (English)

<b>Group Number :</b>	1
<b>Group Id :</b>	1056155
<b>Group Maximum Duration :</b>	0
<b>Group Minimum Duration :</b>	180
<b>Show Attended Group? :</b>	No
<b>Edit Attended Group? :</b>	No
<b>Break time :</b>	0
<b>Group Marks :</b>	160
<b>Is this Group for Examiner? :</b>	No
<b>Examiner permission :</b>	Cant View
<b>Show Progress Bar? :</b>	No

## Mathematics

<b>Section Id :</b>	10561513
<b>Section Number :</b>	1
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	80
<b>Number of Questions to be attempted :</b>	80

Section Marks :	80
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	10561513
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 105615641 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Let  $f : A \rightarrow B$  be defined as  $f(x) = \frac{1}{2} - \tan\left(\frac{\pi x}{2}\right)$  and  $g : B \rightarrow C$  be defined as  $g(x) = \sqrt{3 + 4x - 4x^2}$ . If A, B, C are subsets of  $\mathbb{R}$  and  $f$  is an onto function then the range of the function  $f(x)$  is

Options :

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

1. ✖

2.  $[0, \infty)$

2. ✖

3.  $\left[-\frac{1}{2}, \frac{3}{2}\right]$

3. ✔

4.  $[-1, 1]$

4. ✖

Question Number : 2 Question Id : 105615642 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If D is the domain and G is the range of the real valued function  $f(x) = \sqrt{\frac{1-x^2}{1+x^2}}$ , then

$D \cap G =$

Options :

1.  $[0, \infty)$

1. ✖

[0,1]

2. ✓

$\left[0, \frac{1}{2}\right]$

3. ✘

[-1,1]

4. ✘

Question Number : 3 Question Id : 105615643 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Let  $A = \begin{pmatrix} 0 & 1 \\ 1 & k \end{pmatrix}$ ,  $k \in \mathbb{R}$  and  $A^3 = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ . If  $d = 228$ , then  $b + c =$

Options :

52

1. ✘

74

2. ✓

2

3. ✘

100

4. ✘

Question Number : 4 Question Id : 105615644 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Let A, B be two  $3 \times 3$  matrices and C be a  $3 \times 3$  unit matrix such that  $AB - C$  is a non-singular matrix. Let  $D = (AB - C)^{-1}$ . Then, consider the following statements.

Statement I :  $\det(BA) = \det(BA - C) \det(BDA)$

Statement II :  $ABD = DAB$

Which of the above statements is(are) true?

Options :

Statement I is true, but Statement II is false

1. ✖

Statement II is true, but Statement I is false

2. ✖

Both Statement I and Statement II are true

3. ✔

Both Statement I and Statement II are false

4. ✖

Question Number : 5 Question Id : 105615645 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

$$\text{Let } A = \begin{bmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \text{ then } (A^{-1}B)^{-1} + (AB^{-1})^{-1} =$$

Options :

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

1. ✖

$$\begin{bmatrix} 0 & -2 & 0 \\ 0 & 0 & -2 \\ -2 & 0 & 0 \end{bmatrix}$$

2. ✓

$$\begin{bmatrix} -2 & 0 & 0 \\ 0 & 0 & -2 \\ 0 & -2 & 0 \end{bmatrix}$$

3. ✗

$$\begin{bmatrix} 0 & 0 & -2 \\ -2 & 0 & 0 \\ 0 & -2 & 0 \end{bmatrix}$$

4. ✗

Question Number : 6 Question Id : 105615646 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Let  $\alpha, \beta, \gamma$  be real numbers. If  $\begin{pmatrix} 7 & 5 & \alpha \\ \beta & 2 & 11 \\ 3 & \gamma & 1 \end{pmatrix} \begin{pmatrix} 1 \\ 3 \\ 2 \end{pmatrix} = \begin{pmatrix} \alpha + \beta \\ -2\alpha + \beta - 2\gamma \\ \alpha + 2\beta + 3\gamma \end{pmatrix}$  then

$$100 + \frac{2\alpha + 11\beta}{\gamma} =$$

Options :

27

1. ✓

-25

2. ✗

225

3. ✗

-227

4. ✖

Question Number : 7 Question Id : 105615647 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $Z = \alpha + i\beta$  satisfies the equation  $|Z| - Z = 1 + 2i$  and  $|Z| = \sqrt{\alpha^2 + \beta^2}$  then  $Z\bar{Z} =$

Options :

$\frac{5}{2}$

1. ✖

$\frac{25}{4}$

2. ✔

$\frac{16}{9}$

3. ✖

$\frac{36}{25}$

4. ✖

Question Number : 8 Question Id : 105615648 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $-i$  and  $\alpha$  are the roots of the equation  $iz^2 - 2(i+1)z + (2-i) = 0$ ,  $\tan \theta = \frac{-1}{2}$  and  $\theta \in 4^{\text{th}}$  quadrant, then  $5^3 \cos 6\theta =$

Options :

-117

1. ✔

-44

2. ✖

117

3. ✖

44

4. ✖

Question Number : 9 Question Id : 105615649 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $1, \alpha_1, \alpha_2, \alpha_3, \dots, \alpha_{n-1}$  are  $n^{\text{th}}$  roots of unity then  $\sum_{1 \leq i < j \leq n-1} \alpha_i \alpha_j =$

Options :

1

1. ✔

0

2. ✖

-1

3. ✖

$i$

4. ✖

Question Number : 10 Question Id : 105615650 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Let  $f(x) = Ax^2 + Bx$ ,  $g(x) = Lx^2 + Mx + N$ . Given that  $f(2) - g(2) = 1$ ,  
 $f(3) - g(3) = 4$ ,  $f(4) - g(4) = 9$ . Then a root of  $f(x) - g(x) = 0$  is

Options :

1

1. ✖

-1

2. ✖

0

3. ✔

-2

4. ✖

Question Number : 11 Question Id : 105615651 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $f(x) = \frac{2x-3}{(x-2)(x-3)}$  is a real valued function then the value that  $f(x)$  does not take is

Options :

-10

1. ✖

2

2. ✖

1

3. ✖

-2

4. ✔

Question Number : 12 Question Id : 105615652 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0



If  $\alpha, \beta, \gamma$  are the roots of the equation  $5x^3 - 3x^2 + 2x - 4 = 0$  then  $\sum \alpha^2 \beta^2 =$

Options :

$$\frac{4}{5}$$

1. ✖

$$\frac{-2}{5}$$

2. ✖

$$\frac{2}{5}$$

3. ✖

$$\frac{-4}{5}$$

4. ✔

Question Number : 13 Question Id : 105615653 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $\alpha, \beta, \gamma$  are the roots of the equation  $x^3 + 4x^2 - 9x - 36 = 0$  such that  $\alpha + \beta = 0$ , then  $\alpha^2 + 2\beta^2 + 3\gamma^2 =$

Options :

$$75$$

1. ✔

$$61$$

2. ✖

$$34$$

3. ✖

4. ✖

Question Number : 14 Question Id : 105615654 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $(2-i)$  is one of the roots of the equation  $x^4 - 9x^3 + 31x^2 - 49x + 30 = 0$  and  $\alpha, \beta (\alpha < \beta)$  are its real roots then  $2\alpha - \beta =$

Options :

3

1. ✖

2

2. ✖

1

3. ✔

0

4. ✖

Question Number : 15 Question Id : 105615655 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $m$  and  $M$  are respectively the smallest and greatest rational roots of the equation  $6x^6 - 25x^5 + 31x^4 - 31x^2 + 25x - 6 = 0$ , then  $M - m =$

1

1. ✖

2

2. ✖

3

3. ✓

4

4. ✖

Question Number : 16 Question Id : 105615656 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The number of ways of arranging the letters of the word LINEAR so that the letters N and R do not come together and E and A come together is

Options :

80

1. ✖

60

2. ✖

10

3. ✖

144

4. ✓

Question Number : 17 Question Id : 105615657 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

15 lines are concurrent at a point P. A line L not passing through P intersects all the 15 lines and forms triangles with them. Then the number of triangles having L as one of its side is

Options :

310

1. ✖

91

2. ✖

182

3. ✖

105

4. ✔

Question Number : 18 Question Id : 105615658 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The expansion of  $(a+x)^n$  contains 15 terms. When  $x=1$  the ratio of the neighbouring terms to the middle term in this expansion is 16. Then the positive integral value of 'a' is

Options :

1

1. ✖

3

2. ✖

4

3. ✔

2

4. ✖

Question Number : 19 Question Id : 105615659 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

$$\text{If } \frac{d}{dx} \left( \frac{2x+1}{(x+1)^2(x-2)} \right) = \frac{A}{(x-2)^2} + \frac{B}{(x+2)^3} + \frac{C}{(x+1)^2} \text{ then } A + B + C =$$

Options :

$$\frac{-2}{3}$$

1. ✓

$$\frac{2}{3}$$

2. ✘

$$\frac{1}{3}$$

3. ✘

$$\frac{-1}{3}$$

4. ✘

Question Number : 20 Question Id : 105615660 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

$$\text{If } \frac{x^2 - 2}{(x^2 + 1)(x^2 + 3)} = \frac{Ax + B}{x^2 + 1} + \frac{Cx + D}{x^2 + 3} \text{ then } D =$$

Options :

$$\frac{-3}{2}$$

1. ✘

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

2. ✘

$$2$$

3. ✘

$$\frac{5}{2}$$

4. ✓

Question Number : 21 Question Id : 105615661 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Let  $\alpha$  be the period of  $3\sin\frac{\pi x}{3} - \cos\frac{\pi x}{2} + \tan\frac{\pi x}{4}$ ,  $\beta$  be the period of  $\sin^2\left(\frac{\pi}{7} + \frac{x}{4}\right) - \sin^2\left(\frac{\pi}{7} - \frac{x}{4}\right)$ , and  $\gamma$  be the period of  $\cos^4 x + \sin^4 x$ . Then  $\frac{\alpha\gamma}{\beta} =$

Options :

$$\frac{3}{2}$$

1. ✓

$$\frac{3}{4}$$

2. ✘

$$3$$

3. ✘

$$6$$

4. ✘

Question Number : 22 Question Id : 105615662 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $\theta$  does not lie in the second quadrant and  $\tan\theta = \frac{-3}{4}$ , then  $\tan\frac{\theta}{2} + \sin 2\theta =$

Options :

$$\frac{97}{75}$$

1. ✘

$$\frac{-97}{75}$$

2. ✓

$$\frac{-47}{75}$$

3. ✘

$$\frac{47}{75}$$

4. ✘

Question Number : 23 Question Id : 105615663 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

$$\cos^2 76^\circ + \sin^2 46^\circ + \sin 76^\circ \cos 46^\circ =$$

Options :

$$\frac{3}{4}$$

1. ✘

$$1$$

2. ✘

$$\frac{5}{4}$$

3. ✓

$$2$$

4. ✘

Question Number : 24 Question Id : 105615664 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $x = \log_e \left( \cot \left( \frac{\pi}{4} + \theta \right) \right)$ , then  $\lim_{\theta \rightarrow 0} \frac{\theta}{(\sin hx)(\cosh x)} =$

Options :

0

1. ✖

$-\frac{1}{2}$

2. ✔

-2

3. ✖

1

4. ✖

Question Number : 25 Question Id : 105615665 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $e^{it} = \cos t + i \sin t$  and  $e^{-it} = \cos t - i \sin t$  then  $\cosh(x + iy) - \cosh(x - iy) =$

Options :

$2 \sin h x \sin h y$

1. ✖

$2i \sin h x \cos y$

2. ✖

$2 \cosh x \cos y$

3. ✖



$$2i \sin h x \sin y$$

4. ✓

Question Number : 26 Question Id : 105615666 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

In a triangle ABC, AD and BE are medians. If  $AD = 4$ ,  $\angle DAB = \frac{\pi}{6}$  and  $\angle ABE = \frac{\pi}{3}$  then the area of  $\Delta ABC$  is

Options :

$$\frac{14}{3\sqrt{3}}$$

1. ✘

$$\frac{28}{3\sqrt{3}}$$

2. ✘

$$\frac{11}{3\sqrt{3}}$$

3. ✘

$$\frac{32}{3\sqrt{3}}$$

4. ✓

Question Number : 27 Question Id : 105615667 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If S is the circumcentre of a triangle ABC,  $a = 5, b = 6, c = 9$  and  $SB = \frac{27}{4\sqrt{2}}$  then  $\sin 2C =$

Options :

$$\frac{4\sqrt{2}}{9}$$

1. ✘

$$\frac{4\sqrt{2}}{27}$$

2. ✘

$$\frac{-4\sqrt{2}}{27}$$

3. ✘

$$\frac{-4\sqrt{2}}{9}$$

4. ✔

Question Number : 28 Question Id : 105615668 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

In a triangle ABC, if  $\frac{r}{r_1} = \frac{1}{2}$ , then  $4 \tan \frac{A}{2} \left( \tan \frac{B}{2} + \tan \frac{C}{2} \right) =$

Options :

1

1. ✘

2

2. ✔

3

3. ✘

4

4. ✘

Question Number : 29 Question Id : 105615669 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $2\bar{i} - \bar{j} + \bar{k}$ ,  $\bar{i} - 3\bar{j} - 5\bar{k}$  are the position vectors of the points A and B respectively, C divides AB in the ratio 2 : 3 and M is the mid-point of AB, then  
 5 (position vector of C) – 2 (position vector of M) =

Options :

$$5\bar{i} - 5\bar{j} - 3\bar{k}$$

1. ✓

$$11\bar{i} - 13\bar{j} - 11\bar{k}$$

2. ✗

$$5\bar{i} + 5\bar{j} - 3\bar{k}$$

3. ✗

$$11\bar{i} + 13\bar{j} - 11\bar{k}$$

4. ✗

Question Number : 30 Question Id : 105615670 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $\bar{a}$ ,  $\bar{b}$ ,  $\bar{c}$  are the non-coplanar vectors and  $\bar{a} - 2\bar{b} + 3\bar{c}$ ,  $-4\bar{a} + 5\bar{b} - 6\bar{c}$ ,  $x\bar{a} - 9\bar{b} + z\bar{c}$  are collinear points then  $2x - z =$

Options :

$$-10$$

1. ✗

$$-9$$

2. ✗

$$0$$

3. ✓

4. ✖

Question Number : 31 Question Id : 105615671 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The point which lies on the plane passing through the points  $\bar{i} - 2\bar{j} - 3\bar{k}$ ,  $3\bar{i} - \bar{j} + 4\bar{k}$ ,  $-3\bar{i} + 2\bar{j} - 5\bar{k}$  is

Options :

$$-\bar{i} + 3\bar{j} - 2\bar{k}$$

1. ✖

$$7\bar{i} - 5\bar{j} - 6\bar{k}$$

2. ✖

$$-\bar{i} + 9\bar{j} + 14\bar{k}$$

3. ✔

$$3\bar{i} - 7\bar{j} + 8\bar{k}$$

4. ✖

Question Number : 32 Question Id : 105615672 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $\bar{a} = \bar{i} - 2\bar{j} - 2\bar{k}$  and  $\bar{b} = 2\bar{i} - 3\bar{j} + \bar{k}$ , then the component of  $\bar{b}$  perpendicular to  $\bar{a}$  is

Options :

$$\frac{1}{3}(4\bar{i} - 5\bar{j} + 7\bar{k})$$

1. ✔

$$\frac{1}{3}(8\bar{i}-13\bar{j}-\bar{k})$$

2. ✖

$$\frac{2}{3}(\bar{i}-2\bar{j}-2\bar{k})$$

3. ✖

$$\frac{1}{7}(\bar{i}-5\bar{j}-17\bar{k})$$

4. ✖

Question Number : 33 Question Id : 105615673 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If the angle between the planes  $\bar{r} \cdot (11\bar{i} - 2\bar{j} + \alpha\bar{k}) = 7$  and  $\bar{r} \cdot (2\bar{i} + 4\bar{j} - 2\bar{k}) = 5$  is  $\frac{\pi}{2}$ , then  $\alpha =$

Options :

2

1. ✖

3

2. ✖

5

3. ✖

7

4. ✔

Question Number : 34 Question Id : 105615674 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $2\bar{i} + 3\bar{j} - 4\bar{k}$  and  $-\bar{i} + 2\bar{j} + \bar{k}$  are the two diagonals of a parallelogram, then the area of the parallelogram in square units is

Options :

$$\frac{1}{2}\sqrt{170}$$

1. ✖

$$\sqrt{174}$$

2. ✖

$$\sqrt{\frac{87}{2}}$$

3. ✔

$$\frac{1}{4}\sqrt{174}$$

4. ✖

Question Number : 35 Question Id : 105615675 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

There are  $n$  observations and all of them are negative numbers. The ascending order of these observations is  $x_1, x_2, \dots, x_n$ . If the signs of the first term and last term in that order are changed, then the range of the data is

Options :

$$|x_1| - |x_n|$$

1. ✖

$$|x_n - x_1|$$

2. ✖

3. ✓  $|x_1| - x_2$

$$|x_1| - |x_2|$$

4. ✘

Question Number : 36 Question Id : 105615676 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

A bag contains 3 white and 6 red balls. Four balls are drawn at a time randomly. Then the probability of getting at least two red balls is

Options :

$$\frac{8}{27}$$

1. ✘

$$\frac{5}{14}$$

2. ✘

$$\frac{60}{63}$$

3. ✓

$$\frac{1}{2}$$

4. ✘

Question Number : 37 Question Id : 105615677 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

A and B are two independent events.  $P(A) = \frac{2}{5}$ ,  $P(B) = \frac{1}{3}$ .

Match the following:

List - I		List - II	
A)	$P(\overline{A} \cup B)$	I)	$\frac{2}{3}$
B)	$P\left(\frac{A}{B}\right)$	II)	$\frac{11}{15}$
C)	$P(A \cup B)$	III)	$\frac{3}{5}$
D)	$P\left(\frac{\overline{B}}{A}\right)$	IV)	$\frac{2}{5}$
		V)	$\frac{1}{3}$

The correct match is

Options :

1. ✖

A	B	C	D
I	III	IV	II

2. ✖

A	B	C	D
II	IV	V	I

3. ✖

A	B	C	D
II	IV	III	V

4. ✔

A	B	C	D
II	IV	III	I



Correct Marks : 1 Wrong Marks : 0

Two players A and B are alternately throwing a coin and a die together. A player who first throws head and 6 wins the game. If A starts the game, then the probability that B wins the game is

Options :

$$\frac{12}{23}$$

1. ✘

$$\frac{11}{23}$$

2. ✔

$$\frac{5}{119}$$

3. ✘

$$\frac{12}{119}$$

4. ✘

Question Number : 39 Question Id : 105615679 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If two dice are thrown and if X denotes the sum of the numbers that show up on the faces of the dice then the mean of the random variable X is

Options :

$$\frac{27}{4}$$

1. ✘

$$\frac{35}{6}$$

2. ✘

$$\frac{41}{3}$$

3. ✖

7

4. ✔

**Question Number : 40 Question Id : 105615680 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0**

In a university campus, the probability that a person chosen at random is an engineering student is  $\frac{1}{5}$ . The probability of having atmost two engineering students in a sample of 8 people is

**Options :**

$$45 \times \frac{4^6}{5^8}$$

1. ✖

$$17 \times \frac{4^7}{5^8}$$

2. ✖

$$27 \times \frac{4^6}{5^8}$$

3. ✖

$$19 \times \frac{4^7}{5^8}$$

4. ✔

**Question Number : 41 Question Id : 105615681 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0**

If A(1,1), B(-1,1) and C(-1,-1) are three points and a point P moves such that  $PA^2 = PB^2 + PC^2$ , then the equation of the locus of P is

Options :

$$x^2 + y^2 - 6x - 2y + 2 = 0$$

1. ✖

$$x^2 + y^2 + 6x + 2y + 2 = 0$$

2. ✔

$$x^2 + y^2 + 6x - 2y + 2 = 0$$

3. ✖

$$x^2 + y^2 + 6x + 2y - 2 = 0$$

4. ✖

Question Number : 42 Question Id : 105615682 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $x^2 = 8ay$  is the transformed equation of  $x^2 - 4y + 6x + 15 = 0$  when the origin is shifted to the point  $(\alpha, \beta)$  by translation of axes, then  $2\alpha + 8\beta^2 =$

Options :

8

1. ✖

18

2. ✖

12

3. ✔

4. ✖

Question Number : 43 Question Id : 105615683 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If a straight line L passing through the point  $(5, -3)$  is inclined at an angle of  $60^\circ$  to the line  $\sqrt{3}x + y - 9 = 0$  and L intersects X-axis then the equation of L is

Options :

$$x - \sqrt{3}y - 3 - 5\sqrt{3} = 0$$

1. ✖

$$\sqrt{3}x - y - 3 - 5\sqrt{3} = 0$$

2. ✔

$$\sqrt{3}x - y + 3 + 5\sqrt{3} = 0$$

3. ✖

$$x - \sqrt{3}y + 3 + 5\sqrt{3} = 0$$

4. ✖

Question Number : 44 Question Id : 105615684 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Let  $\alpha, \beta, \gamma$  be three non-zero real constants and  $a, b, c$  be three arbitrary real numbers which satisfy  $\alpha a + \beta b + \gamma c = 0$ . Then the point of concurrence of the family of lines  $ax + by + c = 0$  is

Options :

$$\left(\frac{\alpha}{\beta}, \frac{\beta}{\gamma}\right)$$

1. ✖

$$\left(\frac{\gamma}{\alpha}, \frac{\beta}{\alpha}\right)$$

2. ✖

$$\left(\frac{\alpha}{\gamma}, \frac{\gamma}{\beta}\right)$$

3. ✖

$$\left(\frac{\alpha}{\gamma}, \frac{\beta}{\gamma}\right)$$

4. ✔

Question Number : 45 Question Id : 105615685 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If the algebraic sum of the perpendicular distances from the points  $(2,0)$ ,  $(0,2)$  and  $(1,1)$  to a variable line is zero, then the variable line always passes through a fixed point. The coordinates of that point are

Options :

$$(0,0)$$

1. ✖

$$(2,0)$$

2. ✖

$$(0,2)$$

3. ✖

(1,1)

4. ✓

Question Number : 46 Question Id : 105615686 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

For  $a, b, c \in \mathbb{R}$ , if  $6a^2 - 3b^2 - c^2 + 7ab - ac + 4bc = 0$  and  $|a| + |b| \neq 0$ , then all the lines given by  $ax + by + c = 0$  are

Options :

concurrent at (3, 1) or (1, 3)

1. ✖

parallel to each other  $\forall a, b, c \in \mathbb{R}$

2. ✖

concurrent at (-2, -3) or (3, -1)

3. ✓

concurrent at (2, 3) or (-3, 1)

4. ✖

Question Number : 47 Question Id : 105615687 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $\theta$  is the acute angle between the pair of lines  $H \equiv ax^2 - xy + by^2 = 0$ ,  $\tan \theta = 5$  and  $(1, -1)$  is a point on  $H = 0$  then  $a^2 + ab + b^2 =$

Options :

5

1. ✖

14

2. ✖

7

3. ✔

13

4. ✖

Question Number : 48 Question Id : 105615688 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The equation of the pair of straight lines passing through the point (2,3) and perpendicular to the pair of lines  $3x^2 - 4xy + 5y^2 = 0$  is  $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$  then  $a + b + c + f + g + h =$

Options :

0

1. ✖

52

2. ✔

25

3. ✖

-54

4. ✖

Question Number : 49 Question Id : 105615689 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $f(x, y) = 0$  is the combined equation of the lines joining the origin to the points where the line  $4x - 6y - 2 = 0$  meets the curve  $3x^2 - 4xy + 5y^2 - 2x + y - 6 = 0$ , then

$$\frac{f(1, -1)}{f(-1, -1)} =$$

Options :

153

1. ✓

-153

2. ✗

1

3. ✗

-1

4. ✗

Question Number : 50 Question Id : 105615690 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The radius of the circle passing through the points  $(-1, 1)$ ,  $(2, -1)$  and  $(1, 0)$  is

Options :

5

1. ✗

$\frac{\sqrt{130}}{2}$

2. ✓

6

3. ✗



$$\frac{\sqrt{145}}{2}$$

4. ✖

Question Number : 51 Question Id : 105615691 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

If  $A = (0, -2)$  and  $B$  is any point on the circle  $x^2 + y^2 - 2x - 2y + 1 = 0$ , then the maximum value of  $(\overline{AB})^2$  is

Options :

51

1. ✖

$11 + 2\sqrt{10}$

2. ✔

$9 + 3\sqrt{5}$

3. ✖

$\frac{5 + 2\sqrt{3}}{2}$

4. ✖

Question Number : 52 Question Id : 105615692 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

If  $(\alpha, \beta)$  is the pole of the line  $3x - 5y + 6 = 0$  with respect to the circle  $x^2 + y^2 - 10x + 14y + 46 = 0$  then  $\alpha + \beta =$

Options :

-1

1. ✔

8

2. ✖

3

3. ✖

-4

4. ✖

Question Number : 53 Question Id : 105615693 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

O(0, 0) and A(1, 0) are centres of two unit circles  $C_1$  and  $C_2$  respectively.  $C_3$  is also a unit circle having its centre above X-axis and passing through O and A. The equation of the common tangent to  $C_1$  and  $C_3$  which does not intersect the circle  $C_2$  is

Options :

$$\sqrt{3}x - y + 2 = 0$$

1. ✔

$$x + \sqrt{3}y + 2 = 0$$

2. ✖

$$\sqrt{3}x - y - 2 = 0$$

3. ✖

$$x + \sqrt{3}y - 2 = 0$$

4. ✖

Question Number : 54 Question Id : 105615694 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If the circles  $x^2 + y^2 - 16x - 20y + 164 = r^2$  ( $r > 0$ ) and  $x^2 + y^2 - 8x - 14y + 29 = 0$  intersect in two distinct points, then the maximum possible integral value of  $r$  is

Options :

1

1. ✘

10

2. ✔

-2

3. ✘

2

4. ✘

Question Number : 55 Question Id : 105615695 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If the circle  $x^2 + y^2 - 6x - 12y + 1 = 0$  cuts another circle C orthogonally and the centre of the circle C is  $(-4, 2)$ , then its radius is

Options :

$\sqrt{21}$

1. ✔

5

2. ✘

$\frac{3}{4}$

3. ✘

$\sqrt{15}$

4. ✘

Question Number : 56 Question Id : 105615696 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Let  $LL'$  be the latus rectum and  $PQ$  be the focal chord of the parabola  $y^2 = 16x$ . If  $P = (1, 4)$  and  $P, L$  lie in the same quadrant then  $LQ =$

Options :

5

1. ✖

20

2. ✖

$24\sqrt{5}$

3. ✖

$12\sqrt{5}$

4. ✔

Question Number : 57 Question Id : 105615697 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $P\left(\frac{1}{2}, 4\right)$  and  $Q$  are the ends of a focal chord of the parabola  $y^2 = 32x$  and  $S$  is the focus of the parabola then  $SQ =$

Options :

$\frac{17}{2}$

1. ✖

$\frac{\sqrt{65}}{2}$

2. ✖

136

3. ✔

$$\frac{289}{2}$$

4. ✖

Question Number : 58 Question Id : 105615698 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Statement I : The equation of the directrix of the ellipse  $4x^2 + y^2 - 8x - 4y + 4 = 0$  is

$$3y = 6 - 4\sqrt{3}$$

Statement II : The equation of the latus rectum of the ellipse  $x^2 + 4y^2 - 4x - 8y + 4 = 0$

$$\text{is } y = 2 + \sqrt{3}$$

Which of the above statement(s) is(are) true?

Options :

Statement I is true, but Statement II is false

1. ✔

Statement II is true, but Statement I is false

2. ✖

Both Statement I and Statement II are true

3. ✖

Both Statement I and Statement II are false

4. ✖

Question Number : 59 Question Id : 105615699 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If S is the focus of the ellipse  $\frac{x^2}{9} + \frac{y^2}{4} = 1$  lying on the positive X-axis and P( $\theta$ ) is a point on the ellipse such that SP = 1, then  $\cos \theta =$

Options :

$$\frac{1}{\sqrt{5}}$$

1. ✖

$$\frac{2}{\sqrt{5}}$$

2. ✔

$$\frac{1}{2}$$

3. ✖

$$\frac{1}{3}$$

4. ✖

Question Number : 60 Question Id : 105615700 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

A hyperbola having its centre at the origin is passing through the point (5, 2) and has transverse axis of length 8 along the X-axis. Then the eccentricity of its conjugate hyperbola is

Options :

$$\frac{\sqrt{13}}{3}$$

1. ✖

$$\sqrt{\frac{13}{3}}$$

2. ✖

$$\frac{\sqrt{13}}{2}$$

3. ✔

$$\sqrt{\frac{13}{2}}$$

4. ✖

Question Number : 61 Question Id : 105615701 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $e_1$  is the eccentricity of the hyperbola  $x = \sec \theta, y = \sqrt{2} \tan \theta$  and  $e_2$  is the eccentricity of the hyperbola  $x = \sqrt{2} \sec \theta, y = \tan \theta$ , then  $\frac{e_2^2}{e_1^2} =$

Options :

1

1. ✖

2

2. ✖

$\frac{1}{2}$

3. ✔

$\frac{1}{4}$

4. ✖

Question Number : 62 Question Id : 105615702 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

A (27, -243, 81) is a point in space. B, C, D are images of A with respect to XY, YZ and ZX planes respectively. If the centroid of the triangle BCD is  $(\alpha, \beta, \gamma)$ , then  $\alpha + \beta + \gamma =$

Options :

-25

1. ✖

45

2. ✖

25

3. ✖

-45

4. ✔

Question Number : 63 Question Id : 105615703 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Let  $A(2,5,7)$  be the image of the point  $B(1,-2,3)$  with respect to a plane  $\pi$ . Let  $C$  be the point where  $AB$  meets the plane  $\pi$ . Let  $D = (2,1,6)$ . Then the direction cosines of  $CD$  are

Options :

$$\frac{1}{\sqrt{11}}, \frac{3}{\sqrt{11}}, \frac{-1}{\sqrt{11}}$$

1. ✖

$$\frac{1}{\sqrt{6}}, \frac{-1}{\sqrt{6}}, \frac{2}{\sqrt{6}}$$

2. ✔

$$\frac{3}{\sqrt{46}}, \frac{-1}{\sqrt{46}}, \frac{6}{\sqrt{46}}$$

3. ✖

$$\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$$

4. ✖

Question Number : 64 Question Id : 105615704 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0



If a plane  $x + y + z - 5 = 0$  intersects the line joining A(1, 1, 1) and B(2, 2, 2) at P then AP : PB =

Options :

1 : 2

1. ✖

2 : 3

2. ✖

3 : 2

3. ✖

2 : 1

4. ✔

Question Number : 65 Question Id : 105615705 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

$$\lim_{x \rightarrow 2} \left[ (x^2 - 4x + 4) \cos\left(\frac{2}{x-2}\right) + \frac{x^2 - 4}{x^3 - 2x - 4} \right] =$$

Options :

0

1. ✖

$\infty$

2. ✖

1

3. ✖

$\frac{2}{5}$

4. ✔

Question Number : 66 Question Id : 105615706 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

$$\lim_{x \rightarrow 0} \frac{\tan 2x - 2 \tan x}{(1 - \cos x)(2^x - 1)} =$$

Options :

$$\frac{2}{\log 2}$$

1. ✖

$$\frac{1}{\log 4}$$

2. ✖

$$4 \log 2$$

3. ✖

$$\frac{4}{\log 2}$$

4. ✔

Question Number : 67 Question Id : 105615707 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

$$\frac{d}{dx} \left[ \left( x^{\frac{5}{2}} - x^{\frac{3}{2}} + 1 \right) (x^2 - 3x + 5) \right] =$$

Options :

$$\frac{9}{2}x^{\frac{7}{2}} - 14x^{\frac{5}{2}} + 20x^{\frac{3}{2}} - \frac{15}{2}x^{\frac{1}{2}} + 2x - 3$$

1. ✔

$$\frac{9}{2}x^{\frac{7}{2}} - 7x^{\frac{5}{2}} + 5x^{\frac{3}{2}} - \frac{3}{2}x^{\frac{1}{2}} + 2x - 3$$

2. ✖

$$9x^{\frac{7}{2}} - 14x^{\frac{5}{2}} + 20x^{\frac{3}{2}} - 15x^{\frac{1}{2}} + 2x - 3$$

3. ✖

$$\frac{9}{2}x^{\frac{7}{2}} - \frac{7}{2}x^{\frac{5}{2}} + \frac{5}{2}x^{\frac{3}{2}} - \frac{15}{2}x^{\frac{1}{2}} + 2x - 3$$

4. ✖

Question Number : 68 Question Id : 105615708 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The value of  $\frac{d}{dx} \left[ \log \left( \sin \sqrt{\frac{x^2+1}{x^2+2}} \right) \right]$  when  $x = \sqrt{2}$ , is

Options :

$$\frac{\sqrt{2} \cot \left( \frac{\sqrt{3}}{2} \right)}{6\sqrt{3}}$$

1. ✖

$$\frac{\sqrt{2} \tan \left( \frac{\sqrt{3}}{2} \right)}{6\sqrt{3}}$$

2. ✖

$$\frac{\sqrt{2} \cot \left( \frac{\sqrt{3}}{2} \right)}{8\sqrt{3}}$$

3. ✔

$$\frac{\sqrt{2} \tan\left(\frac{\sqrt{3}}{2}\right)}{8\sqrt{3}}$$

4. ✖

Question Number : 69 Question Id : 105615709 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $f(x) = \frac{1 + \sec x}{2(\sec x - 1)}$  for  $0 < x < \frac{\pi}{2}$  and  $f'(x) = f(x) \cdot g(x)$ , then  $g(x) =$

Options :

cos ec  $x$

1. ✖

-cos ec  $x$

2. ✖

2 cos ec  $x$

3. ✖

-2 cos ec  $x$

4. ✔

Question Number : 70 Question Id : 105615710 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The equation of the normal to the curve  $\sin y = \sqrt{3}x \sin\left(\frac{\pi}{6} + y\right)$  at  $x = 0$ , is

Options :

$2x + \sqrt{3}y = 0$

1. ✔

$$2x + y = 0$$

2. ✖

$$x + 2y = 0$$

3. ✖

$$\sqrt{3}x + 2y = 0$$

4. ✖

Question Number : 71 Question Id : 105615711 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Assertion (A) : The curves  $y^2 = 4x$  and  $x^2 = -2y$  intersect at (1, 2) orthogonally.

Reason (R) : If the product of the slopes of the tangents drawn to two curves at their point of intersection is  $-1$ , then the curves are said to cut each other orthogonally.

The correct option among the following is

Options :

(A) is true, (R) is true and (R) is the correct explanation for (A)

1. ✖

(A) is true, (R) is true but (R) is not the correct explanation for (A)

2. ✖

(A) is true but (R) is false

3. ✖

(A) is false but (R) is true

4. ✔

Question Number : 72 Question Id : 105615712 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Let  $f(x) = \begin{cases} 1+6x-3x^2, & x \leq 1 \\ x + \log_2(b^2+7), & x > 1 \end{cases}$ . Then the set of all possible values of  $b$  such that  $f(1)$  is the maximum value of  $f(x)$  is

Options :

1. ✓  $[-1, 1]$

2. ✘  $[0, 1]$

3. ✘  $[0, 2]$

4. ✘  $[-1, 0]$

Question Number : 73 Question Id : 105615713 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Let  $g(x)$  be the anti-derivative of  $f(x)$ . Then the function for which  $\log_e(1+(g(x))^2)+c$  is an antiderivative is

Options :

1. ✘  $(1+(g(x))^2)g'(x)f(x)$

2. ✘  $\frac{-2f(x)g(x)}{1+g(x)}$

$$\frac{2f(x)g(x)}{1+(g(x))^2}$$

3. ✓

$$\frac{2g(x)}{1+(g(x))^2}$$

4. ✘

Question Number : 74 Question Id : 105615714 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

$$\text{If } f(x) = \int \left[ \tan^2 x + \cot^2 x + \frac{4(\sin^3 x + \cos^3 x)}{\sin^2 2x} \right] dx \text{ and } f\left(\frac{\pi}{4}\right) = 0, \text{ then } 3 \left[ f\left(\frac{\pi}{6}\right) + 2 \right] =$$

Options :

$$\frac{\pi}{2}$$

1. ✓

$$\frac{\pi}{4}$$

2. ✘

$$0$$

3. ✘

$$\frac{-\pi}{2}$$

4. ✘

Question Number : 75 Question Id : 105615715 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

$$\int \sqrt{4\cos^2 x - 5\sin^2 x} \cos x dx =$$

Options :

$$\frac{1}{2} \sin x \sqrt{4-9 \sin^2 x} + \frac{2}{3} \sin^{-1}\left(\frac{3 \sin x}{2}\right) + c$$

1. ✓

$$\frac{1}{2} \cos x \sqrt{4-9 \cos^2 x} + \frac{2}{3} \sin^{-1}\left(\frac{3 \cos x}{2}\right) + c$$

2. ✖

$$\frac{1}{2} \sin x \sqrt{4-9 \sin^2 x} + \frac{2}{3} \cos^{-1}\left(\frac{3 \cos x}{2}\right) + c$$

3. ✖

$$\frac{1}{2} \cos x \sqrt{4-9 \sin^2 x} + \frac{2}{3} \sin^{-1}\left(\frac{3 \sin x}{2}\right) + c$$

4. ✖

Question Number : 76 Question Id : 105615716 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

$$\int_0^3 \left( \sin\left(\frac{\pi}{3}x\right) - \cos\left(\frac{\pi}{3}x\right) \right) dx =$$

Options :

$$\frac{-6}{\pi}$$

1. ✖

$$0$$

2. ✖

$$\frac{-3}{\pi}$$

3. ✖



$$\frac{6}{\pi}$$

4. ✓

Question Number : 77 Question Id : 105615717 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

$$\int_0^{\frac{\pi}{2}} \sin^4 \theta \cos^3 \theta d\theta =$$

Options :

$$\frac{1}{35}$$

1. ✗

$$\frac{2}{35}$$

2. ✓

$$\frac{4}{35}$$

3. ✗

$$\frac{8}{35}$$

4. ✗

Question Number : 78 Question Id : 105615718 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Statement I : The differential equation corresponding to the family of circles having their centres on Y-axis and fixed radius  $k$  is  $(x^2 - k^2) \left( \frac{dy}{dx} \right)^2 + x^2 = 0$

Statement II: The differential equation corresponding to the family of circles passing through the origin and having their centres on X-axis is  $x^2 - y^2 + 2xy \frac{dy}{dx} = 0$ .

Which of the above statements is (are) true?

Options :

Statement I is true, but Statement II is false

1. ✖

Statement II is true, but Statement I is false

2. ✖

Both Statement I and Statement II are true

3. ✔

Both Statement I and Statement II are false

4. ✖

Question Number : 79 Question Id : 105615719 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If  $m$  and  $n$  are respectively the order and the degree of the differential equation representing the family of curves  $y^2 - 5ax - 5a^{\frac{3}{2}} = 0$  ( $a > 0$  is a parameter), then the value of  $m - n$  is

Options :

1

1. ✖

-1

2. ✖

2

3. ✖

-2

4. ✔

Question Number : 80 Question Id : 105615720 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0

The general solution of  $((1+x^2)y \sin x - 2xy)dx - \log y^{1+x^2} dy = 0$  is

Options :

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

1. ✖

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

2. ✔

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

3. ✖

$$\frac{\log y}{y} = 2 \sin x + \cos x \log(1+x^2) + c$$

4. ✖

## Physics

Section Id :	10561514
Section Number :	2
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	40
Number of Questions to be attempted :	40
Section Marks :	40
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	10561514
Question Shuffling Allowed :	Yes

Question Number : 81 Question Id : 105615721 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The range of the nuclear force is

Options :

$10^{-18} \text{ m}$

1. ✖

$10^{-16} \text{ m}$

2. ✖

$10^{-15} \text{ m}$

3. ✔

$10^{-13} \text{ m}$

4. ✖

Question Number : 82 Question Id : 105615722 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Select the physical quantities in Column-I and Column-II having same dimensions.

Column-I	Column-II
A) Entropy	I) Angular velocity
B) Young's modulus of elasticity	II) Boltzman constant
C) Angular momentum	III) Energy density
D) Decay constant	IV) Planck's Constant

Options :

A	B	C	D
III	IV	I	II

1. ✖

A	B	C	D
IV	I	III	II

2. ✖

A	B	C	D
II	III	IV	I

3. ✔

A      B      C      D  
II     IV     III    II

4. ✖

Question Number : 83 Question Id : 105615723 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

A rocket moves straight upward with zero initial velocity and with an acceleration  $20 \text{ m/s}^2$ . It runs out of fuel and stops accelerating at the end of  $5^{\text{th}}$  sec. It reaches a maximum height and falls back to the earth. The speed when it hits the ground is (Take  $g = 10 \text{ m/s}^2$ )

Options :

100 $\sqrt{2}$  m/s

1. ✖

150 $\sqrt{3}$  m/s

2. ✖

50 $\sqrt{6}$  m/s

3. ✔

75 m/s

4. ✖

Question Number : 84 Question Id : 105615724 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Two cars, at a certain instant, are 50 km apart on a line running from south to north. The one farther north is moving west at 25 km/hr. The other is moving towards north at 25 km/hr. How long do they take to reach their distance of closest approach?

Options :

30 min

1. ✖

60 min

2. ✔

85 min

3. ✖

90 min

4. ✖

Question Number : 85 Question Id : 105615725 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

A particle initially at origin starts moving in xy-plane has velocity component  $\vec{V} = (6+2t)\hat{i} + (4+2\sqrt{3}t)\hat{j}$  m/s. Acceleration of the particle in  $m/s^2$  is [x, y are measured in meters, t in seconds, respectively]

Options :

$$(6+2t)\hat{i} + (4+2\sqrt{3}t)\hat{j}$$

1. ✖

$$(6+2t)\hat{i} + 2\sqrt{3}\hat{j}$$

2. ✖

$$2\hat{i} + 2\sqrt{3}\hat{j}$$

3. ✔

$$2\hat{i} + 2\sqrt{3}\hat{k}$$

4. ✖

Question Number : 86 Question Id : 105615726 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

A bullet is fired at time  $t = 0$  with velocity  $20 \text{ m/s}$  and at an initial angle of  $30^\circ$  with the horizontal. The tan angle between the displacement vector and the horizontal after time  $0.1 \text{ s}$  is

(Assume  $g = 10 \text{ m/s}^2$ )

Options :

$$\frac{38}{20\sqrt{3}}$$

1. ✘

$$\frac{19}{20\sqrt{3}}$$

2. ✔

$$\frac{19}{20}$$

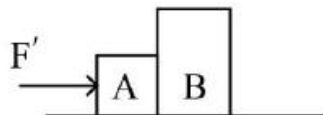
3. ✘

$$\frac{19\sqrt{3}}{20}$$

4. ✘

Question Number : 87 Question Id : 105615727 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

A constant horizontal force  $\vec{F}$  of magnitude 10 N is applied to a block A and this produces an acceleration of magnitude  $20 \text{ m/s}^2$ . If this block A is then kept against another block B of mass 1.5 kg as shown in figure and a force  $F'$  of 20 N is applied, find the force on the block B. Neglect friction.



Options :

15 N

1. ✔

10 N

2. ✘

20 N

3. ✘



5 N

4. ✖

Question Number : 88 Question Id : 105615728 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

A body of mass  $m$  slides down along a frictionless inclined plane from height 'h' and just completes motion in a vertical circle of radius  $2m$  after reaching the bottom. What is the value of  $h$ ?

[Use  $g = 10\text{m/s}^2$ ]

Options :

2 m

1. ✖

$\frac{5}{2}$  m

2. ✖

5 m

3. ✔

10 m

4. ✖

Question Number : 89 Question Id : 105615729 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Particle A moving with a velocity  $v = 10$  m/s experienced a head on collision with a stationary particle B of the same mass. As a result of collision, the kinetic energy of the system decreased by 1%. The speed of particle A after collision is

Options :

10 m/s

1. ✖



0.05 m/s

2. ✖

5 m/s

3. ✔

$10\sqrt{2}$  m/s

4. ✖

Question Number : 90 Question Id : 105615730 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

A metre stick is balanced on a knife edge at its centre. When four coins, each of mass 2g are put one on top of the other at 10.0 cm mark, the stick is found to be balanced at 46.0 cm mark. The mass of the metre stick is

Options :

66 g

1. ✖

60 g

2. ✖

72 g

3. ✔

18 g

4. ✖

Question Number : 91 Question Id : 105615731 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The amplitude of a damped oscillator varies with time as  $A(t) = A_0 \exp(-bt/2m)$  where  $b = 70$  g/s and  $m = 200$  g. How long does it take for the mechanical energy to drop to one – fourth of its initial value?  
[ Take  $\ln 2 = 0.7$  ]

Options :

2.0 s

1. ✖

4.0 s

2. ✔

2.5 s

3. ✖

3.5 s

4. ✖

Question Number : 92 Question Id : 105615732 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Four particles each of mass  $m$  are placed at four vertices of a rectangle having side length as  $3l_0$  and  $4l_0$ . The potential energy of the system in  $\frac{Gm^2}{l_0}$  is

Options :

7/6

1. ✖

47/30

2. ✖

47/60

3. ✔

7/12

4. ✖

Question Number : 93 Question Id : 105615733 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Two wires of same length having radius of 2 mm and 1.5 mm respectively are loaded with same weights. Extension of the second wire is double than that of the first wire. What is the ratio of the Young's modulus of the first wire to that of the second wire?

Options :

8/9

1. ✘

9/8

2. ✔

3/4

3. ✘

4/3

4. ✘

Question Number : 94 Question Id : 105615734 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Consider an increase of 1% in each of radius of artery, viscosity of blood and density of blood respectively. The percentage change in flow rate of blood in artery is

Options :

0.25 %

1. ✘

0.50 %

2. ✘

1.0 %

3. ✔

3.0 %

4. ✘

Question Number : 95 Question Id : 105615735 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

A metal cube of side 10 cm rests on a film of a liquid of thickness 0.2 mm. If upon applying a horizontal force  $\vec{F}$  of magnitude 0.1N the cube slides with a constant speed of 0.08 m/s, then the coefficient of viscosity is

Options :

1. ✓  $2.5 \times 10^{-2} \frac{\text{Ns}}{\text{m}^2}$

2. ✗  $0.25 \times 10^{-2} \frac{\text{Ns}}{\text{m}^2}$

3. ✗  $5 \times 10^{-2} \frac{\text{Ns}}{\text{m}^2}$

4. ✗  $0.5 \times 10^{-2} \frac{\text{Ns}}{\text{m}^2}$

Question Number : 96 Question Id : 105615736 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

176 grams of  $\text{CO}_2$  can change its temperature from  $0^\circ\text{C}$  to  $30^\circ\text{C}$  by absorbing 3600 joules of thermal energy. Molar specific heat of  $\text{CO}_2$  in  $\text{J}\cdot\text{mol}^{-1} \text{K}^{-1}$  is

Options :

1. ✓ 30

2. ✗ 40

50

3. ✖

60

4. ✖

Question Number : 97 Question Id : 105615737 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

A solution consists of ether and 5.0 g of water at 0 °C. If the ether evaporates completely to freeze the water, then the mass of the ether in the solution is

Options :

5 g

1. ✖

4 g

2. ✔

4.5 g

3. ✖

6 g

4. ✖

Question Number : 98 Question Id : 105615738 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Assertion(A): Heat and work are modes of energy transfer to a system resulting in change in its internal energy.

Reason(R) : Heat and work in thermodynamics are state variables.

The correct option among the following is

Options :

(A) is true, (R) is true and (R) is the correct explanation for (A)

1. ✘

(A) is true, (R) is true but (R) is not the correct explanation for (A)

2. ✘

(A) is true but (R) is false

3. ✔

(A) is false but (R) is true

4. ✘

**Question Number : 99 Question Id : 105615739 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0**

An ideal gas at pressure  $P_0$  undergoes an isothermal expansion until its volume is 8.0 times its initial volume. The gas is slowly and adiabatically compressed back to its original volume. If the adiabatic constant of the gas is  $\gamma = 4/3$ , then the ratio of the average kinetic energy per molecule in this final state to that in the initial state is

**Options :**

1.44

1. ✘

1.68

2. ✘

2.0

3. ✔

1.2

4. ✘

**Question Number : 100 Question Id : 105615740 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0**

At what temperature is the root mean square (rms) speed of Neon gas atoms is equal to the rms speed of Helium gas atom at  $-33\text{ }^{\circ}\text{C}$ ?  
(atomic mass of Ne = 20.2 u, and that of He = 4.0 u)

Options :

1. ✖ 1208 K

2. ✖ 1210 K

3. ✔ 1212 K

4. ✖ 1220 K

Question Number : 101 Question Id : 105615741 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

A wire of length 0.4 m stretched at both ends vibrates 250 times per second. If the length of the wire is increased by 0.1 m and the stretching force is reduced to  $1/4^{\text{th}}$  of its original value then the new frequency is

Options :

1. ✖ 50 Hz

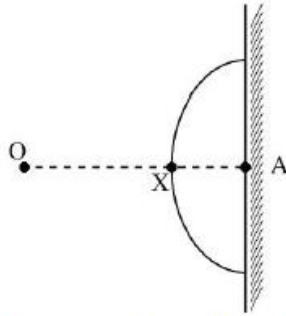
2. ✖ 75 Hz

3. ✔ 100 Hz

4. ✖ 150Hz



Question Number : 102 Question Id : 105615742 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0



A spherical glass is attached to a rigid wall as shown in the figure. An observer located at point O is looking at a point A on the wall. The refractive index of the glass is 1.5 and that of air is 1.0. The distances are  $OA = 8$  cm,  $XA = 3$  cm. If the radius of curvature of spherical glass surface is  $R = 5$  cm, then the apparent distance of A from observer O is

Options :

6.5 cm

1. ✘

8.5 cm

2. ✘

7.0 cm

3. ✘

7.5 cm

4. ✔

Question Number : 103 Question Id : 105615743 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0



In a double-slit experiment performed in air the angular width of a fringe is found to be  $0.15^\circ$  on a screen placed 80 cm away. The wavelength of light used is 490 nm. The angular width of the fringe if the entire apparatus is immersed in a medium of refractive index  $\frac{5}{3}$  is

Options :

0.09°

1. ✖

0.7°

2. ✖

0.9°

3. ✔

0.11°

4. ✖

Question Number : 104 Question Id : 105615744 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

$6\mu\text{C}$  charge is placed at the centre of a cube. What will be the electric flux at each face of the cube?

$$\left[ \text{Take } \frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2\text{C}^{-2} \right]$$

Options :

$9\pi \times 10^2 \text{ Nm}^2/\text{C}$

1. ✖

$36\pi \times 10^3 \text{ Nm}^2/\text{C}$

2. ✔

$$3.6\pi \times 10^3 \text{ Nm}^2/\text{C}$$

3. ✖

$$4\pi \times 10^3 \text{ Nm}^2/\text{C}$$

4. ✖

Question Number : 105 Question Id : 105615745 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

There are two thin wire rings, each of radius  $R$ , whose axes coincide. The charges of the rings are  $q$  and  $-q$ . The magnitude of potential difference between the centres of the rings separated by a distance  $\sqrt{3}R$  is

Options :

$$0$$

1. ✖

$$\frac{q}{4\pi\epsilon_0 R}$$

2. ✔

$$\frac{q}{4\pi\epsilon_0 R} \frac{1}{\sqrt{3}R}$$

3. ✖

$$\frac{q}{2\pi\epsilon_0 R}$$

4. ✖

Question Number : 106 Question Id : 105615746 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Statement (I) : The temperature coefficient of resistance for most of metals in pure form is positive.

Statement (II) : A metal wire 2 mm in diameter carries a charge of  $360\pi\text{ C}$  in two hours. If the metal contains  $5\times 10^{22}$  free electrons /  $\text{cm}^3$ , then drift velocity of the electrons in the wire is  $6.25\times 10^{-6}$  m/s.

Statement (III) : Semiconductors like pure germanium does not obey Ohm's law for all range of electric field values.

Which of the following is correct?

Options :

Statements I, II, III are true.

1. ✓

Statements I, II are true, but statement III is false.

2. ✘

Statements II, III are true, but statement I is false.

3. ✘

Statements I, II, III are false.

4. ✘

Question Number : 107 Question Id : 105615747 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

A cylindrical resistor of radius 7.0 mm and length 4.0 cm is made of material that has a resistivity of  $10^{-6}\ \Omega\cdot\text{m}$ . If the energy is dissipated at rate 1.54 W in the resistor, then the current density is

Options :

$$\frac{10^6}{\sqrt{\pi}}\text{ A/m}^2$$

1. ✘

$$5 \times 10^5 \text{ A/m}^2$$

2. ✓

$$\sqrt{\pi} \times 10^5 \text{ A/m}^2$$

3. ✖

$$8.5 \times 10^4 \text{ A/m}^2$$

4. ✖

Question Number : 108 Question Id : 105615748 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

Statement I : A uniform electric field and a uniform magnetic field are pointed in the same direction. If an electron is projected in the same direction the electron velocity will decrease in magnitude.

Statement II : Two infinite long parallel wires are carrying current in the same direction. The magnetic field at a point midway between the wires is zero.

Statement III : No net force acts on a rectangular coil carrying a steady current when suspended in a uniform magnetic field.

Which of the following is correct?

Options :

Statements I, II and III are true

1. ✓

Statements I and II are true, but statement III is false

2. ✖

Statements II and III are true, but statement I is false

3. ✖

Statements I, III are true, but Statement II is false

4. ✖

Question Number : 109 Question Id : 105615749 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

Two parallel conductor each 50m long, separated by 0.2m experience a force of 1N. If the current in first conductor is twice that of the second conductor, then what is the current in the second conductor?

$$(\mu_0 = 4\pi \times 10^{-7})$$

Options :

100 A

1. ✘

200 A

2. ✔

120 A

3. ✘

50 A

4. ✘

Question Number : 110 Question Id : 105615750 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

The magnitude of axial field due to a bar magnet at a distance of 1 m, is found to be  $5 \times 10^{-8}$  T. The magnetic moment of the bar magnet is  $(\mu_0 = 4\pi \times 10^{-7})$

Options :

0.20 Am<sup>2</sup>

1. ✘

0.25 Am<sup>2</sup>

2. ✔

0.50 Am<sup>2</sup>

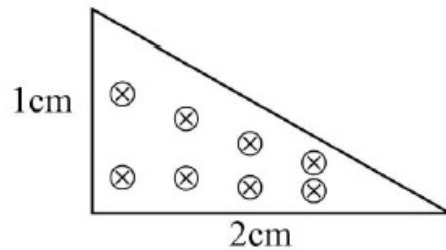
3. ✖

0.40 Am<sup>2</sup>

4. ✖

Question Number : 111 Question Id : 105615751 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The magnetic flux through the triangular loop shown in the figure below



where a uniform magnetic field of strength 2T points perpendicularly into the plane of the triangle.

Options :

10<sup>-4</sup> Wb

1. ✔

2 × 10<sup>-4</sup> Wb

2. ✖

1 Wb

3. ✖

2 Wb

4. ✖

Question Number : 112 Question Id : 105615752 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The Q-value of a series LCR circuit with L = 2H, C = 32 μF, R = 20 Ω is

Options :



1. ✓ 12.5

2. ✘ 25.0

3. ✘ 50.0

4. ✘ 125.0

Question Number : 113 Question Id : 105615753 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

A laser beam has intensity  $2.1 \times 10^{15} \text{ W/m}^2$ . The amplitude of magnetic field in the beam in approximately is

Options :

1. ✘ 1.4 T

2. ✓ 4.2 T

3. ✘ 1 T

4. ✘ 1.5 T

Question Number : 114 Question Id : 105615754 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

In a photo electric experiment, the wavelength of the light incident on the metal is changed from 200 nm to 400 nm. The decrease in the stopping potential is close to [Use  $hc = 1240 \text{ eV-nm}$  where  $h = \text{Planck's constant}$  and  $c$  is velocity of light]

Options :

3.1 V

1. ✓

2. 8 V

2. ✘

4.2 V

3. ✘

1.2 V

4. ✘

Question Number : 115 Question Id : 105615755 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

The de-Broglie wavelength of an electron with kinetic energy of 320 eV is  
(Take  $h = 6.0 \times 10^{-34}$  SI unit, mass of electron =  $m_e = 9.0 \times 10^{-31}$  kg,  
Charge of an electron =  $1.6 \times 10^{-19}$  C.)

Options :

85.8 pm

1. ✘

110.5 pm

2. ✘

62.5 pm

3. ✓

50 pm

4. ✘

Question Number : 116 Question Id : 105615756 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0



Considering the Bohr's model of Hydrogen atom, the ratio of velocities of electrons orbiting in the 4<sup>th</sup> orbit to that in the 9<sup>th</sup> orbit is

Options :

1. ✓ 9 : 4

2. ✘ 3 : 2

3. ✘ 2 : 3

4. ✘ 4 : 9

Question Number : 117 Question Id : 105615757 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

What is the mass number of the nucleus having radius equal to  $\frac{1}{3}$  of that of  $^{189}\text{Os}$ ?

Options :

1. ✘ 20

2. ✓ 7

3. ✘ 12

4. ✘ 14

Question Number : 118 Question Id : 105615758 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

The number of silicon atoms per  $\text{m}^3$  is  $5 \times 10^{28}$ . This is doped with  $4.5 \times 10^{21}$  atoms /  $\text{m}^3$  of Arsenic. The ratio of number of electrons to number of holes after doping is  
(Take  $n_i$  = Number of thermally-generated electrons =  $1.5 \times 10^{16} / \text{m}^3$ )

Options :

1. ✖  $4.5 \times 10^{12}$

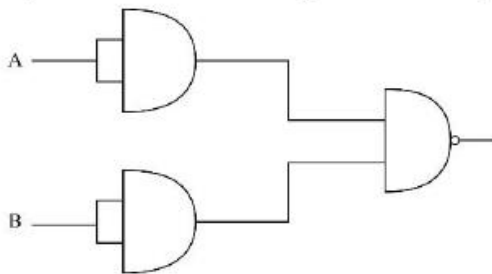
2. ✖  $8 \times 10^{14}$

3. ✔  $9 \times 10^{12}$

4. ✖  $9 \times 10^{11}$

Question Number : 119 Question Id : 105615759 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

The output of the following circuit is equivalent to \_\_\_\_\_ gate.



Options :

1. ✔ OR

2. ✖ AND

NOT

3. ✖

NAND

4. ✖

Question Number : 120 Question Id : 105615760 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

Which of the following statements is NOT true?

Options :

Power radiated from a linear antenna is directly proportional to square of antenna length

1. ✖

Power radiated decreases with increasing frequency.

2. ✔

Antenna should have size comparable to the wavelength of the signal

3. ✖

Effective power radiated by a long wavelength baseband signal is small

4. ✖

## Chemistry

Section Id :	10561515
Section Number :	3
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	40
Number of Questions to be attempted :	40
Section Marks :	40
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	10561515
Question Shuffling Allowed :	Yes

Question Number : 121 Question Id : 105615761 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

If the radius and energy of the second Bohr orbit of hydrogen atom is  $r_2$  and  $E_2$ , respectively. The radius and energy of the third Bohr orbit will be \_\_\_\_\_, \_\_\_ respectively.

Options :

$$\frac{4}{9}r_2, \frac{9}{4}E_2$$

1. ✖

$$\frac{4}{9}r_2, \frac{4}{9}E_2$$

2. ✖

$$\frac{9}{4}r_2, \frac{4}{9}E_2$$

3. ✔

$$\frac{9}{4}r_2, \frac{9}{4}E_2$$

4. ✖

Question Number : 122 Question Id : 105615762 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

When a radiation of 300 nm is shined on five metals, namely, Li, Mg, Ag, Cu and K, the number of metals that show photoelectric effect are

Options :

2

1. ✖

4

2. ✖

5

3. ✖

3

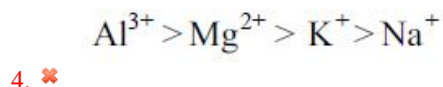
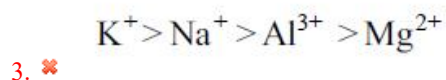
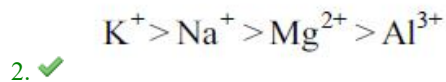
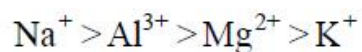
4. ✔

Question Number : 123 Question Id : 105615763 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

The correct order of ionic radii for the given species is

Options :



Question Number : 124 Question Id : 105615764 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

Which of the following set of properties generally decreases along a period?

Options :

1. ✔ Ionization energy and atomic radii

2. ✘ Metallic character and atomic radii

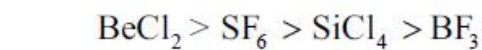
3. ✘ Electron affinity and electronegativity

4. ✘ Valency and oxidation potential

Question Number : 125 Question Id : 105615765 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

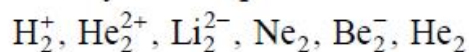
The correct order of the bond angles of the compounds  
 $\text{SiCl}_4$ ,  $\text{BF}_3$ ,  $\text{BeCl}_2$  and  $\text{SF}_6$  is

Options :

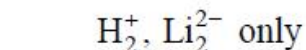
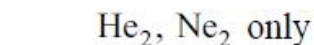


Question Number : 126 Question Id : 105615766 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

Identify all the species that do not exist



Options :



Question Number : 127 Question Id : 105615767 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

The compressibility factor of a real gas at high pressure is

Options :

1

1. ✖

2. ✖  $1 + \frac{RT}{Pb}$

3. ✖  $1 - \frac{RT}{Pb}$

4. ✔  $1 + \frac{Pb}{RT}$

Question Number : 128 Question Id : 105615768 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The compressibility factor ( $z$ ) is lower for  $\text{NH}_3$  and  $\text{CO}_2$  gases than that of  $\text{N}_2$  gas, because

Options :

1. ✔ van der Waals constants ' $a$ ' of  $\text{CO}_2$  and  $\text{NH}_3$  are greater than that of  $\text{N}_2$

2. ✖ van der Waals constants ' $a$ ' of  $\text{CO}_2$  and  $\text{NH}_3$  are less than that of  $\text{N}_2$

3. ✖ ' $a$ ' ( $\text{NH}_3$ ) > ' $a$ ' ( $\text{N}_2$ ) but ' $a$ ' ( $\text{CO}_2$ ) < ' $a$ ' ( $\text{N}_2$ )

4. ✖ ' $a$ ' ( $\text{NH}_3$ ) < ' $a$ ' ( $\text{N}_2$ ) but ' $a$ ' ( $\text{CO}_2$ ) > ' $a$ ' ( $\text{N}_2$ )

Question Number : 129 Question Id : 105615769 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Combustion of 10 ml of a gaseous hydrocarbon gives 40 ml of  $\text{CO}_2$  and 50 ml of water vapour under the same conditions. The molecular formula of the hydrocarbon is

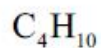
Options :

1. ✖  $\text{C}_4\text{H}_6$

2. ✖  $\text{C}_4\text{H}_8$



3. ✖



4. ✔

Question Number : 130 Question Id : 105615770 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

The number of moles of ferrous oxalate oxidised by one mole of  $\text{KMnO}_4$  in acidic medium is

Options :

$$\frac{5}{2}$$

1. ✔

$$\frac{2}{5}$$

2. ✖

$$\frac{3}{5}$$

3. ✖

$$\frac{5}{3}$$

4. ✖

Question Number : 131 Question Id : 105615771 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

An air bag on adiabatic expansion undergoes 5% increase in its volume.  
The percentage change in pressure is  $[\gamma_{air} = 1.4]$

Options :

$$5$$

1. ✖

$$6$$

2. ✖



3. ✓ 7

4. ✘ 9

Question Number : 132 Question Id : 105615772 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The  $K_p$  value at equilibrium of  $\text{SO}_3$  formation reaction from  $\text{SO}_2(\text{g})$  and  $\text{O}_2(\text{g})$  is  $5 \text{ atm}^{-1}$ . What is the equilibrium partial pressure of  $\text{O}_2$  if the equilibrium pressure of  $\text{SO}_2$  and  $\text{SO}_3$  are equal?

Options :

1. ✓ 0.2 atm

2. ✘ 0.4 atm

3. ✘ 0.3 atm

4. ✘ 0.1 atm

Question Number : 133 Question Id : 105615773 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Match the following.

Metal Sulfide	Solubility product
A) PbS	D) $4.0 \times 10^{-53}$
B) HgS	II) $8.0 \times 10^{-28}$
C) MnS	III) $1.6 \times 10^{-24}$
D) ZnS	IV) $2.5 \times 10^{-13}$

The correct match is

Options :

1. ✖

A	B	C	D
I	II	III	IV

2. ✔

A	B	C	D
II	I	IV	III

3. ✖

A	B	C	D
II	III	IV	I

4. ✖

A	B	C	D
III	IV	I	II

Question Number : 134 Question Id : 105615774 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The correct statements among the following are

- a)  $\text{BeH}_2$  and  $\text{MgH}_2$  are polymeric in nature
- b)  $\text{LiH}$  is unreactive to oxygen, at moderate temperatures
- c)  $\text{BeH}_2$  and  $\text{MgH}_2$  possesses significant covalent character
- d) the stability of alkali hydrides follows the order  $\text{LiH} < \text{NaH} < \text{KH} < \text{RbH} < \text{CsH}$

Options :

1. ✖ a, b, c, d

2. ✖ a, c only

3. ✖ a, c, d only

4. ✔ a, b, c only

Question Number : 135 Question Id : 105615775 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The correct order of melting points of the following salts is

LiCl	LiF	LiI
I	II	III

Options :

1. ✘ I > II > III

2. ✔ II > I > III

3. ✘ III > II > I

4. ✘ II > III > I

Question Number : 136 Question Id : 105615776 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

$\text{Al} + \text{aq. NaOH (excess)} \longrightarrow \text{P} + \text{Q}$ . P and Q are

Options :

1. ✘  $\text{Al(OH)}_3$  ;  $\text{H}_2\text{O}$

2. ✘  $\text{Al(OH)}_3$  ;  $\text{Na}_2\text{O}_2$

3. ✔  $\text{Na}^+[\text{Al(OH)}_4]^-$  ;  $\text{H}_2$

4. ✘  $\text{Al(OH)}_3$  ;  $\text{Na}_2\text{O}$

Question Number : 137 Question Id : 105615777 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

Among the following elements, X exhibits maximum catenation and Y is the least abundant on earth. X and Y elements are

Options :

1. ✓ C, Ge

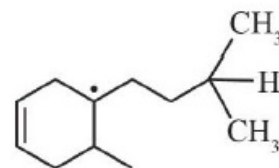
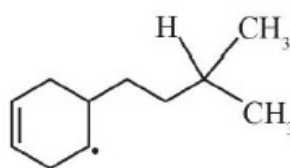
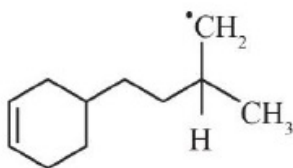
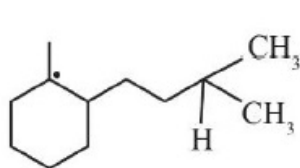
2. ✘ Si, Ge

3. ✘ C, Pb

4. ✘ Ge, C

Question Number : 138 Question Id : 105615778 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

For the following radicals, the correct order of their stability is



Options :

1. ✘ [A] < [B] < [C] < [D]

2. ✘ [D] < [C] < [B] < [A]

3. ✓ [B] < [C] < [D] < [A]

4. ✘ [B] < [C] < [A] < [D]

Question Number : 139 Question Id : 105615779 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The order of decreasing reactivity towards an electrophilic reagent, for the following compounds, is

- (i) Benzene
- (ii) Toluene
- (iii) Chlorobenzene
- (iv) Phenol

Options :

1. ✖ (i) > (ii) > (iii) > (iv)

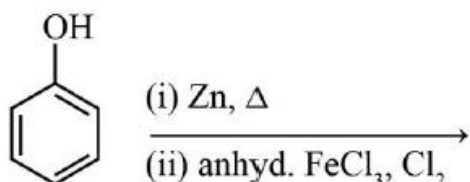
2. ✖ (ii) > (iv) > (i) > (iii)

3. ✖ (iv) > (iii) > (ii) > (i)

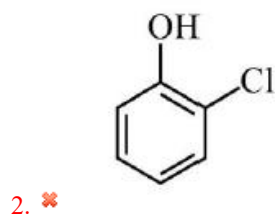
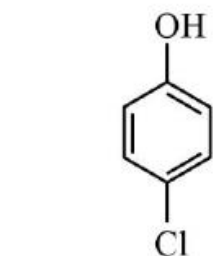
4. ✔ (iv) > (ii) > (i) > (iii)

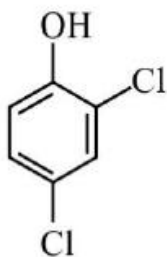
Question Number : 140 Question Id : 105615780 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The major product of the following reactions is

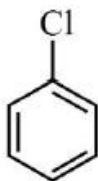


Options :





3. ✖



4. ✔

Question Number : 141 Question Id : 105615781 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

If the length of the body diagonal of a FCC unit cell is  $x \text{ \AA}$ , the distance between two octahedral voids in the cell in  $\text{\AA}$  is

Options :

$$\frac{x}{\sqrt{2}}$$

1. ✖

$$\frac{x}{\sqrt{3}}$$

2. ✖

$$\frac{x}{\sqrt{6}}$$

3. ✔

$$\frac{x}{\sqrt{8}}$$

4. ✖

Question Number : 142 Question Id : 105615782 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Calculate the quantity of CO<sub>2</sub> required to prepare 1 L of soda water when the soda water was packed under 2 atm of CO<sub>2</sub>.

[Henry's law constant for CO<sub>2</sub> is  $1.67 \times 10^8$  Pa]

Options :

1. ✘ 5.98 g

2. ✘ 1.21 g

3. ✔ 2.9 g

4. ✘ 67.1 g

Question Number : 143 Question Id : 105615783 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Which of the following substances show the highest colligative properties?

Options :

1. ✘ 0.1 M BaCl<sub>2</sub>

2. ✘ 0.1 M AgNO<sub>3</sub>

3. ✘ 0.1 M urea

4. ✔ 0.1 M (NH<sub>4</sub>)<sub>3</sub>PO<sub>4</sub>

Question Number : 144 Question Id : 105615784 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

In two separate experiments, the same quantity of electricity was passed through silver and gold solutions [ Assume 't' constant] The amounts of Ag and Au deposited are 2.15 and 1.31g, respectively. The valency of gold is [Atomic mass of Ag=107.9; Au=197]

Options :

1

1. ✖

2

2. ✖

3

3. ✔

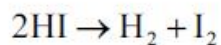
4

4. ✖

Question Number : 145 Question Id : 105615785 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Which of the following is a zero order reaction?

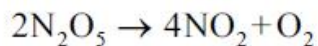
Options :



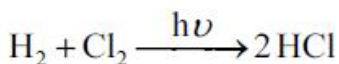
1. ✖



2. ✖



3. ✖



4. ✔

Question Number : 146 Question Id : 105615786 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0



The coagulation of 200 ml of a positive colloid took place when 0.73 g of HCl was added to it without changing the volume much. The flocculation value of HCl for the colloid is

Options :

1000

1. ✖

0.365

2. ✖

200

3. ✖

100

4. ✔

Question Number : 147 Question Id : 105615787 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The oxoacid of phosphorous which contains 4 P– O –H, 2P = O and one P– O –P bond is

Options :

Orthophosphoric acid

1. ✖

Metaphosphoric acid

2. ✖

Pyrophosphoric acid

3. ✔

Hypophosphoric acid

4. ✖

Question Number : 148 Question Id : 105615788 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Group 16 elements are also called

Options :

1. ✖ Pnicogens

2. ✖ Picogens

3. ✖ Halogens

4. ✔ Chalocogens

Question Number : 149 Question Id : 105615789 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

For the reaction  $\text{Br}_2 + \text{F}_2 (\text{excess}) \rightarrow \text{P}$ , the molecular formula and structure of P, respectively, are

Options :

1. ✔  $\text{BrF}_5$ , Square pyramidal

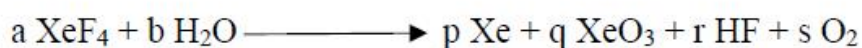
2. ✖  $\text{BrF}_4$ , Square planar

3. ✖  $\text{BrF}_3$ , Bent T-shaped

4. ✖  $\text{BrF}_3$ , Linear

Question Number : 150 Question Id : 105615790 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

In the following reaction, a, b, p, q, r and s are



Options :

	a	b	p	q	r	s
1. ✖	6	10	4	2	20	3

	a	b	p	q	r	s
2. ✖	8	14	5	2	26	4

	a	b	p	q	r	s
3. ✔	6	12	4	2	24	3

	a	b	p	q	r	s
4. ✖	5	10	3	2	20	3

Question Number : 151 Question Id : 105615791 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The increase in the atomic radii of the third (5d) series of transition elements is very small, which may be accounted for the filling of 'X' orbitals before 'Y' orbitals. X and Y are

Options :

	X	Y
1. ✔	4f	5d

	X	Y
2. ✖	5f	5d

	X	Y
3. ✖	5d	4f

	X	Y
4. ✖	4f	4d

Question Number : 152 Question Id : 105615792 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes

Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

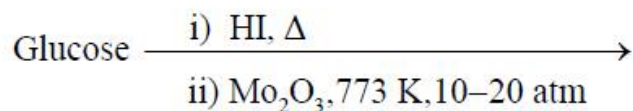
A metal complex absorbed orange light. The colour in which it appears is

Options :

1. ✘ yellow
2. ✘ yellow – green
3. ✘ red
4. ✔ green – blue

Question Number : 153 Question Id : 105615793 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

The major product of the following reactions is

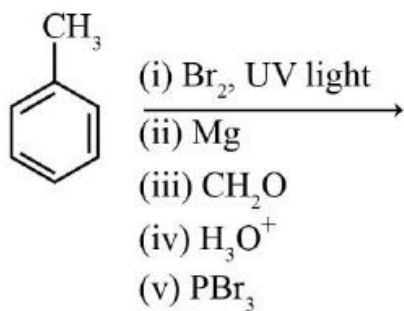


Options :

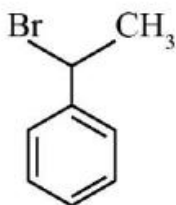
1. ✘ Cyclohexane
2. ✔ Benzene
3. ✘ Cyclohexadiene
4. ✘ Hexane

Question Number : 154 Question Id : 105615794 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

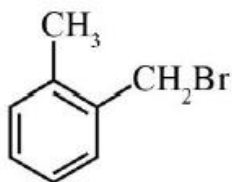
The major product in the following reactions is



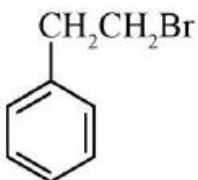
Options :



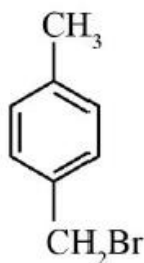
1. ✘



2. ✘



3. ✔



4. ✘

Question Number : 155 Question Id : 105615795 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes  
Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0  
Correct Marks : 1 Wrong Marks : 0

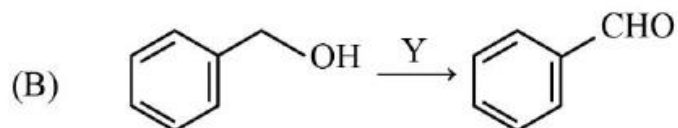
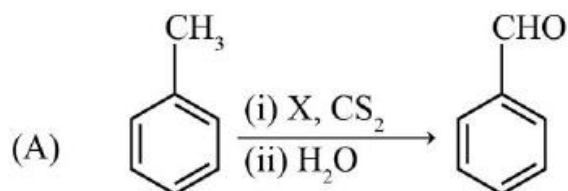


(ii) > (iii) > (iv) > (i)

4. ✓

Question Number : 157 Question Id : 105615797 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

Identify X and Y in the reactions, given below



Options :

X                      Y  
CrO<sub>3</sub>              KMnO<sub>4</sub> (alkaline), Δ

1. ✘

X                      Y  
CrO<sub>2</sub>Cl<sub>2</sub>              Cu, 573 K

2. ✓

X                      Y  
AlCl<sub>3</sub>              CrO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, reflux

3. ✘

X                      Y  
H<sub>2</sub>O<sub>2</sub>              KMnO<sub>4</sub> (acidic), Δ

4. ✘

Question Number : 158 Question Id : 105615798 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

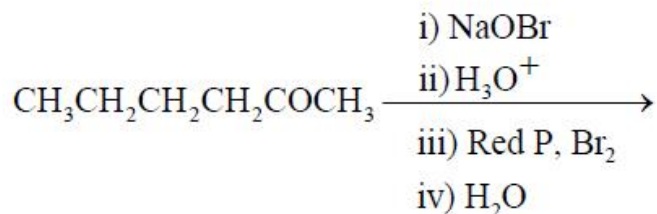
A primary alcohol was reacted with pyridinium chlorochromate (PCC), which resulted in a product P. The product P on treatment with ammonical silver nitrate solution produces

Options :

1. ✖ Anhydride of carboxylic acid
2. ✖ Aldehyde
3. ✖ Amide
4. ✔ Carboxylate anion

Question Number : 159 Question Id : 105615799 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

The major product of the following reactions



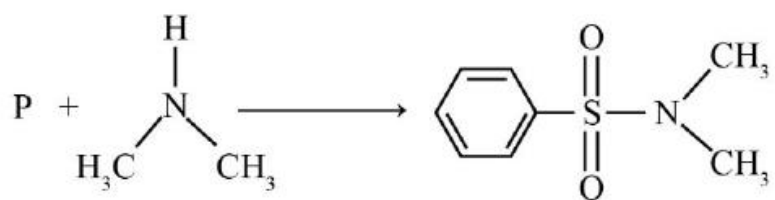
Options :

1. ✖  $\text{CH}_3\text{CH}_2\text{CHBrCO}_2\text{H}$
2. ✖  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHBrCO}_2\text{H}$
3. ✔  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHBrCO}_2\text{H}$
4. ✖  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHBrCOBr}$

Question Number : 160 Question Id : 105615800 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Correct Marks : 1 Wrong Marks : 0

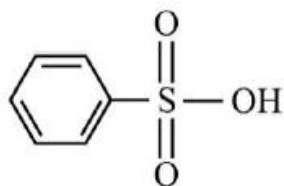


In the following reaction, the suitable starting reagent P is



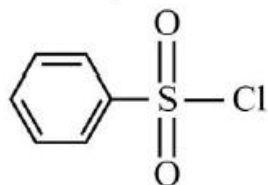
Options :

P



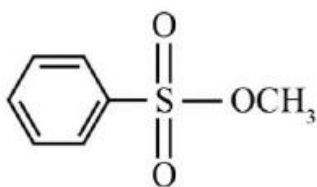
1. ✘

P



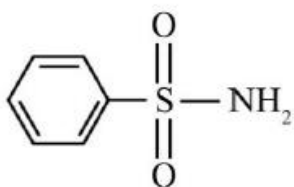
2. ✔

P



3. ✘

P



4. ✘