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|------------------------------|---------------------------------|
| <b>Question Paper Name :</b> | B TECH EG 24th Feb 2021 Shift 1 |
| <b>Subject Name :</b>        | B TECH EG                       |
| <b>Creation Date :</b>       | 2021-02-23 19:51:26             |
| <b>Duration :</b>            | 180                             |
| <b>Number of Questions :</b> | 90                              |
| <b>Total Marks :</b>         | 300                             |
| <b>Display Marks:</b>        | Yes                             |

## B TECH EG

|                                      |           |
|--------------------------------------|-----------|
| <b>Group Number :</b>                | 1         |
| <b>Group Id :</b>                    | 708191188 |
| <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>                 | 300       |
| <b>Is this Group for Examiner? :</b> | No        |

## Physics Section A

|                         |           |
|-------------------------|-----------|
| <b>Section Id :</b>     | 708191706 |
| <b>Section Number :</b> | 1         |
| <b>Section type :</b>   | Online    |

|                                              |           |
|----------------------------------------------|-----------|
| <b>Mandatory or Optional :</b>               | Mandatory |
| <b>Number of Questions :</b>                 | 20        |
| <b>Number of Questions to be attempted :</b> | 20        |
| <b>Section Marks :</b>                       | 80        |
| <b>Mark As Answered Required? :</b>          | Yes       |
| <b>Sub-Section Number :</b>                  | 1         |
| <b>Sub-Section Id :</b>                      | 708191986 |
| <b>Question Shuffling Allowed :</b>          | Yes       |

**Question Number : 1 Question Id : 70819117494 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The workdone by a gas molecule in an isolated system is given by,  $W = \alpha\beta^2 e^{-\frac{x^2}{\alpha kT}}$ , where  $x$  is the displacement,  $k$  is the Boltzmann constant and  $T$  is the temperature.  $\alpha$  and  $\beta$  are constants. Then the dimensions of  $\beta$  will be :

**Options :**

70819157631.  $[M^2 L T^2]$

70819157632.  $[M^0 L T^0]$

70819157633.  $[M L T^{-2}]$

70819157634.  $[M L^2 T^{-2}]$

**Question Number : 1 Question Id : 70819117494 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

એક અલગ કરેલા તંત્રમાં વાયુ આણુઓ દ્વારા થતું કાર્ય  $W = \alpha\beta^2 e^{-\frac{x^2}{\alpha kT}}$ , જ્યાં  $x$  એ સ્થાનાંતર,  $k$  બોલ્ટ્ઝમેન અચળાંક છે અને  $T$  તાપમાન છે.  $\alpha$  અને  $\beta$  એ અચળાંક છે.  $\beta$  નું પરિમાણ \_\_\_\_\_.

**Options :**

70819157631.  $[M^2 L T^2]$

70819157632.  $[M^0 L T^0]$

70819157633.  $[M L T^{-2}]$

70819157634.  $[M L^2 T^{-2}]$

**Question Number : 2 Question Id : 70819117495 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

Two stars of masses  $m$  and  $2m$  at a distance  $d$  rotate about their common centre of mass in free space. The period of revolution is :

**Options :**

70819157635.  $\frac{1}{2\pi} \sqrt{\frac{3Gm}{d^3}}$

70819157636.  $2\pi \sqrt{\frac{d^3}{3Gm}}$

70819157637.  $2\pi \sqrt{\frac{3Gm}{d^3}}$

70819157638.  $\frac{1}{2\pi} \sqrt{\frac{d^3}{3Gm}}$

**Question Number : 2 Question Id : 70819117495 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

d અંતરે તેમજ m અને 2m દળ ધરાવતાં બે તારાઓ મુક્ત અવકાશમાં તેમનાં સામાન્ય દ્રવ્યમાન કેન્દ્ર ને સાપેક્ષ પરિભ્રમણ કરે છે. પરિભ્રમણનો આવર્તકાળ \_\_\_\_\_ છે.

**Options :**

70819157635.  $\frac{1}{2\pi} \sqrt{\frac{3Gm}{d^3}}$

70819157636.  $2\pi \sqrt{\frac{d^3}{3Gm}}$

70819157637.  $2\pi \sqrt{\frac{3Gm}{d^3}}$

70819157638.  $\frac{1}{2\pi} \sqrt{\frac{d^3}{3Gm}}$

**Question Number : 3 Question Id : 70819117496 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

Four identical particles of equal masses 1 kg made to move along the circumference of a circle of radius 1 m under the action of their own mutual gravitational attraction. The speed of each particle will be :

**Options :**

70819157639.  $\frac{\sqrt{(1+2\sqrt{2})G}}{2}$

70819157640.  $\sqrt{\frac{G}{2}(1+2\sqrt{2})}$

70819157641.  $\sqrt{G(1+2\sqrt{2})}$

70819157642.  $\sqrt{\frac{G}{2}(2\sqrt{2}-1)}$

**Question Number : 3 Question Id : 70819117496 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

1 kg સમાન દળ ધરાવતાં એકસરખા ચાર કણોને, મુક્ત અવકાશમાં 1 m ત્રિજ્યા ધરાવતાં વર્તુળની પરિધ પર પોતાનાં અન્યોન્ય ગુરુત્વાકર્ષણની અસર હેઠળ ગતિ કરાવવામાં આવે છે. દરેક કણની ઝડપ \_\_\_\_\_ હશે.

**Options :**

70819157639.  $\frac{\sqrt{(1+2\sqrt{2})G}}{2}$

70819157640.  $\sqrt{\frac{G}{2}(1+2\sqrt{2})}$

70819157641.  $\sqrt{G(1+2\sqrt{2})}$

70819157642.  $\sqrt{\frac{G}{2}(2\sqrt{2}-1)}$

**Question Number : 4 Question Id : 70819117497 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

Moment of inertia (M.I.) of four bodies, having same mass and radius, are reported as ;

$I_1$  = M.I. of thin circular ring about its diameter,

$I_2$  = M.I. of circular disc about an axis perpendicular to disc and going through the centre,

$I_3$  = M.I. of solid cylinder about its axis and

$I_4$  = M.I. of solid sphere about its diameter.

Then :

**Options :**

70819157643.  $I_1 + I_2 = I_3 + \frac{5}{2} I_4$

70819157644.  $I_1 + I_3 < I_2 + I_4$

70819157645.  $I_1 = I_2 = I_3 < I_4$

70819157646.  $I_1 = I_2 = I_3 > I_4$

Question Number : 4 Question Id : 70819117497 Question Type : MCQ Option Shuffling : Yes Is  
Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

સમાન દળ અને ત્રિજ્યા ધરાવતાં ચાર વસ્તુઓની જડત્વની ચાકમાત્રા (M.I.) નીચે મુજબ દર્શાવાય છે.

$I_1$  = પાતળી રીંગની તેના વ્યાસને અનુલક્ષીને M.I.,

$I_2$  = વર્તુળાકાર તક્તિની તેના કેન્દ્રમાંથી પસાર થતી અને તક્તિને લંબ અક્ષને અનુલક્ષીને M.I.,

$I_3$  = ઘન નળાકારની તેની અક્ષને અનુલક્ષીને M.I. અને

$I_4$  = ઘન ગોળાની તેના વ્યાસને અનુલક્ષીને M.I.

તો :

Options :

70819157643.  $I_1 + I_2 = I_3 + \frac{5}{2} I_4$

70819157644.  $I_1 + I_3 < I_2 + I_4$

70819157645.  $I_1 = I_2 = I_3 < I_4$

70819157646.  $I_1 = I_2 = I_3 > I_4$

Question Number : 5 Question Id : 70819117498 Question Type : MCQ Option Shuffling : Yes Is  
Question Mandatory : No

**Correct Marks : 4 Wrong Marks : 1**

Consider two satellites  $S_1$  and  $S_2$  with periods of revolution 1 hr. and 8 hr. respectively revolving around a planet in circular orbits. The ratio of angular velocity of satellite  $S_1$  to the angular velocity of satellite  $S_2$  is :

**Options :**

70819157647. 8 : 1

70819157648. 1 : 8

70819157649. 2 : 1

70819157650. 1 : 4

**Question Number : 5 Question Id : 70819117498 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

ગ્રહને ફરતે વર્તુળાકાર કક્ષામાં ભ્રમણ કરતાં બે ઉપગ્રહો  $S_1$  અને  $S_2$  અનુક્રમે 1 hr. અને 8 hr. જેટલો પરિભ્રમણ આવર્તકાળ ધરાવે છે તેમ ધ્યાનમાં લો.  $S_1$  અને  $S_2$  ઉપગ્રહનાં કોણીય વેગનો ગુણોત્તર \_\_\_\_\_ છે.

**Options :**

70819157647. 8 : 1

70819157648. 1 : 8

70819157649. 2 : 1

70819157650. 1 : 4

**Question Number : 6 Question Id : 70819117499 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

Each side of a box made of metal sheet in cubic shape is 'a' at room temperature 'T', the coefficient of linear expansion of the metal sheet is ' $\alpha$ '. The metal sheet is heated uniformly, by a small temperature  $\Delta T$ , so that its new temperature is  $T + \Delta T$ . Calculate the increase in the volume of the metal box.

**Options :**

70819157651.  $4\pi a^3 \alpha \Delta T$

70819157652.  $4a^3 \alpha \Delta T$

70819157653.  $\frac{4}{3} \pi a^3 \alpha \Delta T$

70819157654.  $3a^3 \alpha \Delta T$

**Question Number : 6 Question Id : 70819117499 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

ધાતુ પતરામાંથી બનેલા સમઘન આકારની પેટી (બોક્સ) ની દરેક બાજુ 'a' છે ધાતુ પતરા માટે ઓરડાનાં તાપમાન 'T' એ રેખીય પ્રસરણાંક ' $\alpha$ ' છે. ધાતુ પતરાને સમાન રીતે ઓછા તાપમાન  $\Delta T$  થી ગરમ કરવામાં આવે છે કે જેથી તેનું નવું તાપમાન  $T + \Delta T$  થાય છે. ધાતુ પેટીનાં કદમાં થતો વધારો \_\_\_\_\_.

**Options :**

70819157651.  $4\pi a^3 \alpha \Delta T$

70819157652.  $4a^3 \alpha \Delta T$

70819157653.  $\frac{4}{3} \pi a^3 \alpha \Delta T$

70819157654.  $3a^3 \alpha \Delta T$

**Question Number : 7 Question Id : 70819117500 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

If  $Y$ ,  $K$  and  $\eta$  are the values of Young's modulus, bulk modulus and modulus of rigidity of any material respectively. Choose the correct relation for these parameters.

**Options :**

70819157655.  $Y = \frac{9K\eta}{2\eta + 3K} \text{ N/m}^2$

70819157656.  $Y = \frac{9K\eta}{3K - \eta} \text{ N/m}^2$

70819157657.  $K = \frac{Y\eta}{9\eta - 3Y} \text{ N/m}^2$

70819157658.  $\eta = \frac{3YK}{9K + Y} \text{ N/m}^2$

**Question Number : 7 Question Id : 70819117500 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

$Y$ ,  $K$  અને  $\eta$  એ કોઈ દ્રવ્ય માટે અનુક્રમે યંગ મોડ્યુલસ (યંગ માપાંક), બલ્ક મોડ્યુલસ (આયતન માપાંક) અને મોડ્યુલસ ઓફ રિજીડીટી (દૃઢતા માપાંક) નાં મૂલ્ય દર્શાવે છે. આ પ્રાયલો માટે સાચો સંબંધ પસંદ કરો.

**Options :**

70819157655.  $Y = \frac{9K\eta}{2\eta + 3K} \text{ N/m}^2$

70819157656.  $Y = \frac{9K\eta}{3K - \eta} \text{ N/m}^2$

70819157657.  $K = \frac{Y\eta}{9\eta - 3Y} \text{ N/m}^2$

70819157658.

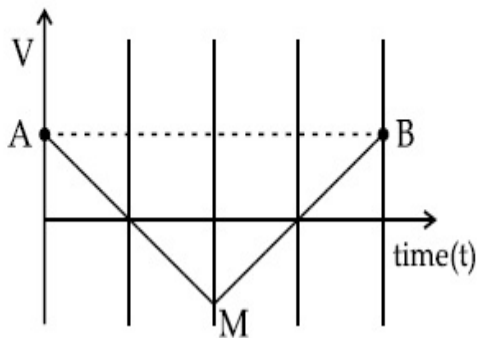
$$\eta = \frac{3YK}{9K+Y} \text{ N/m}^2$$

**Question Number : 8 Question Id : 70819117501 Question Type : MCQ Option Shuffling : Yes Is**

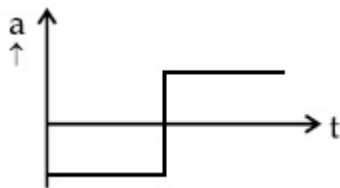
**Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

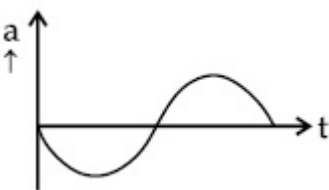
If the velocity-time graph has the shape AMB, what would be the shape of the corresponding acceleration-time graph ?



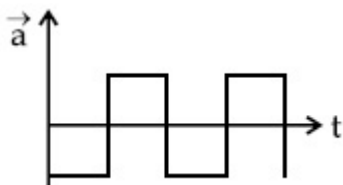
**Options :**



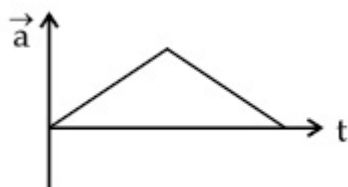
70819157659.



70819157660.



70819157661.

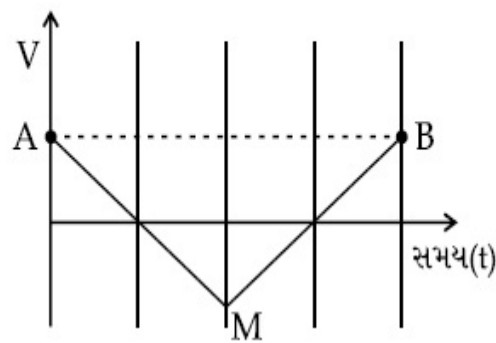


70819157662.

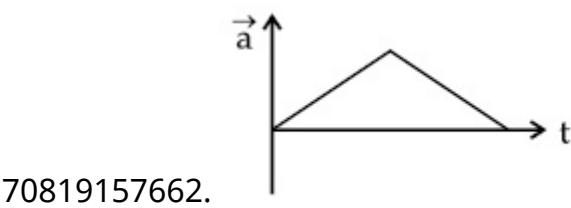
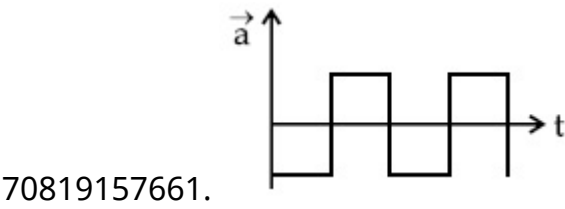
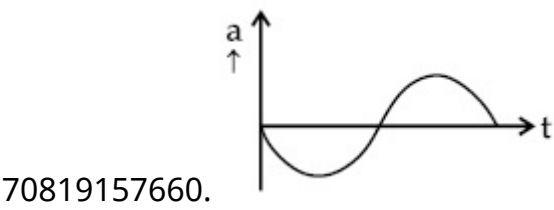
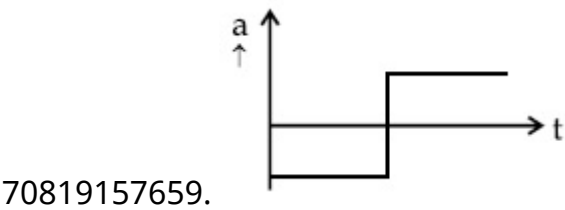
Question Number : 8 Question Id : 70819117501 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

જો વેગ-સમય આલેખનો આકાર AMB હોય તો તેને અનુરૂપ પ્રવેગ-સમય આલેખનો આકાર \_\_\_\_\_ હશે.



Options :



Question Number : 9 Question Id : 70819117502 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

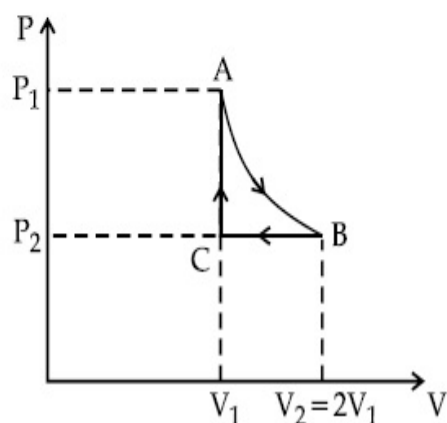
$n$  mole of a perfect gas undergoes a cyclic process ABCA (see figure) consisting of the following processes.

$A \rightarrow B$  : Isothermal expansion at temperature  $T$  so that the volume is doubled from  $V_1$  to  $V_2 = 2V_1$  and pressure changes from  $P_1$  to  $P_2$ .

$B \rightarrow C$  : Isobaric compression at pressure  $P_2$  to initial volume  $V_1$ .

$C \rightarrow A$  : Isochoric change leading to change of pressure from  $P_2$  to  $P_1$ .

Total workdone in the complete cycle ABCA is :



Options :

70819157663. 0

70819157664.  $nRT \ln 2$

70819157665.  $nRT \left( \ln 2 + \frac{1}{2} \right)$

70819157666.  $nRT \left( \ln 2 - \frac{1}{2} \right)$

Question Number : 9 Question Id : 70819117502 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

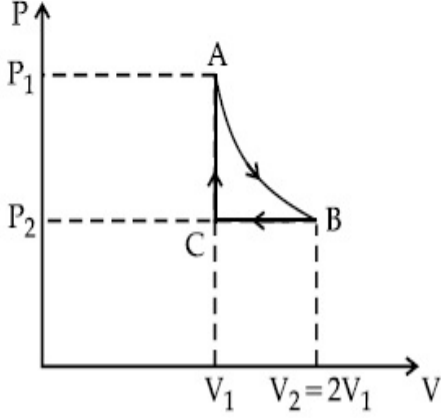
n મોલ ધરાવતાં એક આદર્શવાયું ચક્રિય પ્રક્રિયા ABCA માંથી પસાર થાય છે. (આકૃતિ જુઓ), કે જે નીચેની પ્રક્રિયાઓ ધરાવે છે.

$A \rightarrow B$  : T તાપમાને સમતાપીય વિસ્તરણ કે જેમાં કદ  $V_1$  થી  $V_2 = 2V_1$  બમાણું થાય છે અને દબાણ બદલાઈને  $P_1$  થી  $P_2$  થાય છે.

$B \rightarrow C$  : અચળ દબાણ  $P_2$  એ સમદાબીય સંકોચન દ્વારા પ્રારંભિક કદ  $V_1$ .

$C \rightarrow A$  : અચળ કદે કે જે દબાણમાં  $P_2$  થી  $P_1$  ફેરફાર કરે છે.

એક પૂર્ણ ચક્રિય પ્રક્રિયા ABCA દરમિયાન થતું કુલ કાર્ય \_\_\_\_\_ થશે.



Options :

70819157663. 0

70819157664.  $nRT \ln 2$

70819157665.  $nRT \left( \ln 2 + \frac{1}{2} \right)$

70819157666.  $nRT \left( \ln 2 - \frac{1}{2} \right)$

Question Number : 10 Question Id : 70819117503 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List I with List II.

| List I         | List II                       |
|----------------|-------------------------------|
| (a) Isothermal | (i) Pressure constant         |
| (b) Isochoric  | (ii) Temperature constant     |
| (c) Adiabatic  | (iii) Volume constant         |
| (d) Isobaric   | (iv) Heat content is constant |

Choose the correct answer from the options given below :

**Options :**

70819157667. (a) → (i), (b) → (iii), (c) → (ii), (d) → (iv)

70819157668. (a) → (iii), (b) → (ii), (c) → (i), (d) → (iv)

70819157669. (a) → (ii), (b) → (iv), (c) → (iii), (d) → (i)

70819157670. (a) → (ii), (b) → (iii), (c) → (iv), (d) → (i)

**Question Number : 10 Question Id : 70819117503 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

સૂચી I ને સૂચી II સાથે મેળવો.

| સૂચી I      | સૂચી II                |
|-------------|------------------------|
| (a) સમતાપીય | (i) દબાણ અચળ           |
| (b) સમકદીય  | (ii) તાપમાન અચળ        |
| (c) સમોષ્મી | (iii) કદ અચળ           |
| (d) સમદાબીય | (iv) ઊષ્માનો જથ્થો અચળ |

નીચેનાં વિકલ્પોમાંથી સાચો વિકલ્પ પસંદ કરો.

**Options :**

70819157667. (a) → (i), (b) → (iii), (c) → (ii), (d) → (iv)

70819157668. (a) → (iii), (b) → (ii), (c) → (i), (d) → (iv)

70819157669. (a) → (ii), (b) → (iv), (c) → (iii), (d) → (i)

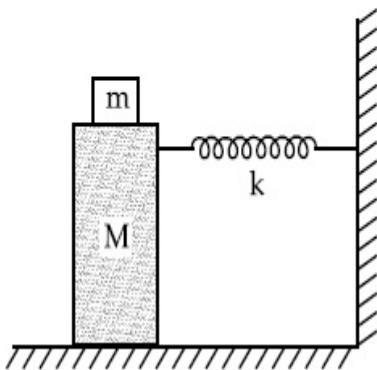
70819157670. (a)  $\rightarrow$  (ii), (b)  $\rightarrow$  (iii), (c)  $\rightarrow$  (iv), (d)  $\rightarrow$  (i)

**Question Number : 11 Question Id : 70819117504 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

In the given figure, a mass  $M$  is attached to a horizontal spring which is fixed on one side to a rigid support. The spring constant of the spring is  $k$ . The mass oscillates on a frictionless surface with time period  $T$  and amplitude  $A$ . When the mass is in equilibrium position, as shown in the figure, another mass  $m$  is gently fixed upon it. The new amplitude of oscillation will be :



**Options :**

70819157671.  $A \sqrt{\frac{M+m}{M}}$

70819157672.  $A \sqrt{\frac{M}{M+m}}$

70819157673.  $A \sqrt{\frac{M-m}{M}}$

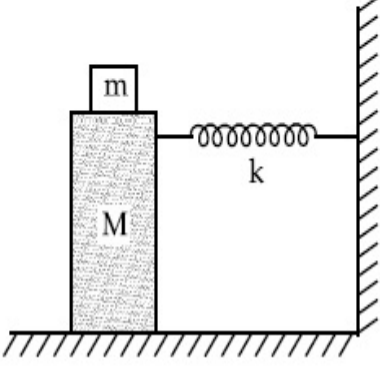
70819157674.  $A \sqrt{\frac{M}{M-m}}$

**Question Number : 11 Question Id : 70819117504 Question Type : MCQ Option Shuffling : Yes**

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

આપેલ આકૃતિમાં, એક  $M$  દળ જેનો એક છેડો દૃઢ આધાર સાથે જડિત કરેલ છે તેવી સમક્ષિતિજ સ્પ્રિંગ સાથે જોડેલ છે. સ્પ્રિંગનો સ્પ્રિંગ અચળાંક  $k$  છે. ઘર્ષણરહિત સપાટી પર દળ  $T$  જેટલા આવર્તકાળ અને  $A$  જેટલા કંપવિસ્તાર સાથે દોલન કરે છે. આકૃતિમાં દર્શાવ્યા અનુસાર, દળ જ્યારે સંતુલન સ્થિતિમાં હોય છે ત્યારે બીજા  $m$  દળને ધીરેથી (સાવચેતીથી) તેના પર જોડવામાં આવે છે. દોલનનો નવો કંપવિસ્તાર \_\_\_\_\_ થશે.



Options :

70819157671.  $A \sqrt{\frac{M+m}{M}}$

70819157672.  $A \sqrt{\frac{M}{M+m}}$

70819157673.  $A \sqrt{\frac{M-m}{M}}$

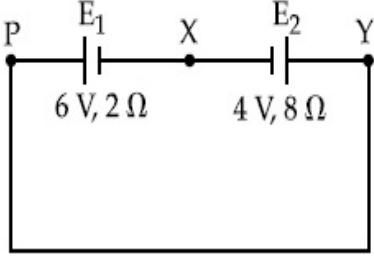
70819157674.  $A \sqrt{\frac{M}{M-m}}$

Question Number : 12 Question Id : 70819117505 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A cell  $E_1$  of emf 6 V and internal resistance  $2\ \Omega$  is connected with another cell  $E_2$  of emf 4 V and internal resistance  $8\ \Omega$  (as shown in the figure). The potential difference across points X and Y is :



**Options :**

70819157675. 2.0 V

70819157676. 3.6 V

70819157677. 5.6 V

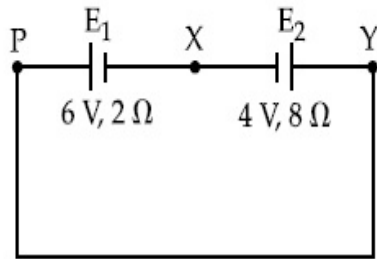
70819157678. 10.0 V

**Question Number : 12 Question Id : 70819117505 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

6 V જેટલું emf અને  $2\ \Omega$  જેટલો આંતરિક અવરોધ ધરાવતાં કોષ  $E_1$  ને 4 V જેટલું emf અને આંતરિક અવરોધ  $8\ \Omega$  ધરાવતાં બીજા કોષ  $E_2$  સાથે જોડેલ છે (આકૃતિમાં દર્શાવ્યા અનુસાર). X અને Y બિંદુઓને વચ્ચે (સમાંતર) સ્થિતિમાનનો તફાવત \_\_\_\_\_ થશે.



**Options :**

70819157675. 2.0 V

70819157676. 3.6 V

70819157677. 5.6 V

70819157678. 10.0 V

**Question Number : 13 Question Id : 70819117506 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

A current through a wire depends on time as

$$i = \alpha_0 t + \beta t^2$$

where  $\alpha_0 = 20 \text{ A/s}$  and  $\beta = 8 \text{ As}^{-2}$ . Find the charge crossed through a section of the wire in 15 s.

**Options :**

70819157679. 260 C

70819157680. 2100 C

70819157681. 11250 C

70819157682. 2250 C

**Question Number : 13 Question Id : 70819117506 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

તારમાંથી વહેતો પ્રવાહ સમય પર

$$i = \alpha_0 t + \beta t^2$$

જ્યાં  $\alpha_0 = 20 \text{ A/s}$  અને  $\beta = 8 \text{ As}^{-2}$ , મુજબ આધાર રાખે છે. 15 સેકન્ડમાં તારનાં આડછેદમાંથી પસાર થતો વિદ્યુતભાર \_\_\_\_\_ છે.

**Options :**

70819157679. 260 C

70819157680. 2100 C

70819157681. 11250 C

70819157682. 2250 C

**Question Number : 14 Question Id : 70819117507 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

Two equal capacitors are first connected in series and then in parallel. The ratio of the equivalent capacities in the two cases will be :

**Options :**

70819157683. 1 : 2

70819157684. 2 : 1

70819157685. 4 : 1

70819157686. 1 : 4

**Question Number : 14 Question Id : 70819117507 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

બે એકસમાન સંઘારકોને પ્રથમ શ્રેણીમાં અને ત્યારબાદ સમાંતરમાં જોડવામાં આવે છે. આ બે કિસ્સાઓમાં સમતુલ્ય સંઘારકતાઓનો ગુણોત્તર \_\_\_\_\_ હશે.

**Options :**

70819157683. 1 : 2

70819157684. 2 : 1

70819157685. 4 : 1

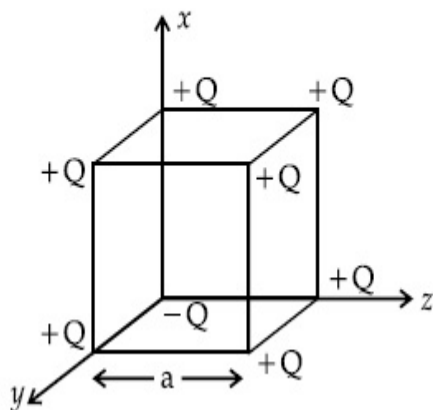
70819157686. 1 : 4

Question Number : 15 Question Id : 70819117508 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A cube of side 'a' has point charges +Q located at each of its vertices except at the origin where the charge is -Q. The electric field at the centre of cube is :



Options :

70819157687. 
$$\frac{-Q}{3\sqrt{3}\pi\epsilon_0 a^2} \left( \hat{x} + \hat{y} + \hat{z} \right)$$

70819157688. 
$$\frac{Q}{3\sqrt{3}\pi\epsilon_0 a^2} \left( \hat{x} + \hat{y} + \hat{z} \right)$$

70819157689. 
$$\frac{-2Q}{3\sqrt{3}\pi\epsilon_0 a^2} \left( \hat{x} + \hat{y} + \hat{z} \right)$$

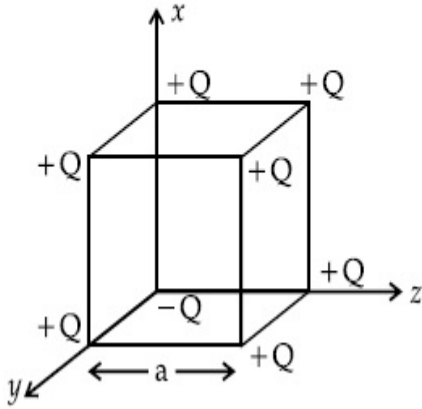
70819157690. 
$$\frac{2Q}{3\sqrt{3}\pi\epsilon_0 a^2} \left( \hat{x} + \hat{y} + \hat{z} \right)$$

Question Number : 15 Question Id : 70819117508 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

**Correct Marks : 4 Wrong Marks : 1**

‘a’ બાજુ ધરાવતાં સમઘનનાં દરેક શિરોબિંદુઓ આગળ બિંદુવત વિદ્યુતભારો +Q રાખવામાં આવ્યા છે. પરંતુ ઊગમબિંદુ આગળ -Q વિદ્યુતભાર છે. સમઘનનાં કેન્દ્ર આગળ વિદ્યુતક્ષેત્ર \_\_\_\_\_ છે.



**Options :**

70819157687. 
$$\frac{-Q}{3\sqrt{3} \pi \epsilon_0 a^2} \left( \hat{x} + \hat{y} + \hat{z} \right)$$

70819157688. 
$$\frac{Q}{3\sqrt{3} \pi \epsilon_0 a^2} \left( \hat{x} + \hat{y} + \hat{z} \right)$$

70819157689. 
$$\frac{-2Q}{3\sqrt{3} \pi \epsilon_0 a^2} \left( \hat{x} + \hat{y} + \hat{z} \right)$$

70819157690. 
$$\frac{2Q}{3\sqrt{3} \pi \epsilon_0 a^2} \left( \hat{x} + \hat{y} + \hat{z} \right)$$

**Question Number : 16 Question Id : 70819117509 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

If an emitter current is changed by 4 mA, the collector current changes by 3.5 mA. The value of  $\beta$  will be :

**Options :**

70819157691. 7

70819157692. 0.875

70819157693. 0.5

70819157694. 3.5

**Question Number : 16 Question Id : 70819117509 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

જો એમીટર પ્રવાહ 4 mA જેટલો બદલવામાં આવે તો કલેક્ટર પ્રવાહ 3.5 mA જેટલો બદલાય છે.  $\beta$  નું મૂલ્ય \_\_\_\_\_.

**Options :**

70819157691. 7

70819157692. 0.875

70819157693. 0.5

70819157694. 3.5

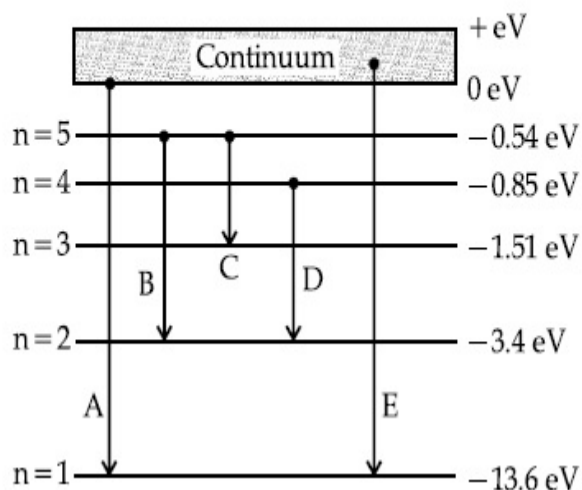
**Question Number : 17 Question Id : 70819117510 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

In the given figure, the energy levels of hydrogen atom have been shown along with some transitions marked A, B, C, D and E.

The transitions A, B and C respectively represent :



**Options :**

70819157695. The first member of the Lyman series, third member of Balmer series and second member of Paschen series.

70819157696. The ionization potential of hydrogen, second member of Balmer series and third member of Paschen series.

70819157697. The series limit of Lyman series, second member of Balmer series and second member of Paschen series.

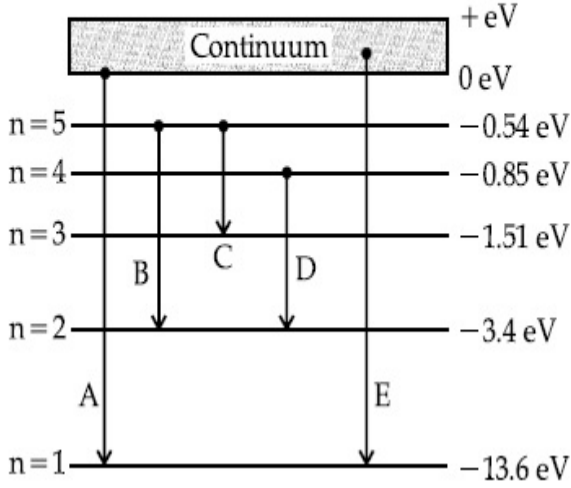
70819157698. The series limit of Lyman series, third member of Balmer series and second member of Paschen series.

**Question Number : 17 Question Id : 70819117510 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

આપેલ આકૃતિમાં, અમુક સંક્રાંતિઓ કે જે A, B, C, D અને E વડે દર્શાવેલ છે. તેની સાથે હાઈડ્રોજન પરમાણુનાં ઊર્ણ સ્તરો દર્શાવ્યા છે. સંક્રાંતિઓ A, B અને C અનુક્રમે, \_\_\_\_\_ રજૂ કરે છે.



**Options :**

70819157695. લાયમન શ્રેણીનો પ્રથમ ઘટક, બામર શ્રેણીનો ત્રીજો ઘટક અને પાશ્વ શ્રેણીનો દ્વિતીય ઘટક.

70819157696. હાઈડ્રોજન માટે આયોનાઈઝેશન સ્થિતિમાન, બામર શ્રેણીનો દ્વિતીય ઘટક અને પાશ્વ શ્રેણીનો તૃતીય ઘટક.

70819157697. લાયમન શ્રેણી માટે શ્રેણી સિમીત (series limit), બામર શ્રેણીનો દ્વિતીય ઘટક અને પાશ્વ શ્રેણીનો દ્વિતીય ઘટક.

70819157698. લાયમન શ્રેણી માટે શ્રેણી-સિમીત (series limit), બામર શ્રેણીનો તૃતીય ઘટક અને પાશ્વ શ્રેણીનો દ્વિતીય ઘટક.

**Question Number : 18 Question Id : 70819117511 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

Given below are two statements :

Statement I : Two photons having equal linear momenta have equal wavelengths.

Statement II : If the wavelength of photon is decreased, then the momentum and energy of a photon will also decrease.

In the light of the above statements, choose the correct answer from the options given below.

**Options :**

70819157699. Both Statement I and Statement II are true

70819157700. Both Statement I and Statement II are false

70819157701. Statement I is true but Statement II is false

70819157702. Statement I is false but Statement II is true

**Question Number : 18 Question Id : 70819117511 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

નીચે બે વિધાનો આપેલા છે :

વિધાન I : સમાન રેખીય વેગમાન ધરાવતાં બે ફોટોનને સમાન તરંગલંબાઈઓ છે.

વિધાન II : જો ફોટોનની તરંગલંબાઈ ઘટે તો ફોટોનનું વેગમાન અને ઊર્જા પણ ઘટે છે.

ઉપરોક્ત વિધાનોનાં સંદર્ભમાં, નીચે આપેલા વિકલ્પો પૈકી સૌથી યોગ્ય ઉત્તર પસંદ કરો.

**Options :**

70819157699. બંને વિધાન I અને વિધાન II સાચાં છે.

70819157700. બંને વિધાન I અને વિધાન II ખોટાં છે.

70819157701. વિધાન I સાચું અને વિધાન II ખોટું છે.

70819157702. વિધાન I ખોટું પણ વિધાન II સાચું છે.

**Question Number : 19 Question Id : 70819117512 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

The focal length  $f$  is related to the radius of curvature  $r$  of the spherical convex mirror by :

**Options :**

70819157703.  $f = r$

70819157704.  $f = -r$

70819157705.  $f = -\frac{1}{2}r$

70819157706.  $f = +\frac{1}{2}r$

**Question Number : 19 Question Id : 70819117512 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

ગોલીય બહિર્ગોળ અરીસાની કેન્દ્રલંબાઈ  $f$  તેની વક્રતાત્રિજ્યા  $r$  સાથે \_\_\_\_\_ અનુસાર સંબંધ ધરાવે છે.

**Options :**

70819157703.  $f = r$

70819157704.  $f = -r$

70819157705.  $f = -\frac{1}{2}r$

70819157706.  $f = +\frac{1}{2}r$

**Question Number : 20 Question Id : 70819117513 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

In a Young's double slit experiment, the width of the one of the slit is three times the other slit. The amplitude of the light coming from a slit is proportional to the slit-width. Find the ratio of the maximum to the minimum intensity in the interference pattern.

**Options :**

70819157707.  $4 : 1$

70819157708. 2 : 1

70819157709. 1 : 4

70819157710. 3 : 1

**Question Number : 20 Question Id : 70819117513 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

ચંગના બે સ્લિટનાં પ્રયોગમાં, એક સ્લિટની પહોળાઈ બીજી સ્લિટની પહોળાઈ કરતાં ત્રણ ગણી છે. સ્લિટમાંથી બહાર આવતા પ્રકાશનો કંપવિસ્તાર સ્લિટ-પહોળાઈનાં સમપ્રમાણમાં હોય છે. વ્યતિકરણભાતમાં મહત્તમ અને ન્યૂનતમ તીવ્રતાઓનો ગુણોત્તર \_\_\_\_\_ થશે.

**Options :**

70819157707. 4 : 1

70819157708. 2 : 1

70819157709. 1 : 4

70819157710. 3 : 1

## Physics Section B

|                                |           |
|--------------------------------|-----------|
| <b>Section Id :</b>            | 708191707 |
| <b>Section Number :</b>        | 2         |
| <b>Section type :</b>          | Online    |
| <b>Mandatory or Optional :</b> | Mandatory |
| <b>Number of Questions :</b>   | 10        |

|                                       |           |
|---------------------------------------|-----------|
| Number of Questions to be attempted : | 5         |
| Section Marks :                       | 20        |
| Mark As Answered Required? :          | Yes       |
| Sub-Section Number :                  | 1         |
| Sub-Section Id :                      | 708191987 |
| Question Shuffling Allowed :          | Yes       |

Question Number : 21 Question Id : 70819117514 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The coefficient of static friction between a wooden block of mass 0.5 kg and a vertical rough wall is 0.2. The magnitude of horizontal force that should be applied on the block to keep it adhere to the wall will be \_\_\_\_\_ N.  
[  $g = 10 \text{ ms}^{-2}$  ]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 21 Question Id : 70819117514 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

0.5 kg દ્રઘ ધરાવતાં લાકડાનાં ચોસલા અને ઊભી ખરબચડી દિવાલ વચ્ચે સ્થિત ઘર્ષણાંક 0.2 છે. બ્લોક દિવાલ સાથે ચિપકેલો (ચોટલો) રહે તે માટે લગાવવું પડતું સમક્ષિતિજ બળ ગણો \_\_\_\_\_ N. [  $g = 10 \text{ ms}^{-2}$  ]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

**Question Number : 22 Question Id : 70819117515 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

An unpolarized light beam is incident on the polarizer of a polarization experiment and the intensity of light beam emerging from the analyzer is measured as 100 Lumens. Now, if the analyzer is rotated around the horizontal axis (direction of light) by  $30^\circ$  in clockwise direction, the intensity of emerging light will be \_\_\_\_\_ Lumens.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

5 to 5.001

**Question Number : 22 Question Id : 70819117515 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

એક અધુવીભૂત પ્રકાશ કિરણપૂંજને ધ્રુવીભવનનાં પ્રયોગનાં પોલરોઈઝર (ધ્રુવક) ઉપર આપાત કરવામાં આવે છે અને વિશ્લેષક (એનાલાઈઝર) માંથી નિર્ગમન પામતી પ્રકાશની તીવ્રતા 100 લ્યુમેન્સ જોટલી માપવામાં આવે છે. હવે વિશ્લેષકને સમક્ષિતિજ અક્ષ (પ્રકાશની દિશામાં) ને ફરતે  $30^\circ$  ના કોણે ઘડીયાળનાં કાંટાની દિશામાં ભ્રમણ આપવામાં આવે છે. નિર્ગમન પામતા પ્રકાશની તીવ્રતા \_\_\_\_\_ લ્યુમેન્સ હશે.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

5 to 5.001

**Question Number : 23 Question Id : 70819117516 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

A ball with a speed of 9 m/s collides with another identical ball at rest. After the collision, the direction of each ball makes an angle of  $30^\circ$  with the original direction. The ratio of velocities of the balls after collision is  $x : y$ , where  $x$  is \_\_\_\_\_ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number :** 23 **Question Id :** 70819117516 **Question Type :** SA

**Correct Marks :** 4 **Wrong Marks :** 0

9 m/s ની ઝડપથી ગતિ કરતો એક બોલ (દડો) તેને સમાન તેવા વિરામ સ્થિતિમાં રહેલ બીજા દડા સાથે સંઘાત અનુભવે છે. સંઘાત બાદ, દરેક દડા મૂળ (પ્રારંભિક) દિશા સાથે  $30^\circ$  નો કોણ બનાવે છે. સંઘાત બાદ દડાઓનો વેગનો ગુણોત્તર  $x : y$  છે, જ્યાં  $x$  \_\_\_\_\_ છે.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number :** 24 **Question Id :** 70819117517 **Question Type :** SA

**Correct Marks :** 4 **Wrong Marks :** 0

A hydraulic press can lift 100 kg when a mass 'm' is placed on the smaller piston. It can lift \_\_\_\_\_ kg when the diameter of the larger piston is increased by 4 times and that of the smaller piston is decreased by 4 times keeping the same mass 'm' on the smaller piston.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 24 Question Id : 70819117517 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

એક હાઈડ્રોલીક પ્રેસ 100 kg ને ઊંચકી શકે છે જ્યારે 'm' જેટલું દળ નાના પિસ્ટન પર મૂકવામાં આવે છે. દળ ને 'm' જેટલું સમાન રાખીને જો મોટા પીસ્ટનનો વ્યાસ 4 ગણો વધારવામાં આવે અને નાના પીસ્ટનનો વ્યાસ 4 ગણો ઘટાડવામાં આવે તો તે \_\_\_\_\_ kg દળ ઊંચકી શકશે.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 25 Question Id : 70819117518 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

An inclined plane is bent in such a way that the vertical cross-section is given by  $y = \frac{x^2}{4}$

where  $y$  is in vertical and  $x$  in horizontal direction. If the upper surface of this curved plane is rough with coefficient of friction  $\mu = 0.5$ , the maximum height in cm at which a stationary block will not slip downward is \_\_\_\_\_ cm.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 25 Question Id : 70819117518 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

એક ઢોળાવવાળા સમતલને એવી રીતે વાળવામાં આવે છે કે જેથી ઉર્ધ્વ આડછેદ  $y = \frac{x^2}{4}$  થી આપી શકાય, જ્યાં  $y$  એ ઉર્ધ્વ દિશા અને  $x$  સમક્ષિતિજ દિશા છે. જો આ વક્ર સમતલની ઉપરની સપાટી  $\mu = 0.5$  જેટલા ઘર્ષણાંક સાથે ખરબચડી હોય તો એક સ્થિર બ્લોક (ચોસલું) નીચે સરકે નહીં તે મહત્તમ ઊંચાઈ \_\_\_\_\_ cm હશે.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

5 to 5.001

**Question Number : 26 Question Id : 70819117519 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

A resonance circuit having inductance and resistance  $2 \times 10^{-4}$  H and  $6.28 \Omega$  respectively oscillates at 10 MHz frequency. The value of quality factor of this resonator is \_\_\_\_\_.  
[ $\pi = 3.14$ ]

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

5 to 5.001

**Question Number : 26 Question Id : 70819117519 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

અનુક્રમે  $2 \times 10^{-4} \text{ H}$  અને  $6.28 \Omega$  જોડેલું પ્રેરણ અને અવરોધ ધરાવતાં અનુનાદીય પરિપથ  $10 \text{ MHz}$  ની આવૃત્તિ થી દોલન કરે છે. અનુનાદીય પરિપથનો ગુણવત્તા અંક \_\_\_\_\_ હશે.  $[\pi = 3.14]$

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number :** 27 **Question Id :** 70819117520 **Question Type :** SA

**Correct Marks :** 4 **Wrong Marks :** 0

An audio signal  $v_m = 20 \sin 2\pi(1500t)$  amplitude modulates a carrier  $v_c = 80 \sin 2\pi(100,000t)$ .  
The value of percent modulation is \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number :** 27 **Question Id :** 70819117520 **Question Type :** SA

**Correct Marks :** 4 **Wrong Marks :** 0

$v_m = 20 \sin 2\pi(1500t)$  નું શ્રાવ્ય (audio) સિગ્નલ એક  $v_c = 80 \sin 2\pi(100,000t)$  નાં કેરીયર સિગ્નલને કંપવિસ્તાર અધિમિશ્રિત કરે છે. પ્રતિશત અધિમિશ્રણનું મૂલ્ય \_\_\_\_\_ હશે.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

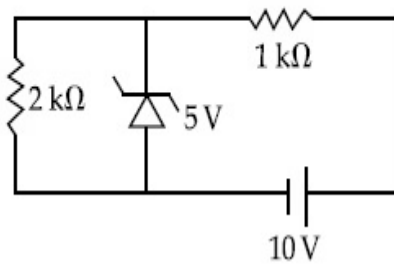
**Possible Answers :**

5 to 5.001

**Question Number : 28 Question Id : 70819117521 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

In connection with the circuit drawn below, the value of current flowing through  $2\text{ k}\Omega$  resistor is \_\_\_\_\_  $\times 10^{-4}\text{ A}$ .



**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

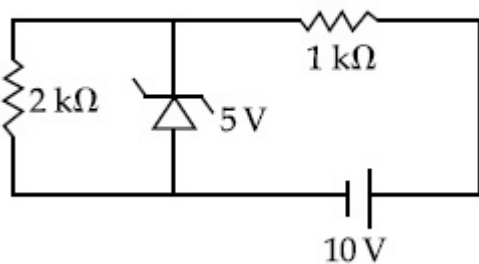
**Possible Answers :**

5 to 5.001

**Question Number : 28 Question Id : 70819117521 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

નીચે આપેલ જોડાણ માટે  $2\text{ k}\Omega$  અવરોધમાં વહેતા પ્રવાહનું મૂલ્ય \_\_\_\_\_  $\times 10^{-4}\text{ A}$ .



**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 29 Question Id : 70819117522 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

An electromagnetic wave of frequency 5 GHz, is travelling in a medium whose relative electric permittivity and relative magnetic permeability both are 2. Its velocity in this medium is \_\_\_\_\_  $\times 10^7$  m/s.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 29 Question Id : 70819117522 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

5 GHz આવૃત્તિ ધરાવતું એક વિદ્યુતચુંબકીય તરંગ જેની સાપેક્ષ વિદ્યુતીય પરમીટીવીટી (પારવીનક) અને સાપેક્ષ ચુંબકીય પરમીયાબીલીટી (પારગમ્યતા) બંને 2 હોય તેવા માધ્યમમાં પ્રસરે છે. આ માધ્યમમાં તરંગ વેગ \_\_\_\_\_  $\times 10^7$  m/s છે.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 30 Question Id : 70819117523 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

A common transistor radio set requires 12 V (D.C.) for its operation. The D.C. source is constructed by using a transformer and a rectifier circuit, which are operated at 220 V (A.C.) on standard domestic A.C. supply. The number of turns of secondary coil are 24, then the number of turns of primary are \_\_\_\_\_.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

5 to 5.001

**Question Number : 30 Question Id : 70819117523 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

ટ્રાન્ઝિસ્ટર રેડીયો સેટને કાર્યરત કરવા માટે 12 V (D.C.) ની જરૂર પડે છે. એક ટ્રાન્સફોર્મર અને એક રેક્ટિફાયર પરિપથની મદદથી D.C. ઉદ્ભવ (સ્ત્રોત) બનાવવામાં આવે છે કે જે સામાન્ય ઘરેલું 220 V નાં (A.C.) સપ્લાય થી ચલાવવામાં આવે છે. જો ગૌણ ગૂંચળામાં 24 આંટા હોય તો પ્રાથમિક આંટાની સંખ્યા \_\_\_\_\_ હશે.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

5 to 5.001

## Chemistry Section A

**Section Id :**

708191708

|                                              |           |
|----------------------------------------------|-----------|
| <b>Section Number :</b>                      | 3         |
| <b>Section type :</b>                        | Online    |
| <b>Mandatory or Optional :</b>               | Mandatory |
| <b>Number of Questions :</b>                 | 20        |
| <b>Number of Questions to be attempted :</b> | 20        |
| <b>Section Marks :</b>                       | 80        |
| <b>Mark As Answered Required? :</b>          | Yes       |
| <b>Sub-Section Number :</b>                  | 1         |
| <b>Sub-Section Id :</b>                      | 708191988 |
| <b>Question Shuffling Allowed :</b>          | Yes       |

**Question Number : 31 Question Id : 70819117524 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

Which of the following are isostructural pairs ?

- A.  $\text{SO}_4^{2-}$  and  $\text{CrO}_4^{2-}$
- B.  $\text{SiCl}_4$  and  $\text{TiCl}_4$
- C.  $\text{NH}_3$  and  $\text{NO}_3^-$
- D.  $\text{BCl}_3$  and  $\text{BrCl}_3$

**Options :**

70819157721. A and B only

70819157722. A and C only

70819157723. B and C only

70819157724. C and D only

**Question Number : 31 Question Id : 70819117524 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

Correct Marks : 4 Wrong Marks : 1

નીચે આપેલામાંથી કયા સમબંધારણીય યુગ્મો છે ?

- A.  $\text{SO}_4^{2-}$  અને  $\text{CrO}_4^{2-}$
- B.  $\text{SiCl}_4$  અને  $\text{TiCl}_4$
- C.  $\text{NH}_3$  અને  $\text{NO}_3^-$
- D.  $\text{BCl}_3$  અને  $\text{BrCl}_3$

Options :

70819157721. ફક્ત A અને B

70819157722. ફક્ત A અને C

70819157723. ફક્ત B અને C

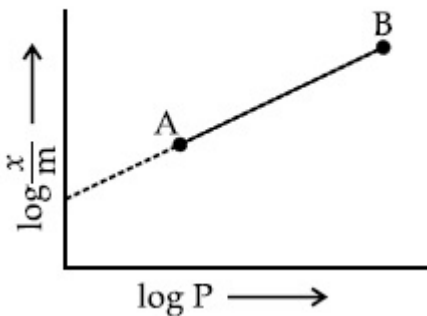
70819157724. ફક્ત C અને D

Question Number : 32 Question Id : 70819117525 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In Freundlich adsorption isotherm, slope of AB line is :



Options :

70819157725.  $n$  with  $(n, 0.1 \text{ to } 0.5)$

70819157726.  $\log n$  with  $(n > 1)$

70819157727.

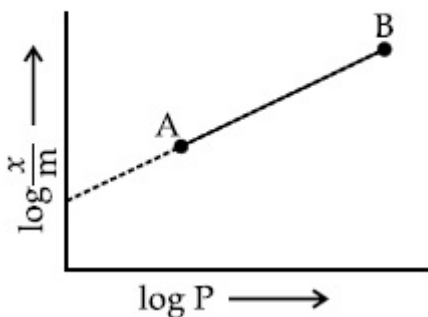
$$\log \frac{1}{n} \text{ with } (n < 1)$$

70819157728.  $\frac{1}{n}$  with  $\left(\frac{1}{n} = 0 \text{ to } 1\right)$

Question Number : 32 Question Id : 70819117525 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

કુન્ડલીય અધિશોષણ સમતાપીમાં, AB રેખાનો ઢાળ શોધો.



Options :

70819157725.  $n$  સાથે મૂલ્યો (0.1 થી 0.5)

70819157726.  $\log n$  સાથે  $n > 1$

70819157727.  $\log \frac{1}{n}$  સાથે  $n < 1$

70819157728.  $\frac{1}{n}$  સાથે  $\frac{1}{n} = 0$  થી 1

Question Number : 33 Question Id : 70819117526 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider the elements Mg, Al, S, P and Si, the correct increasing order of their first ionization enthalpy is :

**Options :**

70819157729.  $\text{Al} < \text{Mg} < \text{Si} < \text{S} < \text{P}$

70819157730.  $\text{Mg} < \text{Al} < \text{Si} < \text{P} < \text{S}$

70819157731.  $\text{Mg} < \text{Al} < \text{Si} < \text{S} < \text{P}$

70819157732.  $\text{Al} < \text{Mg} < \text{S} < \text{Si} < \text{P}$

**Question Number : 33 Question Id : 70819117526 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

Mg, Al, S, P અને Si ને ધ્યાનમાં લો. તેમની પ્રથમ આયનીકરણ એન્ટાલ્પીનો સાચો ચઢતો ક્રમ શોધો.

**Options :**

70819157729.  $\text{Al} < \text{Mg} < \text{Si} < \text{S} < \text{P}$

70819157730.  $\text{Mg} < \text{Al} < \text{Si} < \text{P} < \text{S}$

70819157731.  $\text{Mg} < \text{Al} < \text{Si} < \text{S} < \text{P}$

70819157732.  $\text{Al} < \text{Mg} < \text{S} < \text{Si} < \text{P}$

**Question Number : 34 Question Id : 70819117527 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

Which of the following ore is concentrated using group 1 cyanide salt ?

**Options :**

70819157733. Calamine

70819157734. Malachite

70819157735. Siderite

70819157736. Sphalerite

**Question Number : 34 Question Id : 70819117527 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

સમૂહ 1 સાયનાઈડ ક્ષારનો ઉપયોગ કરીને નીચે આપેલામાંથી કઈ અયસ્કનું સાંદ્રણ (concentrated) કરી શકાય છે ?

**Options :**

70819157733. કેલેમાઈન

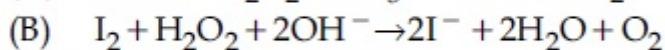
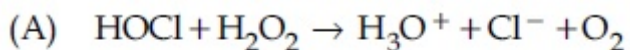
70819157734. મેલેકાઈટ

70819157735. સિડેરાઈટ

70819157736. સ્ફાલેરાઈટ

**Question Number : 35 Question Id : 70819117528 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**



Choose the correct option.

**Options :**

70819157737.  $\text{H}_2\text{O}_2$  acts as oxidising agent in equations (A) and (B).

70819157738.  $\text{H}_2\text{O}_2$  acts as reducing agent in equations (A) and (B).

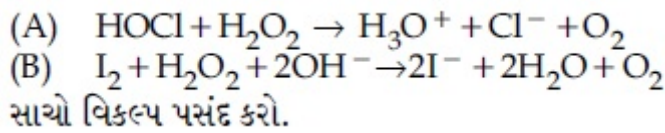
70819157739.  $\text{H}_2\text{O}_2$  act as oxidizing and reducing agent respectively in equations (A) and (B).

70819157740.  $\text{H}_2\text{O}_2$  acts as reducing and oxidising agent respectively in equations (A) and (B).

**Question Number : 35 Question Id : 70819117528 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**



**Options :**

70819157737. સમીકરણો (A) અને (B) માં  $\text{H}_2\text{O}_2$  એ ઓક્સિડેશનકર્તા તરીકે વર્તે છે.

70819157738. સમીકરણો (A) અને (B) માં  $\text{H}_2\text{O}_2$  એ રિડક્શનકર્તા તરીકે વર્તે છે.

70819157739. સમીકરણો (A) અને (B) માં  $\text{H}_2\text{O}_2$  અનુક્રમે ઓક્સિડેશન અને રિડક્શન કર્તા તરીકે વર્તે છે.

70819157740. સમીકરણો (A) અને (B) માં  $\text{H}_2\text{O}_2$  અનુક્રમે રિડક્શન અને ઓક્સિડેશન કર્તા તરીકે વર્તે છે.

**Question Number : 36 Question Id : 70819117529 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

$\text{Al}_2\text{O}_3$  was leached with alkali to get X. The solution of X on passing of gas Y, forms Z.  
X, Y and Z respectively are :

**Options :**

70819157741.  $\text{X} = \text{Na}[\text{Al}(\text{OH})_4]$ ,  $\text{Y} = \text{SO}_2$ ,  $\text{Z} = \text{Al}_2\text{O}_3$

70819157742.  $X = \text{Al}(\text{OH})_3$ ,  $Y = \text{SO}_2$ ,  $Z = \text{Al}_2\text{O}_3 \cdot x\text{H}_2\text{O}$

70819157743.  $X = \text{Al}(\text{OH})_3$ ,  $Y = \text{CO}_2$ ,  $Z = \text{Al}_2\text{O}_3$

70819157744.  $X = \text{Na}[\text{Al}(\text{OH})_4]$ ,  $Y = \text{CO}_2$ ,  $Z = \text{Al}_2\text{O}_3 \cdot x\text{H}_2\text{O}$

**Question Number : 36 Question Id : 70819117529 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

$\text{Al}_2\text{O}_3$  ને આલ્કલી સાથે નિક્ષાલન (Leaching) કરતાં X પ્રાપ્ત થાય છે. X ના દ્રાવણમાં વાયુ Y પસાર કરતાં Z બને છે. X, Y અને Z અનુક્રમે શોધો.

**Options :**

70819157741.  $X = \text{Na}[\text{Al}(\text{OH})_4]$ ,  $Y = \text{SO}_2$ ,  $Z = \text{Al}_2\text{O}_3$

70819157742.  $X = \text{Al}(\text{OH})_3$ ,  $Y = \text{SO}_2$ ,  $Z = \text{Al}_2\text{O}_3 \cdot x\text{H}_2\text{O}$

70819157743.  $X = \text{Al}(\text{OH})_3$ ,  $Y = \text{CO}_2$ ,  $Z = \text{Al}_2\text{O}_3$

70819157744.  $X = \text{Na}[\text{Al}(\text{OH})_4]$ ,  $Y = \text{CO}_2$ ,  $Z = \text{Al}_2\text{O}_3 \cdot x\text{H}_2\text{O}$

**Question Number : 37 Question Id : 70819117530 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

The electrode potential of  $\text{M}^{2+} / \text{M}$  of 3d-series elements shows positive value for :

**Options :**

70819157745. Fe

70819157746. Co

70819157747. Zn

70819157748. Cu

**Question Number : 37 Question Id : 70819117530 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

3d-શ્રેણીઓ તત્વોના  $M^{2+}/M$  ના ઈલેક્ટ્રોડ પોટેન્શિયલ જે ધનાત્મક મૂલ્યો (positive values) દર્શાવે છે તે \_\_\_\_\_ છે.

**Options :**

70819157745. Fe

70819157746. Co

70819157747. Zn

70819157748. Cu

**Question Number : 38 Question Id : 70819117531 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

The major components in "Gun Metal" are :

**Options :**

70819157749. Cu, Sn and Zn

70819157750. Cu, Zn and Ni

70819157751. Cu, Ni and Fe

70819157752. Al, Cu, Mg and Mn

**Question Number : 38 Question Id : 70819117531 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

“બંદૂક ધાતુ” (વિસ્ફોટક ધાતુ) (Gun metal) માં મુખ્ય ઘટકો શોધો.

**Options :**

70819157749. Cu, Sn અને Zn

70819157750. Cu, Zn અને Ni

70819157751. Cu, Ni અને Fe

70819157752. Al, Cu, Mg અને Mn

**Question Number : 39 Question Id : 70819117532 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

The gas released during anaerobic degradation of vegetation may lead to :

**Options :**

70819157753. Acid rain

70819157754. Global warming and cancer

70819157755. Corrosion of metals

70819157756. Ozone hole

Question Number : 39 Question Id : 70819117532 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ઓક્સિજનની ગેરહાજરીમાં વનસ્પતિ (ઝાડ-પાન) ના વિઘટન દરમિયાન મુક્ત થતો વાયુ નીચેનામાંથી એક તરફ દોરી જશે જે \_\_\_\_\_.

Options :

70819157753. એસિડ વર્ષા

70819157754. ગ્લોબલ વોર્મિંગ અને કેન્સર

70819157755. ધાતુઓનું ક્ષારણ

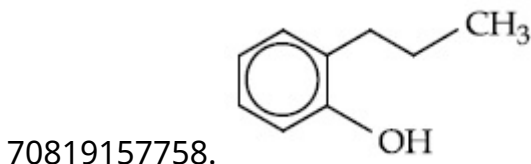
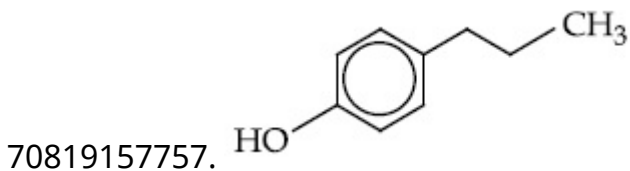
70819157756. ઓઝોન ગાયડાં

Question Number : 40 Question Id : 70819117533 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No

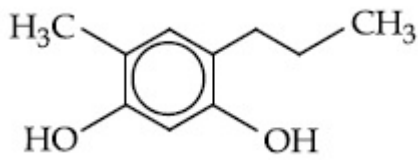
Correct Marks : 4 Wrong Marks : 1

Which of the following compound gives pink colour on reaction with phthalic anhydride in conc.  $H_2SO_4$  followed by treatment with NaOH ?

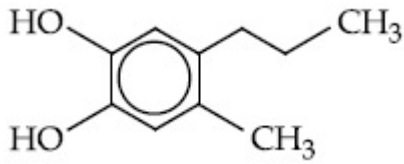
Options :



70819157759.



70819157760.



Question Number : 40 Question Id : 70819117533 Question Type : MCQ Option Shuffling : Yes

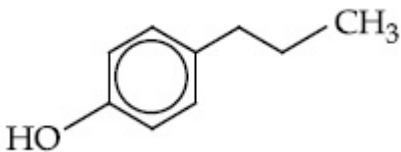
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

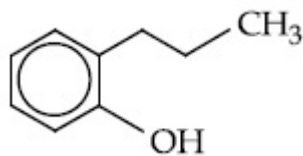
નીચે આપેલામાંથી કયા સંયોજનની સાથે સોડ્ર  $H_2SO_4$  માં રહેલા પ્થેલિક એનહાઈડ્રાઈડની અને ત્યારબાદ તેની NaOH સાથે પ્રક્રિયા કરવાથી ગુલાબી રંગ આપશે ?

Options :

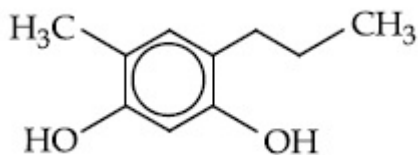
70819157757.



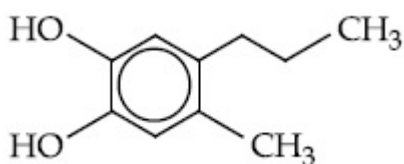
70819157758.



70819157759.



70819157760.

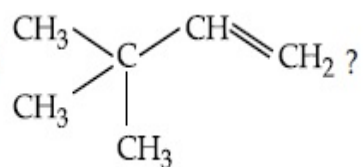


Question Number : 41 Question Id : 70819117534 Question Type : MCQ Option Shuffling : Yes

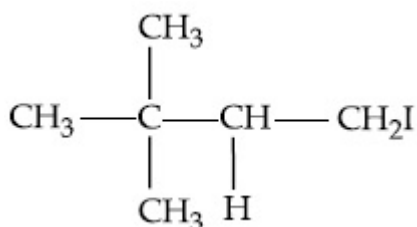
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

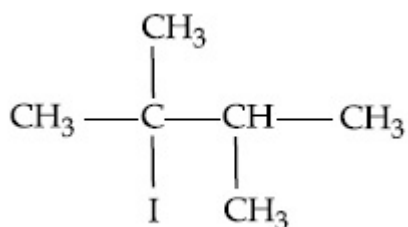
What is the major product formed by HI on reaction with



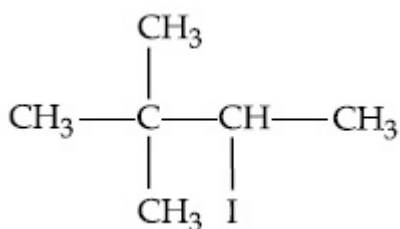
Options :



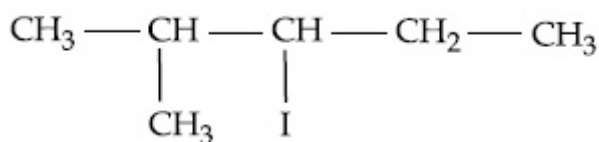
70819157761.



70819157762.



70819157763.

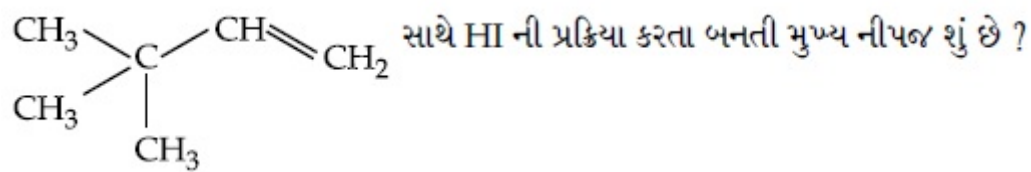


70819157764.

Question Number : 41 Question Id : 70819117534 Question Type : MCQ Option Shuffling : Yes

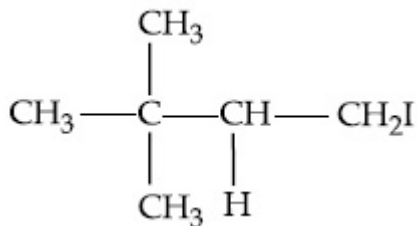
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

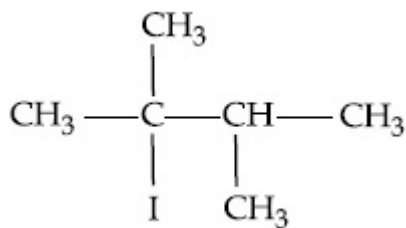


Options :

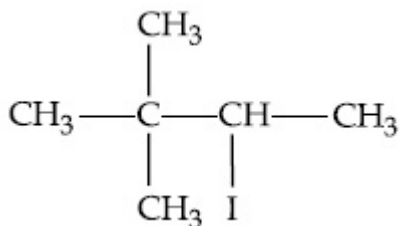
70819157761.



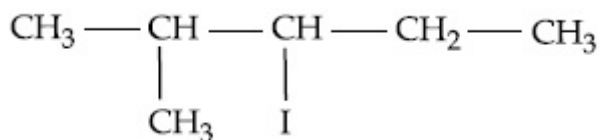
70819157762.



70819157763.



70819157764.

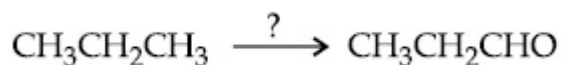


Question Number : 42 Question Id : 70819117535 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following reagent is used for the following reaction ?



Options :

70819157765. Copper at high temperature and pressure

70819157766. Molybdenum oxide

70819157767. Manganese acetate

70819157768. Potassium permanganate

Question Number : 42 Question Id : 70819117535 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$\text{CH}_3\text{CH}_2\text{CH}_3 \xrightarrow{?} \text{CH}_3\text{CH}_2\text{CHO}$  પ્રક્રિયા માટે નીચે આપેલામાંથી કયા પ્રક્રિયકનો ઉપયોગ થાય છે ?

Options :

70819157765. ઊંચા તાપમાન અને દબાણ પર કોપર

70819157766. મોલિબ્ડેમ ઓક્સાઇડ

70819157767. મેંગેનીઝ એસિટેટ

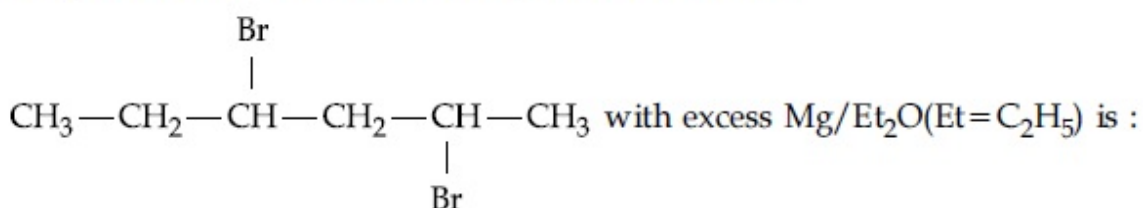
70819157768. પોટેશિયમ પરમેંગેનેટ

Question Number : 43 Question Id : 70819117536 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

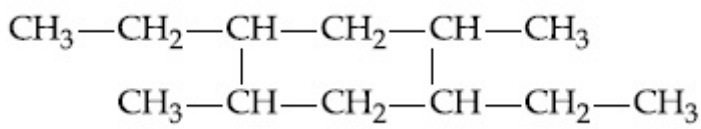
Correct Marks : 4 Wrong Marks : 1

The product formed in the first step of the reaction of

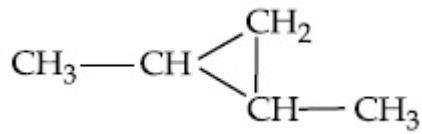


Options :

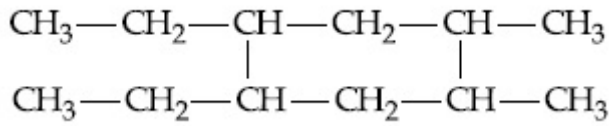
70819157769.



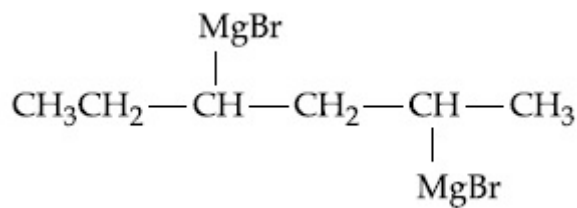
70819157770.



70819157771.



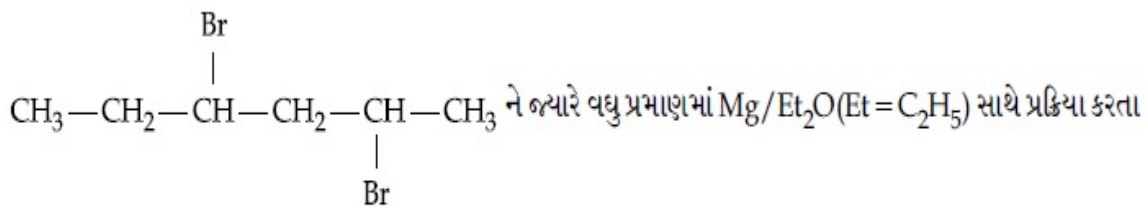
70819157772.



Question Number : 43 Question Id : 70819117536 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

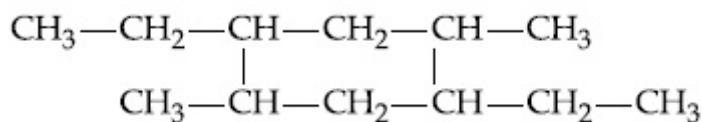
Correct Marks : 4 Wrong Marks : 1



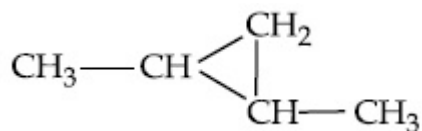
પ્રક્રિયામાં પ્રથમ તબક્કામાં બનતી નીપજ શોધો.

Options :

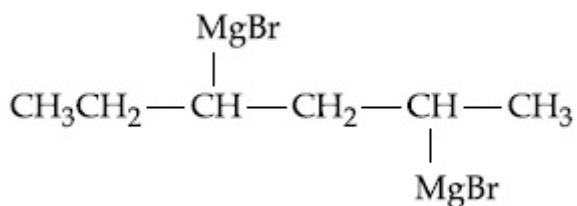
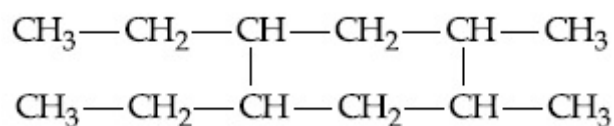
70819157769.



70819157770.



70819157771.

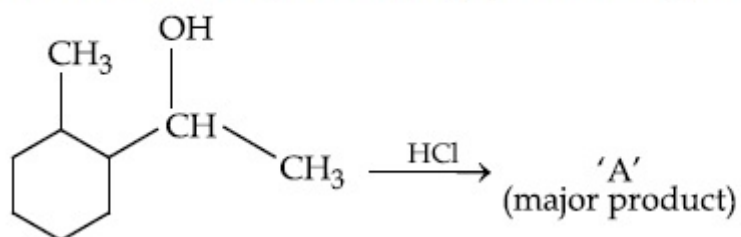


70819157772.

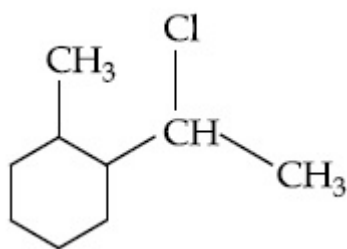
Question Number : 44 Question Id : 70819117537 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

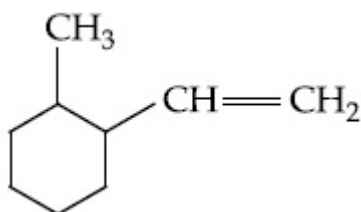
What is the final product (major) 'A' in the given reaction ?



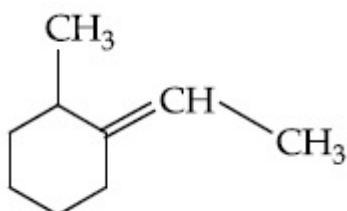
Options :



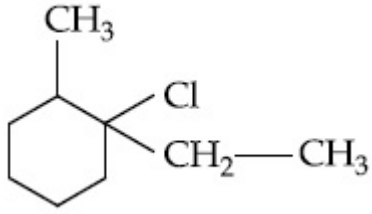
70819157773.



70819157774.



70819157775.



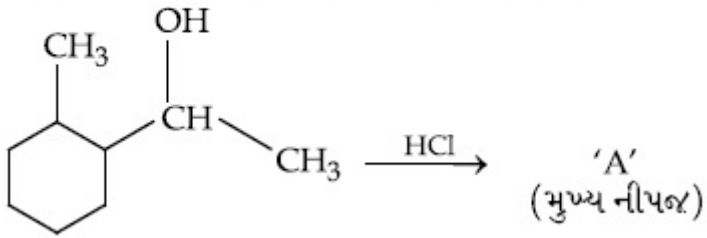
70819157776.

Question Number : 44 Question Id : 70819117537 Question Type : MCQ Option Shuffling : Yes

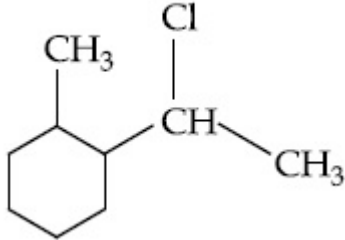
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

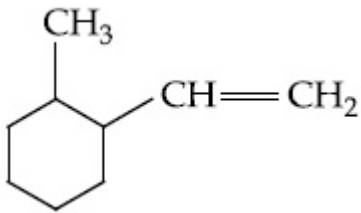
આપેલ પ્રક્રિયામાં અંતિમ નીપજ (મુખ્ય) 'A' શું છે ?



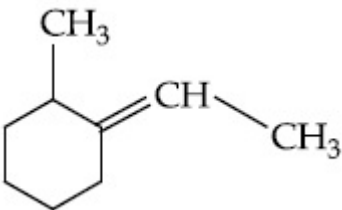
Options :



70819157773.

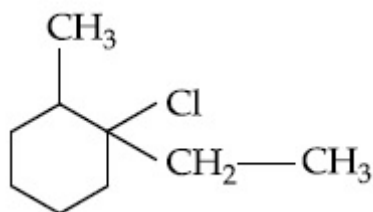


70819157774.



70819157775.

70819157776.

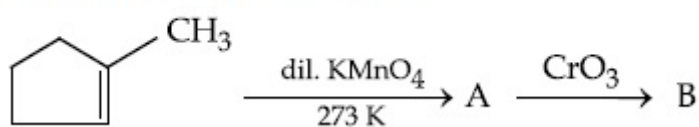


Question Number : 45 Question Id : 70819117538 Question Type : MCQ Option Shuffling : Yes

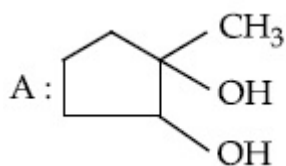
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

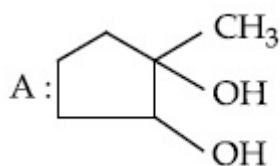
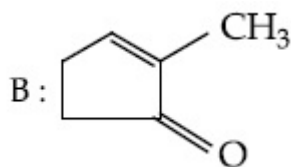
Identify products A and B.



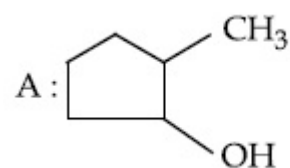
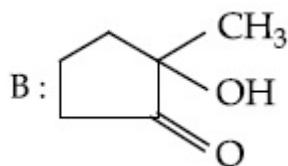
Options :



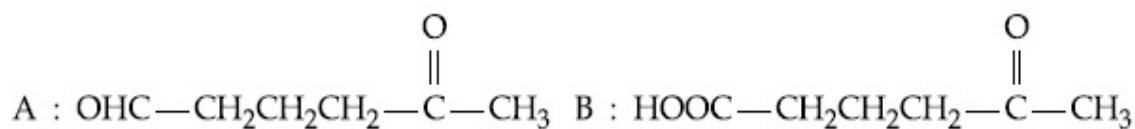
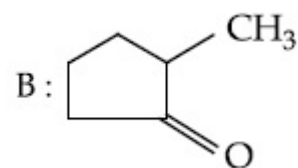
70819157777.



70819157778.



70819157779.



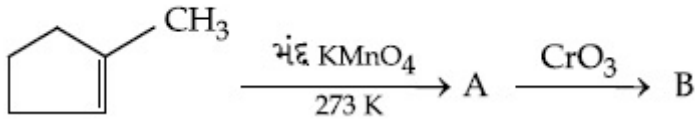
70819157780.

Question Number : 45 Question Id : 70819117538 Question Type : MCQ Option Shuffling : Yes

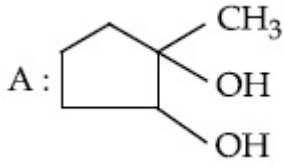
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

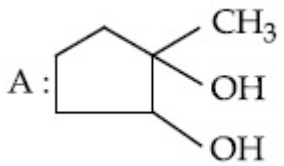
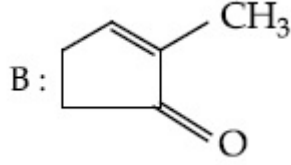
નીચેના A અને B ઓળખો.



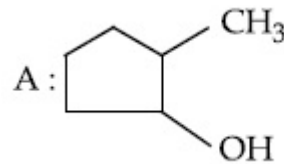
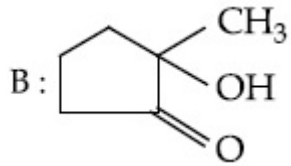
Options :



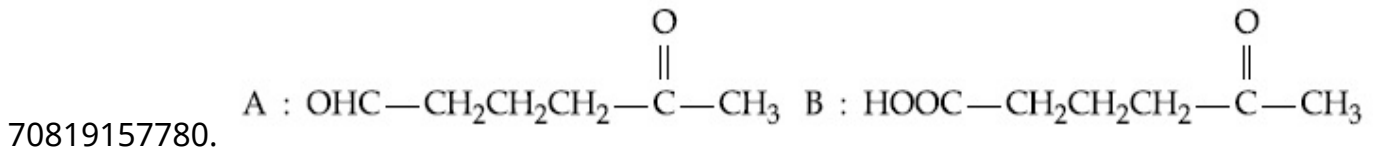
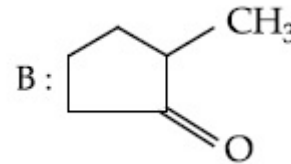
70819157777.



70819157778.



70819157779.

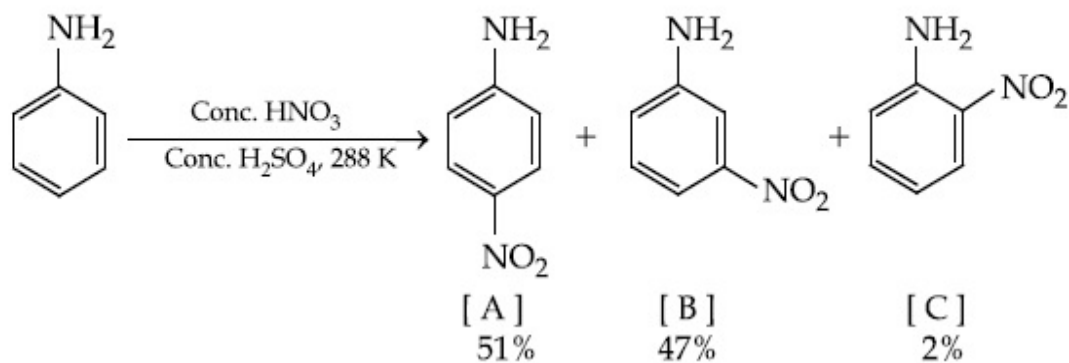


Question Number : 46 Question Id : 70819117539 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the following reaction the reason why *meta*-nitro product also formed is :



Options :

70819157781.  $-\text{NH}_2$  group is highly *meta*-directive

70819157782.  $-\text{NO}_2$  substitution always takes place at *meta*-position

70819157783. Formation of anilinium ion

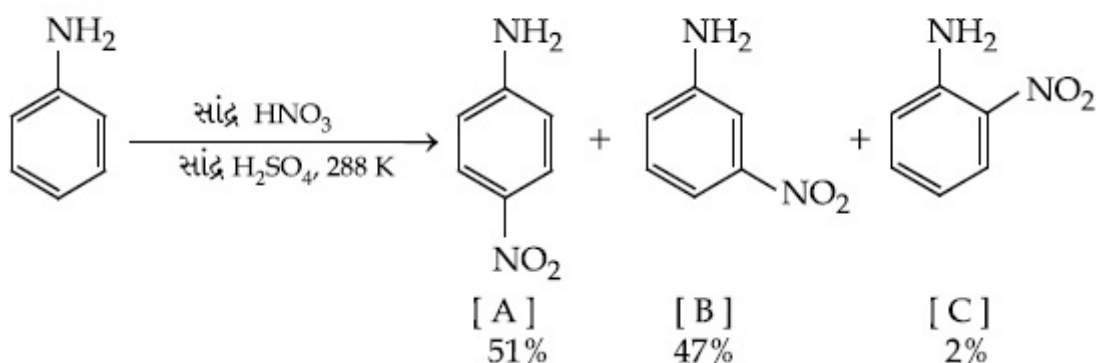
70819157784. low temperature

Question Number : 46 Question Id : 70819117539 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

નીચે આપેલ પ્રક્રિયામાં મેટા-નાઈટ્રો નીપજ પણ કયા કારણને લીધે બને છે ?



Options :

70819157781.  $-\text{NH}_2$  સમૂહ અતિ (highly) મેટા-નિર્દેશક છે.

70819157782.  $-\text{NO}_2$  વિસ્થાપન હંમેશા મેટા સ્થાનમાં જ થાય છે.

70819157783. એનિલિનીયમ આયનનું બનવું (સર્જન).

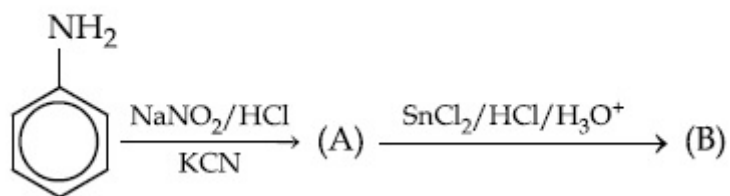
70819157784. નીચું તાપમાન.

Question Number : 47 Question Id : 70819117540 Question Type : MCQ Option Shuffling : Yes

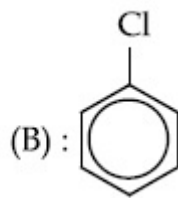
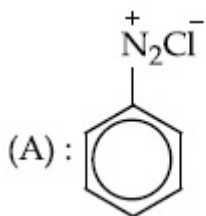
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

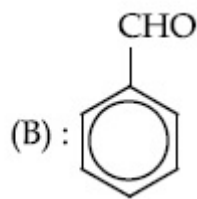
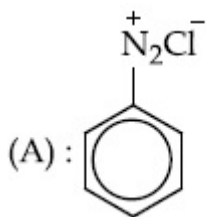
'A' and 'B' in the following reactions are :



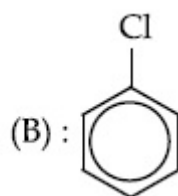
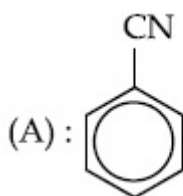
Options :



70819157785.

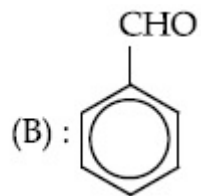
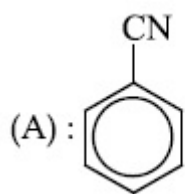


70819157786.



70819157787.

70819157788.

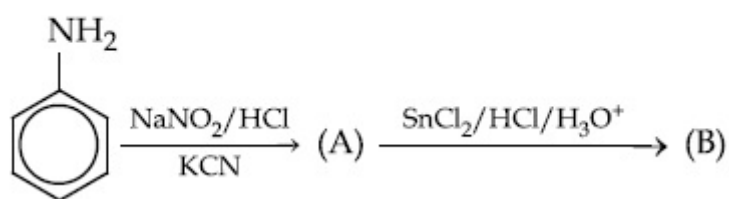


Question Number : 47 Question Id : 70819117540 Question Type : MCQ Option Shuffling : Yes

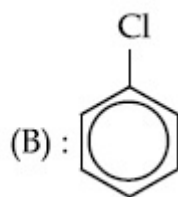
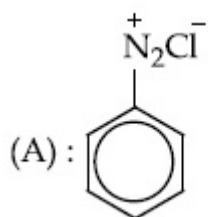
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

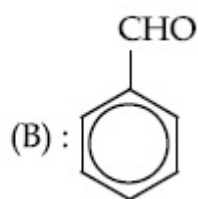
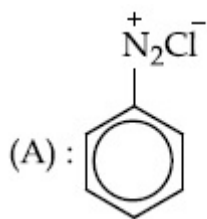
નીચે આપેલ પ્રક્રિયામાં 'A' અને 'B' શોધો :



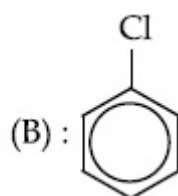
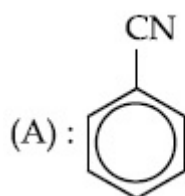
Options :



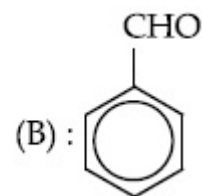
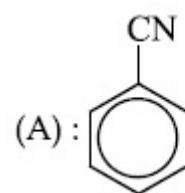
70819157785.



70819157786.



70819157787.



70819157788.

Question Number : 48 Question Id : 70819117541 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List I with List II.

| List I<br>(Monomer Unit)   | List II<br>(Polymer) |
|----------------------------|----------------------|
| (a) Caprolactum            | (i) Natural rubber   |
| (b) 2-Chloro-1,3-butadiene | (ii) Buna-N          |
| (c) Isoprene               | (iii) Nylon 6        |
| (d) Acrylonitrile          | (iv) Neoprene        |

Choose the correct answer from the options given below :

Options :

70819157789. (a) → (i), (b) → (ii), (c) → (iii), (d) → (iv)

70819157790. (a) → (iv), (b) → (iii), (c) → (ii), (d) → (i)

70819157791. (a) → (ii), (b) → (i), (c) → (iv), (d) → (iii)

70819157792. (a) → (iii), (b) → (iv), (c) → (i), (d) → (ii)

Question Number : 48 Question Id : 70819117541 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

સૂચી I ને સૂચી II સાથે જોડો.

| સૂચી I<br>(મોનોમર એકમ)       | સૂચી II<br>(બહુલક) |
|------------------------------|--------------------|
| (a) કેપ્રોલેક્ટમ             | (i) કુદરતી રબર     |
| (b) 2-ક્લોરો-1,3-બ્યુટાડાયેન | (ii) બ્યુના-N      |
| (c) આઈસોપ્રિન                | (iii) નાયલોન 6     |
| (d) એક્રિલોનાઈટ્રાઈલ         | (iv) નિયોપ્રિન     |

નીચે આપેલા વિકલ્પોમાંથી સાચો જવાબ પસંદ કરો.

**Options :**

70819157789. (a)  $\rightarrow$  (i), (b)  $\rightarrow$  (ii), (c)  $\rightarrow$  (iii), (d)  $\rightarrow$  (iv)

70819157790. (a)  $\rightarrow$  (iv), (b)  $\rightarrow$  (iii), (c)  $\rightarrow$  (ii), (d)  $\rightarrow$  (i)

70819157791. (a)  $\rightarrow$  (ii), (b)  $\rightarrow$  (i), (c)  $\rightarrow$  (iv), (d)  $\rightarrow$  (iii)

70819157792. (a)  $\rightarrow$  (iii), (b)  $\rightarrow$  (iv), (c)  $\rightarrow$  (i), (d)  $\rightarrow$  (ii)

**Question Number : 49 Question Id : 70819117542 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

Out of the following, which type of interaction is responsible for the stabilisation of  $\alpha$ -helix structure of proteins ?

**Options :**

70819157793. vander Waals forces

70819157794. Covalent bonding

70819157795. Ionic bonding

70819157796. Hydrogen bonding

**Question Number : 49 Question Id : 70819117542 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

પ્રોટીનનાં  $\alpha$ -સર્પિલ બંધારણની સ્થિરતા માટે નીચે આપેલામાંથી કયા પ્રકારની પારસ્પરિક ક્રિયા (અન્યોન્ય ક્રિયા) જવાબદાર છે ?

**Options :**

70819157793. વાન્ડર વાલ બળો

70819157794. સહસંયોજક બંધન

70819157795. આયોનિક બંધન

70819157796. હાઈડ્રોજન બંધન

**Question Number : 50 Question Id : 70819117543 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

Given below are two statements :

**Statement I :** Colourless cupric metaborate is reduced to cuprous metaborate in a luminous flame.

**Statement II :** Cuprous metaborate is obtained by heating boric anhydride and copper sulphate in a non-luminous flame.

In the light of the above statements, choose the most appropriate answer from the options given below.

**Options :**

70819157797. Both Statement I and Statement II are true

70819157798. Both Statement I and Statement II are false

70819157799. Statement I is true but Statement II is false

70819157800. Statement I is false but Statement II is true

**Question Number : 50 Question Id : 70819117543 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

નીચે બે વિધાનો આપેલા છે.

વિધાન I : પ્રદીપ્ત જ્યોતમાં (luminous flame) રંગવિહીન ક્યુપ્રિક મેટાબોરેટનું ક્યુપ્રસ મેટાબોરેટમાં રિડક્શન થાય છે.

વિધાન II : નોન-પ્રદીપ્ત જ્યોત હોય તેવામાં બોરિક એનહાઈડ્રાઈડ અને કોપર સલ્ફેટને ગરમ કરતાં ક્યુપ્રસ મેટાબોરેટ મેળવવામાં આવે છે.

ઉપરનાં વિધાનોનાં સંદર્ભમાં, નીચે આપેલા વિકલ્પોમાંથી સાચો જવાબ પસંદ કરો.

**Options :**

70819157797. બંને, વિધાન I અને વિધાન II સાચાં છે.

70819157798. બંને, વિધાન I અને વિધાન II ખોટાં છે.

70819157799. વિધાન I સાચું છે પણ વિધાન II ખોટું છે.

70819157800. વિધાન I ખોટું છે પણ વિધાન II સાચું છે.

## Chemistry Section B

|                                       |           |
|---------------------------------------|-----------|
| Section Id :                          | 708191709 |
| Section Number :                      | 4         |
| Section type :                        | Online    |
| Mandatory or Optional :               | Mandatory |
| Number of Questions :                 | 10        |
| Number of Questions to be attempted : | 5         |
| Section Marks :                       | 20        |
| Mark As Answered Required? :          | Yes       |
| Sub-Section Number :                  | 1         |
| Sub-Section Id :                      | 708191989 |
| Question Shuffling Allowed :          | Yes       |

Question Number : 51 Question Id : 70819117544 Question Type : SA

**Correct Marks : 4 Wrong Marks : 0**

4.5 g of compound A (MW=90) was used to make 250 mL of its aqueous solution. The molarity of the solution in M is  $x \times 10^{-1}$ . The value of  $x$  is \_\_\_\_\_. (Rounded off to the nearest integer)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 51 Question Id : 70819117544 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

4.5 g સંયોજન A (MW=90) નો ઉપયોગ કરીને તેનું 250 mL જલીય દ્રાવણ બનાવવામાં આવ્યું. દ્રાવણની મોલારિટી M એ  $x \times 10^{-1}$  છે. તો  $x$  નું મૂલ્ય \_\_\_\_\_ છે. (નજીકના પૂર્ણાંકમાં રાઉન્ડ ઓફ)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 52 Question Id : 70819117545 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

The coordination number of an atom in a body-centered cubic structure is \_\_\_\_\_.  
[Assume that the lattice is made up of atoms.]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 52 Question Id : 70819117545 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

એક અંતઃકેન્દ્રિત ધન (શરીર કેન્દ્રિત ધન) માં પરમાણુનો કો-ઓર્ડિનેશન આંક \_\_\_\_\_ છે. (ધારી લો કે લેટાઈસ એ પરમાણુઓનો બનેલો છે )

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 53 Question Id : 70819117546 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

A proton and a  $\text{Li}^{3+}$  nucleus are accelerated by the same potential. If  $\lambda_{\text{Li}}$  and  $\lambda_{\text{p}}$  denote the de Broglie wavelengths of  $\text{Li}^{3+}$  and proton respectively, then the value of  $\frac{\lambda_{\text{Li}}}{\lambda_{\text{p}}}$  is  $x \times 10^{-1}$ .

The value of  $x$  is \_\_\_\_\_. (Rounded off to the nearest integer)

[Mass of  $\text{Li}^{3+} = 8.3$  mass of proton]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

Question Number : 53 Question Id : 70819117546 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

સમાન પોટેન્શિયલ વડે એક પ્રોટોન અને  $\text{Li}^{3+}$  ન્યુક્લિયસ પ્રવેગિત (accelerated) થાય છે.  $\text{Li}^{3+}$  અને પ્રોટોનની ડી-બ્રોગ્લી તરંગલંબાઈ અનુક્રમે  $\lambda_{\text{Li}}$  અને  $\lambda_{\text{p}}$  હોય તો,  $\frac{\lambda_{\text{Li}}}{\lambda_{\text{p}}}$  નું મૂલ્ય  $x \times 10^{-1}$  છે. તો  $x$  નું મૂલ્ય \_\_\_\_\_ છે.  
(નજીકનાં પૂર્ણાંકમાં રાઉન્ડ ઓફ) [  $\text{Li}^{3+}$  નું દળ = 8.3 પ્રોટોનનું દળ ]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 54 Question Id : 70819117547 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

For the reaction  $\text{A}_{(\text{g})} \rightarrow \text{B}_{(\text{g})}$ , the value of the equilibrium constant at 300 K and 1 atm is equal to 100.0. The value of  $\Delta_{\text{r}}G$  for the reaction at 300 K and 1 atm in  $\text{J mol}^{-1}$  is  $-xR$ , where  $x$  is \_\_\_\_\_. (Rounded off to the nearest integer)  
[ $R = 8.31 \text{ J mol}^{-1}\text{K}^{-1}$  and  $\ln 10 = 2.3$ ]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 54 Question Id : 70819117547 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

પ્રક્રિયા  $A_{(g)} \rightarrow B_{(g)}$  માટે, 300 K અને 1 atm પર સંતુલન અચળાંકનું મૂલ્ય 100.0 ને સમાન છે. 300 K અને 1 atm પર પ્રક્રિયા માટે  $\Delta_r G$  નું મૂલ્ય  $J \text{ mol}^{-1}$  માં  $-xR$  છે. જ્યાં  $x$  \_\_\_\_\_ છે. (નજીકના પૂર્ણાંકમાં રાઉન્ડ ઓફ)  
[ $R=8.31 J \text{ mol}^{-1}K^{-1}$  અને  $\ln 10=2.3$ ]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number :** 55 **Question Id :** 70819117548 **Question Type :** SA

**Correct Marks :** 4 **Wrong Marks :** 0

When 9.45 g of  $\text{ClCH}_2\text{COOH}$  is added to 500 mL of water, its freezing point drops by  $0.5^\circ\text{C}$ . The dissociation constant of  $\text{ClCH}_2\text{COOH}$  is  $x \times 10^{-3}$ . The value of  $x$  is \_\_\_\_\_. (Rounded off to the nearest integer)

[ $K_f(\text{H}_2\text{O})=1.86 \text{ K kg mol}^{-1}$ ]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number :** 55 **Question Id :** 70819117548 **Question Type :** SA

**Correct Marks :** 4 **Wrong Marks :** 0

જ્યારે 9.45 g  $\text{ClCH}_2\text{COOH}$  ને 500 mL પાણીમાં ઉમેરવામાં આવે છે ત્યારે તેનું ધારણ બિંદુ  $0.5^\circ\text{C}$  નીચું જાય છે. તો  $\text{ClCH}_2\text{COOH}$  નો વિયોજન અચળાંક  $x \times 10^{-3}$  છે. તો  $x$  નું મૂલ્ય \_\_\_\_\_ છે.

[ $K_f(\text{H}_2\text{O})=1.86 \text{ K kg mol}^{-1}$ ] (નજીકના પૂર્ણાંકમાં રાઉન્ડ ઓફ)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 56 Question Id : 70819117549 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

At 1990 K and 1 atm pressure, there are equal number of  $\text{Cl}_2$  molecules and Cl atoms in the reaction mixture. The value of  $K_p$  for the reaction  $\text{Cl}_{2(g)} \rightleftharpoons 2\text{Cl}_{(g)}$  under the above conditions is  $x \times 10^{-1}$ . The value of  $x$  is \_\_\_\_\_. (Rounded off to the nearest integer)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 56 Question Id : 70819117549 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

1990 K અને 1 atm દબાણ પર, પ્રક્રિયા મિશ્રણમાં  $\text{Cl}_2$  અણુઓ અને Cl પરમાણુઓ સમાન સંખ્યામાં છે.  $\text{Cl}_{2(g)} \rightleftharpoons 2\text{Cl}_{(g)}$  પ્રક્રિયા માટે ઉપરની પરિસ્થિતિઓ હેઠળ  $K_p$  નું મૂલ્ય  $x \times 10^{-1}$  છે. તો  $x$  નું મૂલ્ય \_\_\_\_\_ છે. (નજીકના પૂર્ણાંકમાં રાઉન્ડ ઓફ)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

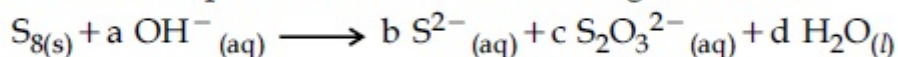
**Possible Answers :**

5 to 5.001

Question Number : 57 Question Id : 70819117550 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The reaction of sulphur in alkaline medium is given below :



The values of 'a' is \_\_\_\_\_. (Integer answer)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

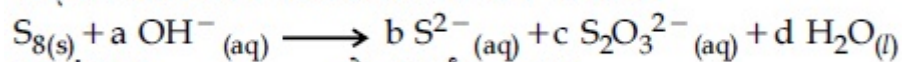
Possible Answers :

5 to 5.001

Question Number : 57 Question Id : 70819117550 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

સલ્ફરની આલ્કલાઈન માધ્યમમાં પ્રક્રિયા નીચે આપેલ છે.



'a' નું મૂલ્ય \_\_\_\_\_ છે. (પૂર્ણાંક જવાબ)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 58 Question Id : 70819117551 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Gaseous cyclobutene isomerizes to butadiene in a first order process which has a 'k' value of  $3.3 \times 10^{-4} \text{ s}^{-1}$  at  $153^\circ\text{C}$ . The time in minutes it takes for the isomerization to proceed 40% to completion at this temperature is \_\_\_\_\_. (Rounded off to the nearest integer)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 58 Question Id : 70819117551 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

પ્રથમ ક્રમ પ્રક્રમમાં વાયુમય સાયક્લો બ્યૂટીનનું બ્યૂટાડાઈનમાં સમઘટકીકરણ (isomerizes) થાય છે કે જેનું  $153^{\circ}\text{C}$  પર, 'k' મૂલ્ય  $3.3 \times 10^{-4} \text{ s}^{-1}$  છે. તો આ જ તાપમાને 40% સમઘટકીકરણ પૂર્ણ કરવા માટે લાગતો સમય મિનીટોમાં \_\_\_\_\_ છે. (નજીકના પૂર્ણાંકમાં રાઉન્ડ ઓફ કરવું)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 59 Question Id : 70819117552 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

Number of amphoteric compounds among the following is \_\_\_\_\_.

(A)  $\text{BeO}$  (B)  $\text{BaO}$  (C)  $\text{Be(OH)}_2$  (D)  $\text{Sr(OH)}_2$

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 59 Question Id : 70819117552 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

નીચે આપેલમાંથી ઉભયગુણી સંયોજનોની સંખ્યા \_\_\_\_\_ છે.

(A) BeO (B) BaO (C) Be(OH)<sub>2</sub> (D) Sr(OH)<sub>2</sub>

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

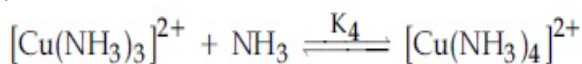
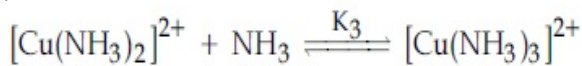
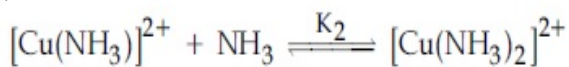
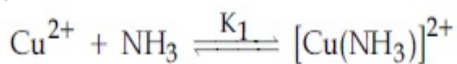
**Possible Answers :**

5 to 5.001

**Question Number : 60 Question Id : 70819117553 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

The stepwise formation of  $[\text{Cu}(\text{NH}_3)_4]^{2+}$  is given below :



The value of stability constants  $K_1$ ,  $K_2$ ,  $K_3$  and  $K_4$  are  $10^4$ ,  $1.58 \times 10^3$ ,  $5 \times 10^2$  and  $10^2$  respectively. The overall equilibrium constants for dissociation of  $[\text{Cu}(\text{NH}_3)_4]^{2+}$  is  $x \times 10^{-12}$ . The value of  $x$  is \_\_\_\_\_. (Rounded off to the nearest integer)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

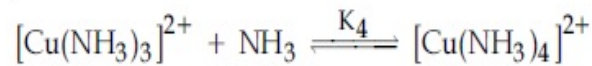
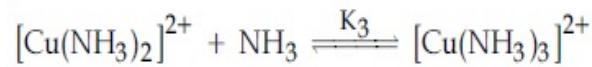
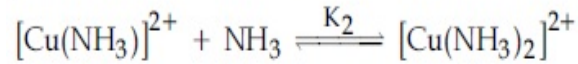
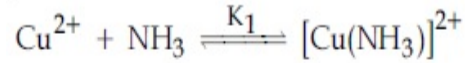
**Possible Answers :**

5 to 5.001

**Question Number : 60 Question Id : 70819117553 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

$[\text{Cu}(\text{NH}_3)_4]^{2+}$  ની તબક્કાવાર બનાવટ નીચે આપેલ છે.



$K_1, K_2, K_3$  અને  $K_4$  ના સ્થિરતા અચળાંકોનાં મૂલ્ય અનુક્રમે  $10^4, 1.58 \times 10^3, 5 \times 10^2$  અને  $10^2$  છે.  $[\text{Cu}(\text{NH}_3)_4]^{2+}$  ના વિયોજન માટે સમગ્ર (બધાજ) સંતુલન અચળાંકો  $x \times 10^{-12}$  છે. તો  $x$  નું મૂલ્ય \_\_\_\_\_ છે. (નજીકનાં પૂર્ણાંકમાં રાઉન્ડ ઓફ)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

## Mathematics Section A

**Section Id :** 708191710

**Section Number :** 5

**Section type :** Online

**Mandatory or Optional :** Mandatory

**Number of Questions :** 20

Number of Questions to be attempted : 20  
Section Marks : 80  
Mark As Answered Required? : Yes  
Sub-Section Number : 1  
Sub-Section Id : 708191990  
Question Shuffling Allowed : Yes

Question Number : 61 Question Id : 70819117554 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  be defined as  $f(x) = 2x - 1$  and  $g: \mathbb{R} - \{1\} \rightarrow \mathbb{R}$  be defined as  $g(x) = \frac{x - \frac{1}{2}}{x - 1}$ .  
Then the composition function  $f(g(x))$  is :

Options :

70819157811. one-one but not onto  
70819157812. onto but not one-one  
70819157813. neither one-one nor onto  
70819157814. both one-one and onto

Question Number : 61 Question Id : 70819117554 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

વિધેય  $f: \mathbb{R} \rightarrow \mathbb{R}$  એ  $f(x) = 2x - 1$  દ્વારા અને  $g: \mathbb{R} - \{1\} \rightarrow \mathbb{R}$  એ  $g(x) = \frac{x - \frac{1}{2}}{x - 1}$ ; દ્વારા વ્યાખ્યાયિત છે. તો  
સંયોજિત વિધેય  $f(g(x))$  એ :

Options :

70819157811. એક-એક છે પણ વ્યાસ નથી.

70819157812. વ્યાસ છે પણ એક-એક નથી.

70819157813. એક-એક પણ નથી અને વ્યાસ પણ નથી.

70819157814. એક-એક અને વ્યાસ બંને છે.

**Question Number : 62 Question Id : 70819117555 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

Let p and q be two positive numbers such that  $p + q = 2$  and  $p^4 + q^4 = 272$ . Then p and q are roots of the equation :

**Options :**

70819157815.  $x^2 - 2x + 136 = 0$

70819157816.  $x^2 - 2x + 16 = 0$

70819157817.  $x^2 - 2x + 8 = 0$

70819157818.  $x^2 - 2x + 2 = 0$

**Question Number : 62 Question Id : 70819117555 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

ધારોકે p અને q એ એવી બે ધન સંખ્યાઓ છે કે જેથી  $p + q = 2$  અને  $p^4 + q^4 = 272$  થાય. તો p અને q એ સમીકરણ \_\_\_\_\_ નાં બીજ છે.

**Options :**

70819157815.  $x^2 - 2x + 136 = 0$

70819157816.  $x^2 - 2x + 16 = 0$

70819157817.  $x^2 - 2x + 8 = 0$

70819157818.  $x^2 - 2x + 2 = 0$

**Question Number : 63 Question Id : 70819117556 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

The system of linear equations

$$3x - 2y - kz = 10$$

$$2x - 4y - 2z = 6$$

$$x + 2y - z = 5m$$

is inconsistent if :

**Options :**

70819157819.  $k \neq 3, m \neq \frac{4}{5}$

70819157820.  $k = 3, m = \frac{4}{5}$

70819157821.  $k = 3, m \neq \frac{4}{5}$

70819157822.  $k \neq 3, m \in \mathbb{R}$

**Question Number : 63 Question Id : 70819117556 Question Type : MCQ Option Shuffling : Yes**

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

સુરેખ સમીકરણ સંહિત

$$3x - 2y - kz = 10$$

$$2x - 4y - 2z = 6$$

$$x + 2y - z = 5m \text{ સુસંગત ન હોય તો :}$$

Options :

70819157819.  $k \neq 3, m \neq \frac{4}{5}$

70819157820.  $k = 3, m = \frac{4}{5}$

70819157821.  $k = 3, m \neq \frac{4}{5}$

70819157822.  $k \neq 3, m \in \mathbb{R}$

Question Number : 64 Question Id : 70819117557 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of

$$-{}^{15}C_1 + 2.{}^{15}C_2 - 3.{}^{15}C_3 + \dots - 15.{}^{15}C_{15} + {}^{14}C_1 + {}^{14}C_3 + {}^{14}C_5 + \dots + {}^{14}C_{11} \text{ is :}$$

Options :

70819157823.  $2^{16} - 1$

70819157824.  $2^{13} - 14$

70819157825.  $2^{13} - 13$

70819157826.  $2^{14}$

Question Number : 64 Question Id : 70819117557 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$-{}^{15}C_1 + 2.{}^{15}C_2 - 3.{}^{15}C_3 + \dots - 15.{}^{15}C_{15} + {}^{14}C_1 + {}^{14}C_3 + {}^{14}C_5 + \dots + {}^{14}C_{11}$  નું મૂલ્ય \_\_\_\_\_ છે.

Options :

70819157823.  $2^{16} - 1$

70819157824.  $2^{13} - 14$

70819157825.  $2^{13} - 13$

70819157826.  $2^{14}$

Question Number : 65 Question Id : 70819117558 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If  $e^{(\cos^2 x + \cos^4 x + \cos^6 x + \dots) \log_e 2}$  satisfies the equation  $t^2 - 9t + 8 = 0$ , then the value of

$\frac{2 \sin x}{\sin x + \sqrt{3} \cos x} \left( 0 < x < \frac{\pi}{2} \right)$  is:

Options :

70819157827.  $\frac{1}{2}$

70819157828.  $\sqrt{3}$

70819157829.  $\frac{3}{2}$

70819157830.  $2\sqrt{3}$

Question Number : 65 Question Id : 70819117558 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

જો  $e^{(\cos^2 x + \cos^4 x + \cos^6 x + \dots \infty) \log_e 2}$  એ સમીકરણ  $t^2 - 9t + 8 = 0$  નું સમાધાન કરે, તો

$\frac{2 \sin x}{\sin x + \sqrt{3} \cos x} \left( 0 < x < \frac{\pi}{2} \right)$  નું મૂલ્ય \_\_\_\_\_ થાય.

Options :

70819157827.  $\frac{1}{2}$

70819157828.  $\sqrt{3}$

70819157829.  $\frac{3}{2}$

70819157830.  $2\sqrt{3}$

Question Number : 66 Question Id : 70819117559 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$\lim_{x \rightarrow 0} \frac{\int_0^{x^2} (\sin \sqrt{t}) dt}{x^3}$  is equal to :

Options :

70819157831.  $\frac{2}{3}$

70819157832.  $\frac{3}{2}$

70819157833.  $\frac{1}{15}$

70819157834.  $0$

**Question Number : 66 Question Id : 70819117559 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

$$\lim_{x \rightarrow 0} \frac{\int_0^{x^2} (\sin \sqrt{t}) dt}{x^3} = \underline{\hspace{2cm}}.$$

**Options :**

70819157831.  $\frac{2}{3}$

70819157832.  $\frac{3}{2}$

70819157833.  $\frac{1}{15}$

70819157834.  $0$

**Question Number : 67 Question Id : 70819117560 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

The function  $f(x) = \frac{4x^3 - 3x^2}{6} - 2 \sin x + (2x - 1) \cos x$  :

**Options :**

70819157835. increases in  $\left[\frac{1}{2}, \infty\right)$

70819157836. decreases in  $\left[\frac{1}{2}, \infty\right)$

70819157837. increases in  $\left(-\infty, \frac{1}{2}\right]$

70819157838. decreases in  $\left(-\infty, \frac{1}{2}\right]$

**Question Number : 67 Question Id : 70819117560 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

વિધેય  $f(x) = \frac{4x^3 - 3x^2}{6} - 2 \sin x + (2x - 1) \cos x$  એ :

**Options :**

70819157835.  $\left[\frac{1}{2}, \infty\right)$  માં વધતું છે.

70819157836.  $\left[\frac{1}{2}, \infty\right)$  માં ઘટતું છે.

70819157837.  $\left(-\infty, \frac{1}{2}\right]$  માં વધતું છે.

70819157838.  $\left(-\infty, \frac{1}{2}\right]$  માં ઘટતું છે.

Question Number : 68 Question Id : 70819117561 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A scientific committee is to be formed from 6 Indians and 8 foreigners, which includes at least 2 Indians and double the number of foreigners as Indians. Then the number of ways, the committee can be formed, is :

Options :

70819157839. 1050

70819157840. 1625

70819157841. 560

70819157842. 575

Question Number : 68 Question Id : 70819117561 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

6 ભારતીય અને 8 વિદેશીમાંથી એક એવી વૈજ્ઞાનિક સમિતિ રચવામાં આવે છે, કે જેમાં ઓછામાં ઓછા 2 ભારતીય અને ભારતીય કરતાં બમણી સંખ્યાના વિદેશીઓનો સમાવેશ થાય છે. તો આવી સમિતિ રચવાની રીતોની સંખ્યા \_\_\_\_\_ છે.

Options :

70819157839. 1050

70819157840. 1625

70819157841. 560

70819157842. 575

Question Number : 69 Question Id : 70819117562 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If  $f: \mathbb{R} \rightarrow \mathbb{R}$  is a function defined by  $f(x) = [x-1] \cos\left(\frac{2x-1}{2}\right)\pi$ , where  $[ \cdot ]$  denotes the greatest integer function, then  $f$  is :

Options :

70819157843. discontinuous only at  $x=1$

70819157844. discontinuous at all integral values of  $x$  except at  $x=1$

70819157845. continuous only at  $x=1$

70819157846. continuous for every real  $x$

Question Number : 69 Question Id : 70819117562 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

જો વિધેય  $f: \mathbb{R} \rightarrow \mathbb{R}$  એ  $f(x) = [x-1] \cos\left(\frac{2x-1}{2}\right)\pi$  વડે વ્યાખ્યાયિત છે, જ્યાં  $[ \cdot ]$  પૂર્ણાંક ભાગ વિધેય (greatest integer function) દર્શાવે છે, તો  $f$  એ :

Options :

70819157843. માત્ર  $x=1$  આગળ અસતત છે.

70819157844.  $x=1$  સિવાયની  $x$  ની બાકીની બધીજ પૂર્ણાંક કિંમતો આગળ અસતત છે.

70819157845. માત્ર  $x=1$  આગળ સતત છે.

70819157846. બધાજ વાસ્તવિક  $x$  માટે સતત છે.

Question Number : 70 Question Id : 70819117563 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If  $\int \frac{\cos x - \sin x}{\sqrt{8 - \sin 2x}} dx = a \sin^{-1} \left( \frac{\sin x + \cos x}{b} \right) + c$ , where  $c$  is a constant of integration, then

the ordered pair  $(a, b)$  is equal to :

Options :

70819157847.  $(3, 1)$

70819157848.  $(1, 3)$

70819157849.  $(-1, 3)$

70819157850.  $(1, -3)$

Question Number : 70 Question Id : 70819117563 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

જો  $\int \frac{\cos x - \sin x}{\sqrt{8 - \sin 2x}} dx = a \sin^{-1} \left( \frac{\sin x + \cos x}{b} \right) + c$  જ્યાં  $c$  સંકલનનો અચળાંક છે, તો ક્રમયુક્ત જોડ

$(a, b) =$  \_\_\_\_\_.

Options :

70819157847.  $(3, 1)$

70819157848.  $(1, 3)$

70819157849.  $(-1, 3)$

70819157850.  $(1, -3)$

Question Number : 71 Question Id : 70819117564 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The area (in sq. units) of the part of the circle  $x^2 + y^2 = 36$ , which is outside the parabola  $y^2 = 9x$ , is :

Options :

70819157851.  $24\pi + 3\sqrt{3}$

70819157852.  $24\pi - 3\sqrt{3}$

70819157853.  $12\pi + 3\sqrt{3}$

70819157854.  $12\pi - 3\sqrt{3}$

Question Number : 71 Question Id : 70819117564 Question Type : MCQ Option Shuffling : Yes  
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

પરવલય  $y^2 = 9x$  ની બહારનાં ભાગમાં આવેલા, વર્તુળ  $x^2 + y^2 = 36$  નાં પ્રદેશનું ક્ષેત્રફળ (ચો. એકમમાં) \_\_\_\_\_ થાય.

Options :

70819157851.  $24\pi + 3\sqrt{3}$

70819157852.  $24\pi - 3\sqrt{3}$

70819157853.  $12\pi + 3\sqrt{3}$

70819157854.  $12\pi - 3\sqrt{3}$

Question Number : 72 Question Id : 70819117565 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The population  $P = P(t)$  at time 't' of a certain species follows the differential equation

$$\frac{dP}{dt} = 0.5P - 450. \text{ If } P(0) = 850, \text{ then the time at which population becomes zero is :}$$

Options :

70819157855.  $\log_e 9$

70819157856.  $\frac{1}{2} \log_e 18$

70819157857.  $\log_e 18$

70819157858.  $2 \log_e 18$

Question Number : 72 Question Id : 70819117565 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

કોઈ સમય 't' એ કોઈ ચોક્કસ જીવની વસ્તી  $P = P(t)$  એ વિકલ સમીકરણ  $\frac{dP}{dt} = 0.5P - 450$  ને અનુસરે છે. જો

$P(0) = 850$  હોય, તો વસ્તી શૂન્ય થાય તે સમય \_\_\_\_\_ થશે.

Options :

70819157855.  $\log_e 9$

70819157856.  $\frac{1}{2} \log_e 18$

70819157857.  $\log_e 18$

70819157858.  $2\log_e 18$

**Question Number : 73 Question Id : 70819117566 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

A man is walking on a straight line. The arithmetic mean of the reciprocals of the intercepts of this line on the coordinate axes is  $\frac{1}{4}$ . Three stones A, B and C are placed at the points (1, 1), (2, 2) and (4, 4) respectively. Then which of these stones is/are on the path of the man ?

**Options :**

70819157859. A only

70819157860. B only

70819157861. C only

70819157862. All the three

**Question Number : 73 Question Id : 70819117566 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

એક માણસ સીધી રેખા પર ચાલે છે. આ રેખાનાં યામાક્ષો પરના અંતઃખંડનાં વ્યસ્તનો સમાંતર મધ્યક  $\frac{1}{4}$  છે. બિંદુઓ (1, 1), (2, 2) અને (4, 4) આગળ અનુક્રમે ત્રણ પથ્થરો A, B અને C રાખવામાં આવેલ છે. તો આ પથ્થરો પૈકી નો કયો/ના કયા માણસનાં રસ્તા પર છે ?

**Options :**

70819157859. માત્ર A

70819157860. માત્ર B

70819157861. માત્ર C

70819157862. આ ત્રણેય

**Question Number : 74 Question Id : 70819117567 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

The locus of the mid-point of the line segment joining the focus of the parabola  $y^2 = 4ax$  to a moving point of the parabola, is another parabola whose directrix is :

**Options :**

70819157863.  $x = a$

70819157864.  $x = -\frac{a}{2}$

70819157865.  $x = 0$

70819157866.  $x = \frac{a}{2}$

**Question Number : 74 Question Id : 70819117567 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

પરવલય  $y^2 = 4ax$  નાં નાભિ અને પરવલય પરના ચલિત બિંદુથી બનતા રેખાખંડનાં મધ્યબિંદુનો બિંદુપથ એક બીજો પરવલય છે, જેની નિયામિકા \_\_\_\_\_ છે.

**Options :**

70819157863.  $x = a$

70819157864.  $x = -\frac{a}{2}$

70819157865.  $x = 0$

70819157866.  $x = \frac{a}{2}$

**Question Number : 75 Question Id : 70819117568 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

If the tangent to the curve  $y = x^3$  at the point  $P(t, t^3)$  meets the curve again at  $Q$ , then the ordinate of the point which divides  $PQ$  internally in the ratio  $1 : 2$  is :

**Options :**

70819157867.  $0$

70819157868.  $2t^3$

70819157869.  $-t^3$

70819157870.  $-2t^3$

**Question Number : 75 Question Id : 70819117568 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

જો વક્ર  $y = x^3$  નાં બિંદુ  $P(t, t^3)$  આગળનો સ્પર્શક વક્રને ફરીથી  $Q$  બિંદુએ મળે, તો  $PQ$  નુ  $1 : 2$  ગુણોત્તરમાં અંતઃવિભાજન કરતાં બિંદુનો  $y$ -ચામ \_\_\_\_\_ છે.

**Options :**

70819157867.  $0$

70819157868.  $2t^3$

70819157869.  $-t^3$

70819157870.  $-2t^3$

**Question Number : 76 Question Id : 70819117569 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

The equation of the plane passing through the point  $(1, 2, -3)$  and perpendicular to the planes  $3x + y - 2z = 5$  and  $2x - 5y - z = 7$ , is :

**Options :**

70819157871.  $6x - 5y + 2z + 10 = 0$

70819157872.  $11x + y + 17z + 38 = 0$

70819157873.  $6x - 5y - 2z - 2 = 0$

70819157874.  $3x - 10y - 2z + 11 = 0$

**Question Number : 76 Question Id : 70819117569 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

બિંદુ  $(1, 2, -3)$  માંથી પસાર થતાં અને સમતલો  $3x + y - 2z = 5$  તથા  $2x - 5y - z = 7$  ને લંબ સમતલનું સમીકરણ \_\_\_\_\_ છે.

**Options :**

70819157871.  $6x - 5y + 2z + 10 = 0$

70819157872.  $11x + y + 17z + 38 = 0$

70819157873.  $6x - 5y - 2z - 2 = 0$

70819157874.  $3x - 10y - 2z + 11 = 0$

**Question Number : 77 Question Id : 70819117570 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

The distance of the point (1, 1, 9) from the point of intersection of the line

$\frac{x-3}{1} = \frac{y-4}{2} = \frac{z-5}{2}$  and the plane  $x+y+z=17$  is :

**Options :**

70819157875.  $2\sqrt{19}$

70819157876.  $19\sqrt{2}$

70819157877.  $\sqrt{38}$

70819157878. 38

**Question Number : 77 Question Id : 70819117570 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

બિંદુ (1, 1, 9) નું રેખા  $\frac{x-3}{1} = \frac{y-4}{2} = \frac{z-5}{2}$  અને સમતલ  $x+y+z=17$  નાં છેદબિંદુ થી અંતર \_\_\_\_\_ છે.

**Options :**

70819157875.  $2\sqrt{19}$

70819157876.  $19\sqrt{2}$

70819157877.  $\sqrt{38}$

70819157878. 38

**Question Number : 78 Question Id : 70819117571 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

An ordinary dice is rolled for a certain number of times. If the probability of getting an odd number 2 times is equal to the probability of getting an even number 3 times, then the probability of getting an odd number for odd number of times is :

**Options :**

70819157879.  $\frac{1}{32}$

70819157880.  $\frac{3}{16}$

70819157881.  $\frac{5}{16}$

70819157882.  $\frac{1}{2}$

**Question Number : 78 Question Id : 70819117571 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

એક સામાન્ય પાસો ચોક્કસ વખત ફેંકવામાં આવે છે. જો અયુગ્મ સંખ્યા 2 વખત મળવાની સંભાવના એ યુગ્મ સંખ્યા 3 વખત મળવાની સંભાવના જેટલી હોય, તો અયુગ્મ સંખ્યા અયુગ્મ વખત મળે તેની સંભાવના \_\_\_\_\_ થાય.

**Options :**

70819157879.  $\frac{1}{32}$

70819157880.  $\frac{3}{16}$

70819157881.  $\frac{5}{16}$

70819157882.  $\frac{1}{2}$

**Question Number : 79 Question Id : 70819117572 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

Two vertical poles are 150 m apart and the height of one is three times that of the other. If from the middle point of the line joining their feet, an observer finds the angles of elevation of their tops to be complementary, then the height of the shorter pole (in meters) is :

**Options :**

70819157883. 25

70819157884. 30

70819157885.  $20\sqrt{3}$

70819157886.  $25\sqrt{3}$

**Question Number : 79 Question Id : 70819117572 Question Type : MCQ Option Shuffling : Yes**  
**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

બે શિરોલંબ સ્તંભ એક બીજાથી 150 મીટર અંતરે આવેલ છે અને એકની ઊંચાઈ બીજા કરતાં ત્રણ ગણી છે. જો તેમના તળીયાને જોડતા રેખાખંડના મધ્યબિંદુથી તેમની ટોચના ઉત્સેધકોણ કોટીકોણ હોય, તો નાના સ્તંભની ઊંચાઈ (મીટરમાં) \_\_\_\_\_ થાય.

**Options :**

70819157883.  $25$

70819157884.  $30$

70819157885.  $20\sqrt{3}$

70819157886.  $25\sqrt{3}$

**Question Number : 80 Question Id : 70819117573 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

The statement among the following that is a tautology is :

**Options :**

70819157887.  $A \wedge (A \vee B)$

70819157888.  $A \vee (A \wedge B)$

70819157889.  $[A \wedge (A \rightarrow B)] \rightarrow B$

70819157890.  $B \rightarrow [A \wedge (A \rightarrow B)]$

**Question Number : 80 Question Id : 70819117573 Question Type : MCQ Option Shuffling : Yes**

**Is Question Mandatory : No**

**Correct Marks : 4 Wrong Marks : 1**

નીચેનાં પૈકી કયું વિધાન નિત્યસત્ય છે ?

**Options :**

70819157887.  $A \wedge (A \vee B)$

70819157888.  $A \vee (A \wedge B)$

70819157889.  $[A \wedge (A \rightarrow B)] \rightarrow B$

70819157890.  $B \rightarrow [A \wedge (A \rightarrow B)]$

## Mathematics Section B

|                                       |           |
|---------------------------------------|-----------|
| Section Id :                          | 708191711 |
| Section Number :                      | 6         |
| Section type :                        | Online    |
| Mandatory or Optional :               | Mandatory |
| Number of Questions :                 | 10        |
| Number of Questions to be attempted : | 5         |
| Section Marks :                       | 20        |
| Mark As Answered Required? :          | Yes       |
| Sub-Section Number :                  | 1         |
| Sub-Section Id :                      | 708191991 |
| Question Shuffling Allowed :          | Yes       |

Question Number : 81 Question Id : 70819117574 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If the least and the largest real values of  $\alpha$ , for which the equation  $z + \alpha|z - 1| + 2i = 0$  ( $z \in \mathbb{C}$  and  $i = \sqrt{-1}$ ) has a solution, are  $p$  and  $q$  respectively; then  $4(p^2 + q^2)$  is equal to \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 81 Question Id : 70819117574 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

જો સમીકરણ  $z + \alpha|z-1| + 2i = 0$  ( $z \in \mathbb{C}$  અને  $i = \sqrt{-1}$ ) ને ઉકેલ હોય તેવી  $\alpha$  ની નાનામાં નાની અને મોટામાં મોટી વાસ્તવિક કિંમતો અનુક્રમે  $p$  અને  $q$  હોય, તો  $4(p^2 + q^2) = \underline{\hspace{2cm}}$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 82 Question Id : 70819117575 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

Let  $B_i$  ( $i=1, 2, 3$ ) be three independent events in a sample space. The probability that only  $B_1$  occur is  $\alpha$ , only  $B_2$  occurs is  $\beta$  and only  $B_3$  occurs is  $\gamma$ . Let  $p$  be the probability that none of the events  $B_i$  occurs and these 4 probabilities satisfy the equations  $(\alpha - 2\beta) p = \alpha\beta$  and  $(\beta - 3\gamma) p = 2\beta\gamma$  (All the probabilities are assumed to lie in the interval  $(0, 1)$ ). Then  $\frac{P(B_1)}{P(B_3)}$  is equal to  $\underline{\hspace{2cm}}$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 82 Question Id : 70819117575 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

ધારોકે  $B_i$  ( $i = 1, 2, 3$ ) એ એકજ નિદર્શાવકાશની ત્રણ નિરપેક્ષ ઘટનાઓ છે. માત્ર  $B_1$  ઉદ્ભવે તેની સંભાવના  $\alpha$ , માત્ર  $B_2$  ઉદ્ભવે તેની સંભાવના  $\beta$  અને માત્ર  $B_3$  ઉદ્ભવે તેની સંભાવના  $\gamma$  છે.  $B_i$  પૈકીની એકપણ ઘટના ન ઉદ્ભવે તેની સંભાવના  $p$  છે અને આ 4 સંભાવનાઓ, સમીકરણો  $(\alpha - 2\beta)p = \alpha\beta$  તથા  $(\beta - 3\gamma)p = 2\beta\gamma$  નું સમાધાન કરે છે.  
(આ બધીજ સંભાવનાઓ અંતરાલ  $(0, 1)$  માં આવેલ છે તેમ સ્વિકારેલ છે.)

તો  $\frac{P(B_1)}{P(B_3)} = \underline{\hspace{2cm}}$ .

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

5 to 5.001

**Question Number : 83 Question Id : 70819117576 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

Let  $P = \begin{bmatrix} 3 & -1 & -2 \\ 2 & 0 & \alpha \\ 3 & -5 & 0 \end{bmatrix}$ , where  $\alpha \in \mathbb{R}$ . Suppose  $Q = [q_{ij}]$  is a matrix satisfying  $PQ = kI_3$  for

some non-zero  $k \in \mathbb{R}$ . If  $q_{23} = -\frac{k}{8}$  and  $|Q| = \frac{k^2}{2}$ , then  $\alpha^2 + k^2$  is equal to \_\_\_\_\_.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

5 to 5.001

Question Number : 83 Question Id : 70819117576 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ધારોકે  $P = \begin{bmatrix} 3 & -1 & -2 \\ 2 & 0 & \alpha \\ 3 & -5 & 0 \end{bmatrix}$  જ્યાં  $\alpha \in \mathbb{R}$ .

ધારોકે શ્રેણિક  $Q = [q_{ij}]$  એ કોઈક શૂન્યેતર  $k \in \mathbb{R}$  માટે  $PQ = kI_3$  નું, સમાધાન કરે છે. તો  $q_{23} = -\frac{k}{8}$  અને  $|Q| = \frac{k^2}{2}$  હોય, તો  $\alpha^2 + k^2 = \underline{\hspace{2cm}}$ .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

Question Number : 84 Question Id : 70819117577 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let  $M$  be any  $3 \times 3$  matrix with entries from the set  $\{0, 1, 2\}$ . The maximum number of such matrices, for which the sum of diagonal elements of  $M^T M$  is seven, is           .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

5 to 5.001

**Question Number : 84 Question Id : 70819117577 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

ધારોકે  $M$  એ ગણ  $\{0, 1, 2\}$  ના ઘટકોથી બનતો કોઈ  $3 \times 3$  શ્રેણિક છે, જેના માટે  $M^T M$  નાં વિકર્ણના ઘટકોનો સરવાળો સાત હોય, તેવા શ્રેણિકોની મહત્તમ સંખ્યા \_\_\_\_\_ છે.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

5 to 5.001

**Question Number : 85 Question Id : 70819117578 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

Let  $A = \{n \in \mathbb{N} : n \text{ is a 3-digit number}\}$

$B = \{9k + 2 : k \in \mathbb{N}\}$

and  $C = \{9k + l : k \in \mathbb{N}\}$  for some  $l$  ( $0 < l < 9$ )

If the sum of all the elements of the set  $A \cap (B \cup C)$  is  $274 \times 400$ , then  $l$  is equal to \_\_\_\_\_.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

5 to 5.001

**Question Number : 85 Question Id : 70819117578 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

ધારોકે  $A = \{n \in \mathbb{N} : n \text{ એ ત્રણ અંકોની સંખ્યા છે}\}$

$$B = \{9k + 2 : k \in \mathbb{N}\}$$

અને  $C = \{9k + l : k \in \mathbb{N}\}$  કોઈક  $l$  ( $0 < l < 9$ ) માટે.

જો ગણ  $A \cap (B \cup C)$  નાં બધાજ ઘટકોનો સરવાળો  $274 \times 400$  હોય, તો  $l =$  \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number :** 86 **Question Id :** 70819117579 **Question Type :** SA

**Correct Marks :** 4 **Wrong Marks :** 0

The minimum value of  $\alpha$  for which the equation  $\frac{4}{\sin x} + \frac{1}{1 - \sin x} = \alpha$  has at least one solution in  $\left(0, \frac{\pi}{2}\right)$  is \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number :** 86 **Question Id :** 70819117579 **Question Type :** SA

**Correct Marks :** 4 **Wrong Marks :** 0

સમીકરણ  $\frac{4}{\sin x} + \frac{1}{1 - \sin x} = \alpha$  ને  $\left(0, \frac{\pi}{2}\right)$  માં ઓછામાં ઓછો એક ઉકેલ હોય, તેવી  $\alpha$  ની ન્યૂનતમ કિંમત \_\_\_\_\_ છે.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 87 Question Id : 70819117580 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

If  $\int_{-a}^a (|x| + |x - 2|) dx = 22$ , ( $a > 2$ ) and  $[x]$  denotes the greatest integer  $\leq x$ ,  
then  $\int_a^{-a} (x + [x]) dx$  is equal to \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 87 Question Id : 70819117580 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

જો  $\int_{-a}^a (|x| + |x - 2|) dx = 22$ , ( $a > 2$ ) અને  $[x]$  એ, મહત્તમ પૂર્ણાંક  $\leq x$  દર્શાવે, તો  $\int_a^{-a} (x + [x]) dx$   
= \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 88 Question Id : 70819117581 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

If one of the diameters of the circle  $x^2 + y^2 - 2x - 6y + 6 = 0$  is a chord of another circle 'C', whose center is at (2, 1), then its radius is \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 88 Question Id : 70819117581 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

જો વર્તુળ  $x^2 + y^2 - 2x - 6y + 6 = 0$  નો કોઈ એક વ્યાસ એ કેન્દ્ર (2, 1) વાળા બીજા એક વર્તુળ 'C' ની જવા હોય, તો તે વર્તુળની ત્રિજ્યા \_\_\_\_\_ થાય.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 89 Question Id : 70819117582 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

Let three vectors  $\vec{a}$ ,  $\vec{b}$  and  $\vec{c}$  be such that  $\vec{c}$  is coplanar with  $\vec{a}$  and  $\vec{b}$ ,  $\vec{a} \cdot \vec{c} = 7$  and  $\vec{b}$  is perpendicular to  $\vec{c}$ , where  $\vec{a} = -\hat{i} + \hat{j} + \hat{k}$  and  $\vec{b} = 2\hat{i} + \hat{k}$ , then the value of  $2|\vec{a} + \vec{b} + \vec{c}|^2$  is \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 89 Question Id : 70819117582 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

ધારોકે  $\vec{a}$ ,  $\vec{b}$  અને  $\vec{c}$  એ ત્રણ એવા સદિશો છે કે જેથી  $\vec{c}$  એ  $\vec{a}$  અને  $\vec{b}$  સાથે સમતલીય છે,  $\vec{a} \cdot \vec{c} = 7$  અને  $\vec{b}$  એ  $\vec{c}$  ને લંબ છે, જ્યાં  $\vec{a} = -\hat{i} + \hat{j} + \hat{k}$  અને  $\vec{b} = 2\hat{i} + \hat{k}$ , તો  $2|\vec{a} + \vec{b} + \vec{c}|^2$  નું મૂલ્ય \_\_\_\_\_ થાય.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number : 90 Question Id : 70819117583 Question Type : SA**

**Correct Marks : 4 Wrong Marks : 0**

$$\lim_{n \rightarrow \infty} \tan \left\{ \sum_{r=1}^n \tan^{-1} \left( \frac{1}{1 + r + r^2} \right) \right\} \text{ is equal to } \underline{\hspace{2cm}}.$$

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001

**Question Number :** 90 **Question Id :** 70819117583 **Question Type :** SA

**Correct Marks :** 4 **Wrong Marks :** 0

$$\lim_{n \rightarrow \infty} \tan \left\{ \sum_{r=1}^n \tan^{-1} \left( \frac{1}{1 + r + r^2} \right) \right\} = \underline{\hspace{2cm}}.$$

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

5 to 5.001