

# National Testing Agency

**Question Paper Name :** B TECH EG 16th March 2021 Shift 2  
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## B TECH EG

**Group Number :** 1  
**Group Id :** 86435116  
**Group Maximum Duration :** 0  
**Group Minimum Duration :** 180  
**Show Attended Group? :** No  
**Edit Attended Group? :** No  
**Break time :** 0  
**Group Marks :** 300  
**Is this Group for Examiner? :** No

## Physics Section A

**Section Id :** 86435191  
**Section Number :** 1  
**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 :** 86435191  
**Question Shuffling Allowed :** Yes

**Question Number : 1 Question Id : 8643511351 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Two identical antennas mounted on identical towers are separated from each other by a distance of 45 km. What should nearly be the minimum height of receiving antenna to receive the signals in line of sight ?

(Assume radius of earth is 6400 km)

Options :

8643514051. 79.1 m

8643514052. 39.55 m

8643514053. 158.2 m

8643514054. 19.77 m

Question Number : 1 Question Id : 8643511351 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

એક સમાન ટોવર ઉપર બે એકસમાન એન્ટીનાઓ રાખવામાં આવેલા છે. તેમની વચ્ચે 45 km જેટલું અંતર છે. ગ્રાહ્ય (receiving) એન્ટીનાની ઓછામાં ઓછી કેટલી ઊંચાઈ હશે કે જેથી તે line of sight (દષ્ટિરેખા) પર સિગ્નલને ગ્રહણ કરી શકે ?

(પૃથ્વીની ત્રિજ્યા 6400 km ધારો)

Options :

8643514051. 79.1 m

8643514052. 39.55 m

8643514053. 158.2 m

8643514054. 19.77 m

Question Number : 2 Question Id : 8643511352 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The de-Broglie wavelength associated with an electron and a proton were calculated by accelerating them through same potential of 100 V. What should nearly be the ratio of their wavelengths ? ( $m_p = 1.00727u$   $m_e = 0.00055u$ )

Options :

8643514055. 43 : 1

8643514056. 1860 : 1

8643514057. 41.4 : 1

8643514058.  $(1860)^2 : 1$

Question Number : 2 Question Id : 8643511352 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

100 V નાં સમાન સ્થિતિમાનથી ઈલેક્ટ્રોન અને પ્રોટોનને પ્રવેગિત કરી તેમને સંકળાયેલ ડી-બ્રોગલી તરંગલંબાઈને અલગ ગણવામાં આવે છે. તેમની તરંગલંબાઈનો ગુણોત્તર કેટલો હશે ? ( $m_p = 1.00727u$   $m_e = 0.00055u$ )

Options :

8643514055. 43 : 1

8643514056. 1860 : 1

8643514057. 41.4 : 1

8643514058.  $(1860)^2 : 1$

Question Number : 3 Question Id : 8643511353 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The refractive index of a converging lens is 1.4. What will be the focal length of this lens if it is placed in a medium of same refractive index ? Assume the radii of curvature of the faces of lens are  $R_1$  and  $R_2$  respectively.

Options :

8643514059. Zero

8643514060. 1

8643514061. Infinite

$$\frac{R_1 R_2}{R_1 - R_2}$$

8643514062.

**Question Number : 3 Question Id : 8643511353 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

બહિર્ગોળ લેન્સનો વક્રિભવનાંક 1.4 છે. જો લેન્સને આટલોજ વક્રિભવનાંક ધરાવતાં માધ્યમમાં મૂકવામાં આવે તો તેની કેન્દ્રલંબાઈ કેટલી થશે ? લેન્સની વક્રબાજુઓની વક્રતા ત્રિજ્યા અનુક્રમે  $R_1$  અને  $R_2$  છે તેમ ધારો :

**Options :**

8643514059. શૂન્ય

8643514060. 1

8643514061. અનંત

$$\frac{R_1 R_2}{R_1 - R_2}$$

8643514062.

**Question Number : 4 Question Id : 8643511354 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Red light differs from blue light as they have :

**Options :**

8643514063. Same frequencies and same wavelengths

8643514064. Different frequencies and different wavelengths

8643514065. Same frequencies and different wavelengths

8643514066. Different frequencies and same wavelengths

**Question Number : 4 Question Id : 8643511354 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

રાતો પ્રકાશ, વાદળી પ્રકાશ કરતાં જુદો પડે છે કારણ કે તેઓને \_\_\_\_\_.

**Options :**

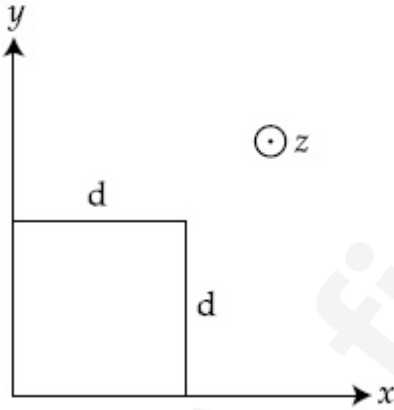
8643514063. સમાન આવૃત્તિઓ અને સમાન તરંગલંબાઈઓ હોય છે.
8643514064. જુદી-જુદી આવૃત્તિઓ અને જુદી-જુદી તરંગલંબાઈઓ હોય છે.
8643514065. સમાન આવૃત્તિઓ અને જુદી-જુદી તરંગલંબાઈઓ હોય છે.
8643514066. જુદી-જુદી આવૃત્તિઓ અને સમાન તરંગલંબાઈઓ હોય છે.

**Question Number : 5 Question Id : 8643511355 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

The magnetic field in a region is given by  $\vec{B} = B_0 \left(\frac{x}{a}\right) \hat{k}$ . A square loop of side  $d$  is placed with its edges along the  $x$  and  $y$  axes. The loop is moved with a constant velocity  $\vec{v} = v_0 \hat{i}$ .

The emf induced in the loop is :



**Options :**

8643514067.  $\frac{B_0 v_0 d}{2a}$
8643514068.  $\frac{B_0 v_0 d^2}{a}$
8643514069.  $\frac{B_0 v_0^2 d}{2a}$

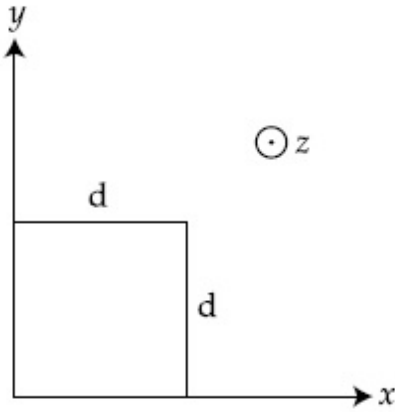
$$\frac{B_0 v_0 d^2}{2a}$$

8643514070.

**Question Number : 5 Question Id : 8643511355 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

એક વિસ્તારમાં ચુંબકીય ક્ષેત્ર  $\vec{B} = B_0 \left(\frac{x}{a}\right) \hat{k}$  વડે અપાય છે.  $d$  બાજુ ધરાવતાં એક ચોરસ ગાળાને તેની બાજુઓ  $x$  અને  $y$  અક્ષ પર રહે તેમ મૂકવામાં આવે છે. ગાળાને અચળ વેગ  $\vec{v} = v_0 \hat{i}$  થી ગતિ કરાવવામાં આવે છે. ગાળામાં પ્રેરિત emf \_\_\_\_\_ હશે.



**Options :**

$$\frac{B_0 v_0 d}{2a}$$

8643514067.

$$\frac{B_0 v_0 d^2}{a}$$

8643514068.

$$\frac{B_0 v_0^2 d}{2a}$$

8643514069.

$$\frac{B_0 v_0 d^2}{2a}$$

8643514070.

**Question Number : 6 Question Id : 8643511356 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Amplitude of a mass-spring system, which is executing simple harmonic motion decreases with time. If mass = 500g, Decay constant = 20 g/s then how much time is required for the amplitude of the system to drop to half of its initial value ?

( $\ln 2 = 0.693$ )

**Options :**

8643514071. 34.65 s

8643514072. 15.01 s

8643514073. 0.034 s

8643514074. 17.32 s

**Question Number : 6 Question Id : 8643511356 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

દળ-સ્પ્રિંગ તંત્રનો કંપવિસ્તાર, કે જે સરળ આવર્ત ગતિ કરે છે, તે સમય સાથે ઘટે છે. જો દળ = 500 ગ્રામ, અવમંદન અચળાંક = 20 ગ્રામ/સેકન્ડ હોય તો તેના પ્રારંભિક મૂલ્ય કરતાં અડધો કંપવિસ્તાર થવા માટે કેટલો સમય લાગશે ?

( $\ln 2 = 0.693$  લો)

**Options :**

8643514071. 34.65 s

8643514072. 15.01 s

8643514073. 0.034 s

8643514074. 17.32 s

**Question Number : 7 Question Id : 8643511357 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Calculate the value of mean free path ( $\lambda$ ) for oxygen molecules at temperature 27°C and pressure  $1.01 \times 10^5$  Pa. Assume the molecular diameter 0.3 nm and the gas is ideal. ( $k = 1.38 \times 10^{-23}$  JK<sup>-1</sup>)

Options :

8643514075. 32 nm

8643514076. 58 nm

8643514077. 86 nm

8643514078. 102 nm

Question Number : 7 Question Id : 8643511357 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

27°C તાપમાને અને  $1.01 \times 10^5$  Pa દબાણે રહેલા ઓક્સિજન અણુ માટે સરેરાશ મુક્ત પથ ( $\lambda$ ) ગણો. આણ્વીય વ્યાસ 0.3 nm અને વાયુ આદર્શ છે તેમ ધારો. ( $k = 1.38 \times 10^{-23}$  JK<sup>-1</sup>)

Options :

8643514075. 32 nm

8643514076. 58 nm

8643514077. 86 nm

8643514078. 102 nm

Question Number : 8 Question Id : 8643511358 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

What will be the nature of flow of water from a circular tap, when its flow rate increased from 0.18 L/min to 0.48 L/min ? The radius of the tap and viscosity of water are 0.5 cm and  $10^{-3}$  Pa s, respectively.

(Density of water :  $10^3$  kg/m<sup>3</sup>)

Options :

8643514079. Steady flow to unsteady flow

8643514080. Unsteady to steady flow

8643514081. Remains steady flow

8643514082. Remains turbulent flow

Question Number : 8 Question Id : 8643511358 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

જ્યારે તેનો વહન દર 0.18 લી/મિનીટ થી વધારીને 0.48 લી/મિનીટ કરવામાં આવે ત્યારે વર્તુળાકાર નળમાંથી વહેતા પાણીના દહનનો પ્રકાર કયો હશે ? ત્રિજ્યા અને પાણીની સ્નિગ્ધતા અનુક્રમે 0.5 cm અને  $10^{-3}$  Pa s છે.

(પાણીની ઘનતા :  $10^3$  kg/m<sup>3</sup>)

Options :

8643514079. સ્થાયી વહન થી અસ્થાયી વહન

8643514080. અસ્થાયી વહન થી સ્થાયી વહન

8643514081. સ્થાયી વહન જ રહે છે

8643514082. ટર્બ્યુલન્ટ (turbulent) વહન જ રહે છે

Question Number : 9 Question Id : 8643511359 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A charge Q is moving  $d\vec{l}$  distance in the magnetic field  $\vec{B}$ . Find the value of work done by  $\vec{B}$ .

Options :

8643514083. 1

8643514084. Zero

8643514085. Infinite

8643514086. -1

Question Number : 9 Question Id : 8643511359 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

એક વિદ્યુતભાર  $Q$  એ ચુંબકીય ક્ષેત્ર  $\vec{B}$  માં  $\vec{v}$  જેટલું અંતર કાપે (ગતિ કરે) છે.  $\vec{B}$  દ્વારા થતું કાર્ય શોધો :

Options :

8643514083. 1

8643514084. શૂન્ય

8643514085. અનંત

8643514086. -1

Question Number : 10 Question Id : 8643511360 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Calculate the time interval between 33% decay and 67% decay if half-life of a substance is 20 minutes.

Options :

8643514087. 20 minutes

8643514088. 40 minutes

8643514089. 60 minutes

8643514090. 13 minutes

Question Number : 10 Question Id : 8643511360 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

જો પદાર્થનો અર્ધ-આયુ 20 મિનીટ હોય તો 33% ક્ષય અને 67% ક્ષય વચ્ચેનો સમય અંતરાલ ગણો :

Options :

8643514087. 20 મીનીટ

8643514088. 40 મીનિટ

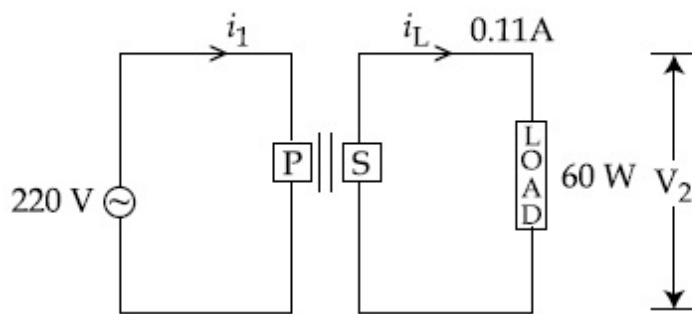
8643514089. 60 મીનિટ

8643514090. 13 મીનિટ

**Question Number : 11 Question Id : 8643511361 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

For the given circuit, comment on the type of transformer used.



**Options :**

8643514091. Step - up transformer

8643514092. Step down transformer

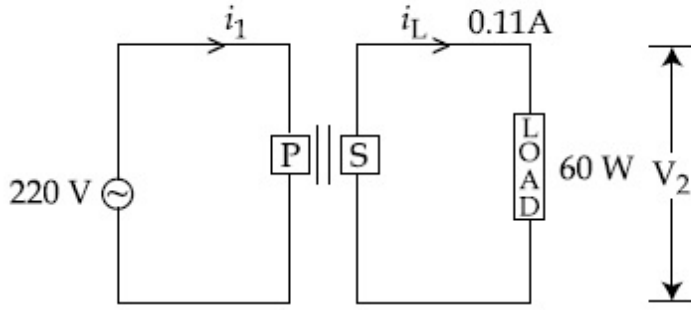
8643514093. Auto transformer

8643514094. Auxilliary transformer

**Question Number : 11 Question Id : 8643511361 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

આપેલ પરિપથ માટે, વપરાયેલ ટ્રાન્સફોર્મર માટે પ્રતિક્રિયા આપો :



Options :

8643514091. સ્ટેપ-અપ ટ્રાન્સફોર્મર
8643514092. સ્ટેપ-ડાઉન ટ્રાન્સફોર્મર
8643514093. ઓટો ટ્રાન્સફોર્મર
8643514094. ઓક્સિલરી (વધારાનું) ટ્રાન્સફોર્મર

Question Number : 12 Question Id : 8643511362 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The half-life of  $\text{Au}^{198}$  is 2.7 days. The activity of 1.50 mg of  $\text{Au}^{198}$  if its atomic weight is  $198 \text{ g mol}^{-1}$  is, ( $N_A = 6 \times 10^{23} / \text{mol}$ ).

Options :

8643514095.  $^{240}\text{Ci}$
8643514096.  $^{357}\text{Ci}$
8643514097.  $^{252}\text{Ci}$
8643514098.  $^{535}\text{Ci}$

Question Number : 12 Question Id : 8643511362 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$\text{Au}^{198}$  નો અર્ધ-આયુ 2.7 દિવસ છે. જો પરમાણુ દળ  $198 \text{ g mol}^{-1}$  હોય તો  $1.50 \text{ mg Au}^{198}$  સક્રિયતા (activity) \_\_\_\_\_ છે. ( $N_A = 6 \times 10^{23} / \text{mol}$ ).

**Options :**

8643514095. 240 Ci

8643514096. 357 Ci

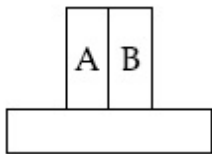
8643514097. 252 Ci

8643514098. 535 Ci

**Question Number : 13 Question Id : 8643511363 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

A bimetallic strip consists of metals A and B. It is mounted rigidly as shown. The metal A has higher coefficient of expansion compared to that of metal B. When the bimetallic strip is placed in a cold bath, it will :



**Options :**

8643514099. Bend towards the right

8643514100. Bend towards the left

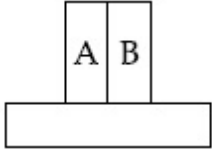
8643514101. Not bend but shrink

8643514102. Neither bend nor shrink

**Question Number : 13 Question Id : 8643511363 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

એ દ્વિ-ઘાત્વીય પટ્ટી A અને B એમ બે ધાતુઓની બનેલી છે. તેને દર્શાવ્યા મુજબ દટતાથી જડેલ છે. ધાતુ A નો પ્રસરણાંક ધાતુ B નાં પ્રસરણાંક કરતા વધારે છે. જ્યારે દ્વિ-ઘાત્વીય પટ્ટીને ઠંડા બાથ-ટબમાં મૂકવામાં આવે છે, ત્યારે તે \_\_\_\_\_.



**Options :**

8643514099. જમણી તરફ વળે છે.

8643514100. ડાબી તરફ વળે છે.

8643514101. વળતી નથી પણ સંકોચાય છે.

8643514102. વળતી નથી અને સંકોચાતી પણ નથી.

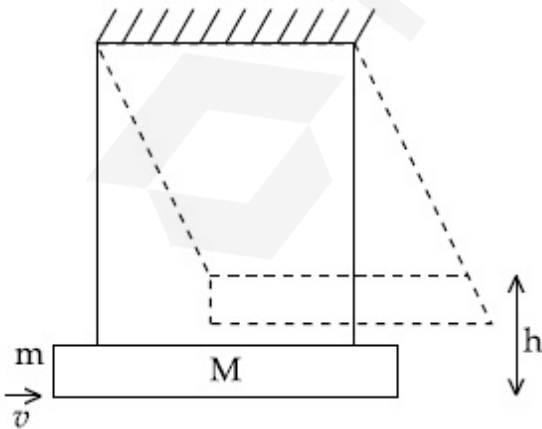
**Question Number : 14 Question Id : 8643511364 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

A large block of wood of mass  $M = 5.99 \text{ kg}$  is hanging from two long massless cords. A bullet of mass  $m = 10 \text{ g}$  is fired into the block and gets embedded in it. The (block + bullet) then swing upwards, their centre of mass rising a vertical distance  $h = 9.8 \text{ cm}$  before the (block + bullet) pendulum comes momentarily to rest at the end of its arc. The speed of the bullet just before collision is :

(take  $g = 9.8 \text{ ms}^{-2}$ )



**Options :**

8643514103. 811.4 m/s

8643514104. 821.4 m/s

8643514105. 831.4 m/s

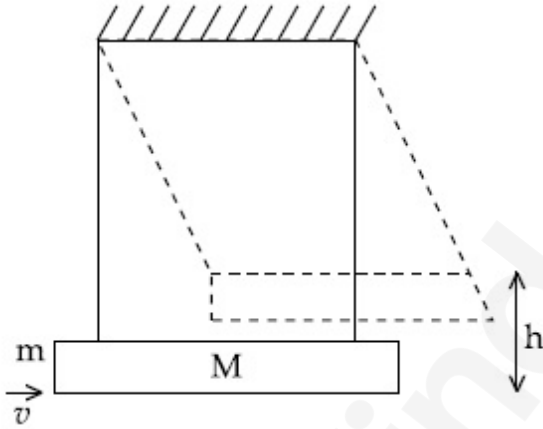
8643514106. 841.4 m/s

**Question Number : 14 Question Id : 8643511364 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

$M = 5.99 \text{ kg}$  દળ ધરાવતું એક મોટું ચોસલું બે દળરહિત દોરીઓ વડે લટકાવવામાં આવેલ છે.  $m = 10 \text{ g}$  દળ ધરાવતી ગોળીને ચોસલામાં ફાયર (ફોડવામાં) કરવામાં આવે છે અને તે તેમાં ધૂસી જાય છે. (ચોસલું+ગોળી) પછી ઉપર તરફ ગતિ કરે છે, આ દોલક (ચોસલું+ગોળી) તેમની માપના અંત્ય બિંદુ આગળ ક્ષણભાર સ્થિર થાય તે પહેલા તેમના દ્રવ્યમાન કેન્દ્ર શિરોલંબ દિશામાં  $h = 9.8 \text{ cm}$  ઊંચાઈએ પહોંચે છે. સંઘાત પહેલા તરત જ ગોળીની ઝડપ \_\_\_\_\_ હશે.

( $g = 9.8 \text{ ms}^{-2}$  લો.)



**Options :**

8643514103. 811.4 m/s

8643514104. 821.4 m/s

8643514105. 831.4 m/s

8643514106. 841.4 m/s

**Question Number : 15 Question Id : 8643511365 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

**Statement I :** A cyclist is moving on an unbanked road with a speed of  $7 \text{ kmh}^{-1}$  and takes a sharp circular turn along a path of radius of 2m without reducing the speed. The static friction coefficient is 0.2. The cyclist will not slip and pass the curve. ( $g = 9.8 \text{ m/s}^2$ )

**Statement II :** If the road is banked at an angle of  $45^\circ$ , cyclist can cross the curve of 2m radius with the speed of  $18.5 \text{ kmh}^{-1}$  without slipping.

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

**Options :**

8643514107. Both statement I and statement II are true
8643514108. Both statement I and statement II are false
8643514109. Statement I is correct and statement II is incorrect
8643514110. Statement I is incorrect and statement II is correct

**Question Number : 15 Question Id : 8643511365 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

**વિધાન I :** એક સાઈકલ સવાર ઢોળાવ વગરના રસ્તા ઉપર  $7 \text{ kmh}^{-1}$  ના ઝડપથી ગતિ કરે છે અને 2 m ની ત્રિજ્યા ધરાવતાં પથ પર પોતાની ઝડપ ઘટાડ્યા સિવાય એક sharp વળાંક લે છે. સ્થિત ઘર્ષણાંક 0.2 છે. સાઈકલ સવાર સરકતો નથી અને વળાંક પસાર કરે છે. ( $g = 9.8 \text{ m/s}^2$ )

**વિધાન II :** જો રસ્તો  $45^\circ$  ના કોણે ઢળેલા હોય તો સાઈકલ સવાર 2 m ત્રિજ્યા ધરાવતો વળાંક સરક્યા સિવાય  $18.5 \text{ kmh}^{-1}$  ની ઝડપ સાથે પસાર કરી શકે છે.

ઉપરોક્ત વિધાનોનાં સંદર્ભમાં, નીચે આપેલ વિકલ્પો પૈકી સાચો જવાબ પસંદ કરો :

**Options :**

8643514107. બંને વિધાન I અને વિધાન II સાચાં છે.
8643514108. બંને વિધાન I અને વિધાન II ખોટાં છે.
8643514109. વિધાન I સાચું અને વિધાન II ખોટું છે.
8643514110. વિધાન I ખોટું છે અને વિધાન II સાચું છે.

Question Number : 16 Question Id : 8643511366 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A mosquito is moving with a velocity  $\vec{v} = 0.5 t^2 \hat{i} + 3t \hat{j} + 9\hat{k}$  m/s and accelerating in uniform conditions. What will be the direction of mosquito after 2 s ?

Options :

8643514111.  $\tan^{-1}\left(\frac{5}{2}\right)$  from  $x$ -axis

8643514112.  $\tan^{-1}\left(\frac{5}{2}\right)$  from  $y$ -axis

8643514113.  $\tan^{-1}\left(\frac{2}{3}\right)$  from  $x$ -axis

8643514114.  $\tan^{-1}\left(\frac{2}{3}\right)$  from  $y$ -axis

Question Number : 16 Question Id : 8643511366 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

એક મચ્છર  $\vec{v} = 0.5 t^2 \hat{i} + 3t \hat{j} + 9\hat{k}$  m/s ના વેગથી અને સમાન પ્રવેગથી ગતિ કરે છે. 2 s ના અંતે મચ્છરની દિશા કઈ હશે ?

Options :

8643514111.  $x$ -અક્ષથી  $\tan^{-1}\left(\frac{5}{2}\right)$

8643514112.  $y$ -અક્ષથી  $\tan^{-1}\left(\frac{5}{2}\right)$

8643514113.  $x$ -અક્ષથી  $\tan^{-1}\left(\frac{2}{3}\right)$

$$y\text{-અક્ષથી } \tan^{-1}\left(\frac{2}{3}\right)$$

8643514114.

**Question Number : 17 Question Id : 8643511367 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

In order to determine the Young's Modulus of a wire of radius 0.2 cm (measured using a scale of least count=0.001 cm) and length 1m (measured using a scale of least count=1 mm), a weight of mass 1 kg (measured using a scale of least count=1 g) was hanged to get the elongation of 0.5 cm (measured using a scale of least count 0.001 cm). What will be the fractional error in the value of Young's Modulus determined by this experiment ?

**Options :**

8643514115. 1.4 %

8643514116. 0.9%

8643514117. 0.14%

8643514118. 9%

**Question Number : 17 Question Id : 8643511367 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

એક 0.2 cm (0.001 cm લઘુત્તમ માપશક્તિ ધરાવતી ફૂટ પટ્ટી વડે) જેટલી ત્રિજ્યા, 1 m (1 mm લઘુત્તમ માપશક્તિ ધરાવતી મીટર પટ્ટી વડે) જેટલી લંબાઈ અને 1 kg (1 g લઘુત્તમ માપશક્તિ સાથે) જેટલું દળ ધરાવતાં તારનો યંગ મોડ્યુલસ માપવા માટે તેને લટકાવતા તેમાં 0.5 cm (0.001 cm લઘુત્તમ માપશક્તિ ધરાવતા સ્કેલ) જેટલું ખેંચાણ મેળવામાં છે. આ પ્રયોગ દ્વારા મપાતા યંગ મોડ્યુલસમાં કેટલી અંશીય ત્રુટિ હશે ?

**Options :**

8643514115. 1.4 %

8643514116. 0.9%

8643514117. 0.14%

8643514118. 9%

**Question Number : 18 Question Id : 8643511368 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

A resistor develops 500 J of thermal energy in 20 s when a current of 1.5A is passed through it. If the current is increased from 1.5 A to 3 A, what will be the energy developed in 20 s.

**Options :**

8643514119. 500 J

8643514120. 1000 J

8643514121. 1500 J

8643514122. 2000 J

**Question Number : 18 Question Id : 8643511368 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

જ્યારે અવરોધમાંથી 1.5 A જેટલો પ્રવાહ 20 s સુધી પસાર કરવામાં આવે છે ત્યારે તે 500 J ઉષ્માઊર્જા ઉત્પન્ન કરે છે.

જો પ્રવાહ 1.5 A થી વધારીને 3 A કરવામાં આવે તો 20 s માં ઉત્પન્ન ઊર્જા કેટલી હશે ?

**Options :**

8643514119. 500 J

8643514120. 1000 J

8643514121. 1500 J

8643514122. 2000 J

**Question Number : 19 Question Id : 8643511369 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

Find out the surface charge density at the intersection of point  $x=3$  m plane and  $x$ -axis, in the region of uniform line charge of  $8$  nC/m lying along the  $z$ -axis in free space.

Options :

8643514123.  $47.88$  C/m
8643514124.  $0.07$  nC m<sup>-2</sup>
8643514125.  $0.424$  nC m<sup>-2</sup>
8643514126.  $4.0$  nC m<sup>-2</sup>

Question Number : 19 Question Id : 8643511369 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

મુક્ત અવકાશમાં  $z$ -અક્ષ પર  $8$  nC/m ના સમાંગ રેખીય વિદ્યુતભાર ધરાવતાં વિસ્તરમાં  $x=3$  m બિંદુ આગળ વિદ્યુત ફ્લક્સ ઘનતા શોધો :

Options :

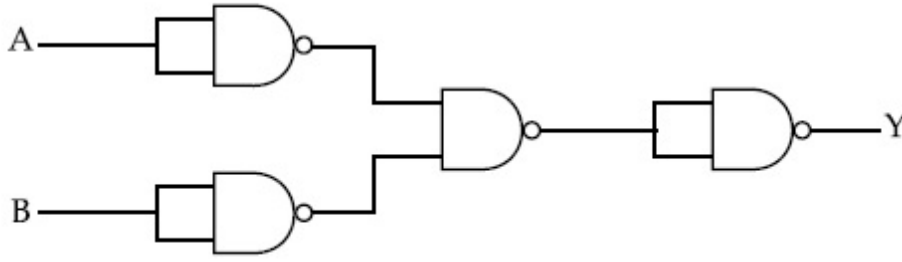
8643514123.  $47.88$  C/m
8643514124.  $0.07$  nC m<sup>-2</sup>
8643514125.  $0.424$  nC m<sup>-2</sup>
8643514126.  $4.0$  nC m<sup>-2</sup>

Question Number : 20 Question Id : 8643511370 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The following logic gate is equivalent to :



**Options :**

8643514127. AND Gate

8643514128. NAND Gate

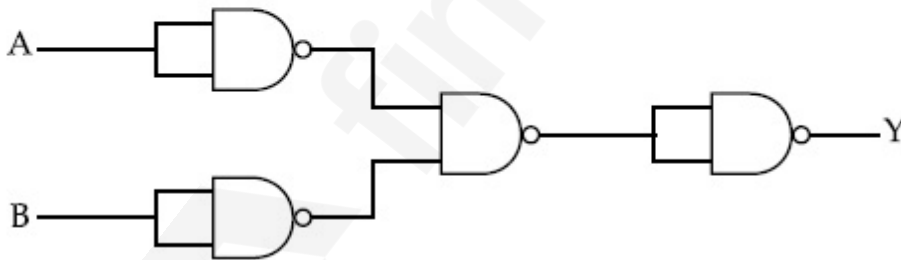
8643514129. OR Gate

8643514130. NOR Gate

**Question Number : 20 Question Id : 8643511370 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

નીચે દર્શાવેલ પરિપથ \_\_\_\_\_ ને સમતુલ્ય છે.



**Options :**

8643514127. AND ગેટ

8643514128. NAND ગેટ

8643514129. OR ગેટ

8643514130. NOR ગેટ

## Physics Section B

Section Id :	86435192
Section Number :	2
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 :	86435192
Question Shuffling Allowed :	Yes

Question Number : 21 Question Id : 8643511371 Question Type : SA  
Correct Marks : 4 Wrong Marks : 0

If one wants to remove all the mass of the earth to infinity in order to break it up completely.

The amount of energy that needs to be supplied will be  $\frac{x}{5} \frac{GM^2}{R}$  where  $x$  is \_\_\_\_\_

(Round off to the Nearest Integer)

(M is the mass of earth, R is the radius of earth, G is the gravitational constant)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 21 Question Id : 8643511371 Question Type : SA  
Correct Marks : 4 Wrong Marks : 0

જો પૃથ્વી પરનાં સમગ્ર દળને અનંત સુધી દૂર કરવું હોય, કે જેથી તેને સંપૂર્ણ રીતે તોડી શકાય, તો આપવી પડતી ઊર્જાનો

જથ્થો  $\frac{x}{5} \frac{GM^2}{R}$  છે, જ્યાં  $x$  \_\_\_\_\_ હશે. (નજીકતમ પૂર્ણાંકમાં લખો)

(M એ પૃથ્વીનું દળ, R એ પૃથ્વીની ત્રિજ્યા, G ગુરુત્વાકર્ષી અચળાંક છે.)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 22 Question Id : 8643511372 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A swimmer can swim with velocity of 12 km/h in still water. Water flowing in a river has velocity 6 km/h. The direction with respect to the direction of flow of river water he should swim in order to reach the point on the other bank just opposite to his starting point is \_\_\_\_\_°. (Round off to the Nearest Integer)

(Find the angle in degrees)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 22 Question Id : 8643511372 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

એક તરવૈયો નદીમાં 6 km/h ના વેગથી વહેતા પાણીની સાપેક્ષે 12 km/h ના વેગથી તરી શકે છે. સામેના કાંઠે શરૂઆતના બિંદુની બરાબર વિરુદ્ધ આવેલા બિંદુએ પહોંચવા માટે નદીના પાણીના વહનની દિશાને સાપેક્ષે તેણે \_\_\_\_\_° દિશામાં તરવું જોઈએ. (નજીકત્તમ પૂર્ણાંકમાં લખો)

(ડીગ્રીમાં ખૂણો શોધો)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 23 Question Id : 8643511373 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A body of mass 2 kg moves under a force of  $(2\hat{i} + 3\hat{j} + 5\hat{k})$  N. It starts from rest and was at the origin initially. After 4 s, its new coordinates are (8, b, 20). The value of b is \_\_\_\_\_.

(Round off to the Nearest Integer)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 23 Question Id : 8643511373 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

2 kg દળ ધરાવતો પદાર્થ  $(2\hat{i} + 3\hat{j} + 5\hat{k})$  N બળની અસર હેઠળ ગતિ કરે છે. તે વિરામ સ્થિતિમાંથી શરૂ કરે છે. તે પ્રારંભમાં ઊગમબિંદુ આગળ હતો. 4 સેકન્ડ બાદ, તેના નવા યામો (8, b, 20) છે. b નું મૂલ્ય \_\_\_\_\_.

(નજીકતમ પૂર્ણાંકમાં લખો)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 24 Question Id : 8643511374 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A force  $\vec{F} = 4\hat{i} + 3\hat{j} + 4\hat{k}$  is applied on an intersection point of  $x = 2$  plane and  $x$ -axis. The magnitude of torque of this force about a point (2, 3, 4) is \_\_\_\_\_. (Round off to the Nearest Integer)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 24 Question Id : 8643511374 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$x = 2$  સમતલ અને  $x$ -અક્ષના અંતઃછેદ ઉપર  $\vec{F} = 4\hat{i} + 3\hat{j} + 4\hat{k}$  જેટલું બળ લગાડવામાં આવે છે. આ બળને કારણે (2, 3, 4) બિંદુ આગળ લાગતા ટોર્કનું મૂલ્ય \_\_\_\_\_. (નજીકત્તમ પૂર્ણાંકમાં લખો)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

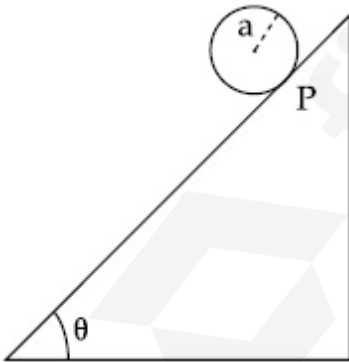
Question Number : 25 Question Id : 8643511375 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A solid disc of radius 'a' and mass 'm' rolls down without slipping on an inclined plane making an angle  $\theta$  with the horizontal. The acceleration of the disc will be  $\frac{2}{b} g \sin\theta$  where b is \_\_\_\_\_. (Round off to the Nearest Integer)

(g = acceleration due to gravity

$\theta$  = angle as shown in figure)



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 25 Question Id : 8643511375 Question Type : SA

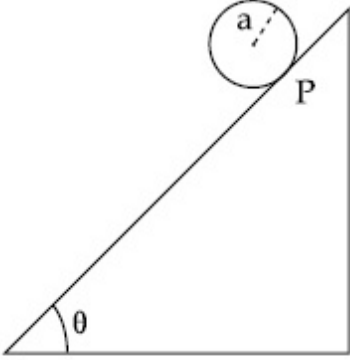
Correct Marks : 4 Wrong Marks : 0

સમક્ષિતિજ સાથે  $\theta$  કોણ બનાવતા ઢળતા સમતલ (ઢોળાવ) પર 'a' ત્રિજ્યાની અને 'm' દળ ધરાવતી ઘન તકિતે સરક્યા

સિવાય નીચે ગબડે છે. તકિતમાં પ્રવેગ  $\frac{2}{b} g \sin\theta$  છે, જ્યાં b \_\_\_\_\_ છે. (નજીકત્તમ પૂર્ણાંકમાં લખો)

(g = ગુરુત્વીય પ્રવેગ

$\theta$  = આકૃતિમાં દર્શાવ્યા મુજબ કોણ)



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 26 Question Id : 8643511376 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

For an ideal heat engine, the temperature of the source is  $127^{\circ}\text{C}$ . In order to have 60% efficiency the temperature of the sink should be \_\_\_\_\_  $^{\circ}\text{C}$ . (Round off to the Nearest Integer)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 26 Question Id : 8643511376 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

એક આદર્શ ઉષ્મીય ચંત્ર માટે, સ્ત્રોતનું તાપમાન  $127^{\circ}\text{C}$  છે. 60% જેટલી કાર્યક્ષમતા મેળવવા માટે, ઠારણનું તાપમાન \_\_\_\_\_  $^{\circ}\text{C}$  હોવું જોઈએ. (નજીકત્તમ પૂર્ણાંકમાં લખો)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

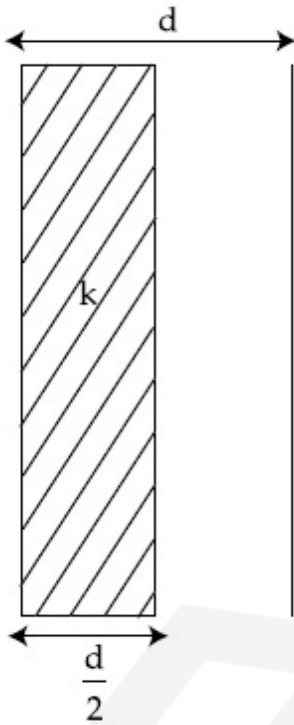
**Possible Answers :**

100

**Question Number :** 27 **Question Id :** 8643511377 **Question Type :** SA

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

In a parallel plate capacitor set up, the plate area of capacitor is  $2\text{ m}^2$  and the plates are separated by 1 m. If the space between the plates are filled with a dielectric material of thickness 0.5 m and area  $2\text{ m}^2$  (see fig) the capacitance of the set-up will be \_\_\_\_\_  $\epsilon_0$ . (Dielectric constant of the material = 3.2) (Round off to the Nearest Integer)



**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

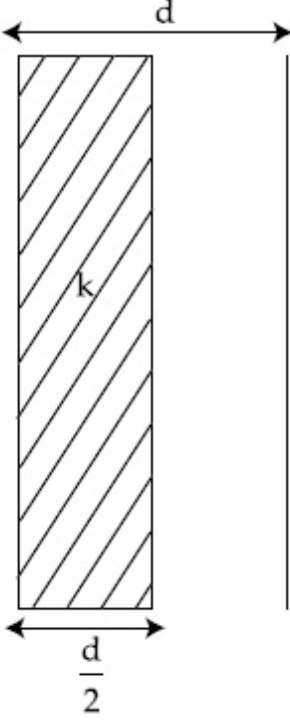
**Possible Answers :**

100

Question Number : 27 Question Id : 8643511377 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

એક સમાંતર પ્લેટ સંઘારક સંરચનામાં, સંઘારકની પ્લેટનું ક્ષેત્રફળ  $2 \text{ m}^2$  અને તેમની વચ્ચેનું અંતર  $1 \text{ m}$  છે. બે પ્લેટો વચ્ચેની જગ્યા  $0.5 \text{ m}$  જડાઈ અને  $2 \text{ m}^2$  ક્ષેત્રફળ ધરાવતા (આકૃતિ જુઓ) ડાયઇલેક્ટ્રિક (અવાહક) પદાર્થ દ્વારા ભરવામાં આવે તો આ સંરચનાની સંઘારકતા \_\_\_\_\_  $\epsilon_0$  થશે. (પદાર્થનો ડાયઇલેક્ટ્રિક અચળાંક  $= 3.2$ ) (નજીકત્તમ પૂર્ણાંકમાં ગણો)



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 28 Question Id : 8643511378 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The energy dissipated by a resistor is  $10 \text{ mJ}$  in  $1 \text{ s}$  when an electric current of  $2 \text{ mA}$  flows through it. The resistance is \_\_\_\_\_  $\Omega$ . (Round off to the Nearest Integer)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

**Question Number : 28 Question Id : 8643511378 Question Type : SA****Correct Marks : 4 Wrong Marks : 0**

જ્યારે 2 mA વિદ્યુતપ્રવાહ 1 s માટે પસાર કરવામાં આવે ત્યારે અવરોધમાં વિખેરાતી ઊર્જા 10 mJ છે. અવરોધ \_\_\_\_\_  $\Omega$  છે. (નજીકત્તમ પૂર્ણાંકમાં લખો)

**Response Type : Numeric****Evaluation Required For SA : Yes****Show Word Count : Yes****Answers Type : Equal****Text Areas : PlainText****Possible Answers :**

100

**Question Number : 29 Question Id : 8643511379 Question Type : SA****Correct Marks : 4 Wrong Marks : 0**

A deviation of  $2^\circ$  is produced in the yellow ray when prism of crown and flint glass are achromatically combined. Taking dispersive powers of crown and flint glass as 0.02 and 0.03 respectively and refractive index for yellow light for these glasses are 1.5 and 1.6 respectively. The refracting angles for crown glass prism will be \_\_\_\_\_ $^\circ$  (in degree). (Round off to the Nearest Integer)

**Response Type : Numeric****Evaluation Required For SA : Yes****Show Word Count : Yes****Answers Type : Equal****Text Areas : PlainText****Possible Answers :**

100

**Question Number : 29 Question Id : 8643511379 Question Type : SA****Correct Marks : 4 Wrong Marks : 0**

જ્યારે ક્રાઉન અને ફ્લિન્ટ ગ્લાસને અવર્ણક (achromatic) રીતે સંયોજીત કરી બનાવેલા પ્રિઝમમાં પીળા-કિરણ માટે  $2^\circ$  જેટલું વિચલન મળે છે. ક્રાઉન અને ફ્લિન્ટ ગ્લાસ માટે ડિસ્પર્સીવ (dispersive) પોવર અનુક્રમે 0.02 અને 0.03 , અને પીળા પ્રકાશ માટે આ ગ્લાસો માટે વક્રીભવનાંક અનુક્રમે 1.5 અને 1.6 લો. ક્રાઉન ગ્લાસ માટે વક્રીભવન કોણ \_\_\_\_\_ હશે. (નજીકત્તમ પૂર્ણાંકમાં લખો)

**Response Type : Numeric****Evaluation Required For SA : Yes****Show Word Count : Yes**

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 30 Question Id : 8643511380 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A closed organ pipe of length  $L$  and an open organ pipe contain gases of densities  $\rho_1$  and  $\rho_2$  respectively. The compressibility of gases are equal in both the pipes. Both the pipes are

vibrating in their first overtone with same frequency. The length of the open pipe is  $\frac{x}{3} L \sqrt{\frac{\rho_1}{\rho_2}}$  where  $x$  is \_\_\_\_\_. (Round off to the Nearest Integer)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 30 Question Id : 8643511380 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

L લંબાઈની બંધ ઓર્ગન-પાઈપ અને ખુલ્લી ઓર્ગન-પાઈપમાં અનુક્રમે  $\rho_1$  અને  $\rho_2$  ઘનતા ધરાવતાં વાયુઓ રહેલા છે. બંને પાઈપોમાં વાયુની દાબનીયતા સમાન છે. બંને પાઈપ સમાન આવૃત્તિ સાથે પોતાના પ્રથમ અધિસ્વર (overtone) માં કંપન

કરે છે. ખુલ્લા પાઈપની લંબાઈ  $\frac{x}{3} L \sqrt{\frac{\rho_1}{\rho_2}}$  છે. જ્યાં  $x$  \_\_\_\_\_ છે. (નજીકત્તમ પૂર્ણાંકમાં લખો)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

## Chemistry Section A

Section Id :

86435193

Section Number :

3

Section type :

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>	86435193
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 31 Question Id : 8643511381 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

The INCORRECT statement regarding the structure of  $C_{60}$  is :

**Options :**

8643514141. It contains 12 six-membered rings and 24 five-membered rings.
8643514142. The six-membered rings are fused to both six and five-membered rings.
8643514143. The five-membered rings are fused only to six-membered rings.
8643514144. Each carbon atom forms three sigma bonds.

**Question Number : 31 Question Id : 8643511381 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

$C_{60}$  નાં અંધારણનાં સંદર્ભમાં ખોટું વિધાન શોધો.

**Options :**

8643514141. તે 12 છ-સભ્યોવાળા ચક્રો અને 24 પાંચ-સભ્યોવાળા ચક્રો ધરાવે છે.
8643514142. છ-સભ્યોવાળા ચક્રો એ બન્ને છ અને પાંચ-સભ્યોવાળા ચક્રો સાથે સંલગ્નિત (જોડાયેલ) (fused) હોય છે.
8643514143. પાંચ-સભ્યોવાળા ચક્રો તે ફક્ત છ-સભ્યોવાળા ચક્રો સાથે જ જોડાયેલ (fused) હોય છે.
8643514144. દરેક કાર્બન પરમાણુ ત્રણ સિગ્મા બંધો બનાવે છે.

**Question Number : 32 Question Id : 8643511382 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

The **INCORRECT** statements below regarding colloidal solutions is :

**Options :**

8643514145. A colloidal solution shows colligative properties.
8643514146. A colloidal solution shows Brownian motion of colloidal particles.
8643514147. The flocculating power of  $Al^{3+}$  is more than that of  $Na^{+}$ .
8643514148. An ordinary filter paper can stop the flow of colloidal particles.

**Question Number : 32 Question Id : 8643511382 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

નીચે આપેલા કલિલમય દ્રાવણોનાં સંદર્ભમાં અસત્ય વિધાન શોધો.

**Options :**

8643514145. કલિલમય દ્રાવણ એ સંખ્યાત્મક ગુણધર્મો દર્શાવે છે.
8643514146. કલિલમય દ્રાવણ એ કલિલમય કણોની આઉનિયન ગતિ દર્શાવે છે.
8643514147.  $Al^{3+}$  ની સમાક્ષેપિત શક્તિ (પૌવર) (flocculating power) એ  $Na^{+}$  કરતાં વધારે છે.
8643514148. સામાન્ય ગાળણ પત્ર એ કલિલમય કણોનો પ્રવાહ અટકાવી શકે છે.

**Question Number : 33 Question Id : 8643511383 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

The characteristics of elements X, Y and Z with atomic numbers, respectively, 33, 53 and 83 are :

**Options :**

8643514149. X, Y and Z are metals.
8643514150. X and Z are non-metals and Y is a metalloid.

8643514151. X is a metalloid, Y is a non-metal and Z is a metal.

8643514152. X and Y are metalloids and Z is a metal.

**Question Number : 33 Question Id : 8643511383 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

અનુક્રમે પરમાણુ ક્રમાંકો 33, 53 અને 83 ધરાવતાં X, Y અને Z તત્વોની લાક્ષણિકતાઓ શોધો.

**Options :**

8643514149. X, Y અને Z ધાતુઓ છે.

8643514150. X અને Z અધાતુઓ છે અને Y એ અર્ધધાતુ છે.

8643514151. X એ અર્ધધાતુ છે, Y એ અધાતુ અને Z એ ધાતુ છે.

8643514152. X અને Y અર્ધધાતુઓ છે અને Z એ ધાતુ છે.

**Question Number : 34 Question Id : 8643511384 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Which of the following reduction reaction CANNOT be carried out with coke ?

**Options :**

8643514153.  $\text{Fe}_2\text{O}_3 \rightarrow \text{Fe}$

8643514154.  $\text{ZnO} \rightarrow \text{Zn}$

8643514155.  $\text{Cu}_2\text{O} \rightarrow \text{Cu}$

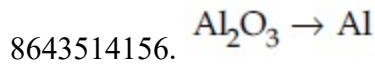
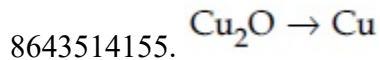
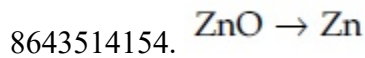
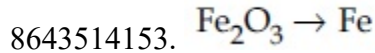
8643514156.  $\text{Al}_2\text{O}_3 \rightarrow \text{Al}$

**Question Number : 34 Question Id : 8643511384 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

નીચે આપેલમાંથી કઈ રીડક્શન પ્રક્રિયા કોક (coke) સાથે થઈ શકતી નથી ?

**Options :**



**Question Number : 35 Question Id : 8643511385 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

The correct statements about  $\text{H}_2\text{O}_2$  are :

- (A) used in the treatment of effluents.
- (B) used as both oxidising and reducing agents.
- (C) the two hydroxyl groups lie in the same plane.
- (D) miscible with water.

Choose the correct answer from the options given below :

**Options :**

8643514157. (A), (B) and (D) only

8643514158. (B), (C) and (D) only

8643514159. (A), (C) and (D) only

8643514160. (A), (B), (C) and (D)

**Question Number : 35 Question Id : 8643511385 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

$H_2O_2$  નાં સંદર્ભમાં સાચું વિધાન શોધો.

- (A) ગંદા પાણી (effluents) નાં શુદ્ધિકરણ (treatment) નાં ઉપયોગમાં  
(B) ઓક્સિડેશન અને રિડક્શનકર્તા બંને તરીકેનાં ઉપયોગમાં  
(C) બંને હાઈડ્રોક્સિલ સમૂહો એક જ સમતલમાં ગોઠવાયેલા હોય છે  
(D) પાણી સાથે મિશ્ર થાય છે.

નીચે આપેલા વિકલ્પોમાંથી સાચો જવાબ પસંદ કરો.

**Options :**

8643514157. ફક્ત (A), (B) અને (D)

8643514158. ફક્ત (B), (C) અને (D)

8643514159. ફક્ત (A), (C) અને (D)

8643514160. (A), (B), (C) અને (D)

**Question Number : 36 Question Id : 8643511386 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Identify the elements X and Y using the ionisation energy values given below :

**Ionization energy (kJ/mol)**

	1 <sup>st</sup>	2 <sup>nd</sup>
X	495	4563
Y	731	1450

**Options :**

8643514161. X = Na ; Y = Mg

8643514162. X = Mg ; Y = Na

8643514163. X = F ; Y = Mg

8643514164. X = Mg ; Y = F

Question Number : 36 Question Id : 8643511386 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

નીચે આપેલ આયનીકરણ ઊર્જાનાં મૂલ્યોનો ઉપયોગ કરીને તત્વો X અને Y ઓળખી બતાવો.

	આયનીકરણ ઊર્જા	(kJ/mol)
	1 <sup>st</sup>	2 <sup>nd</sup>
X	495	4563
Y	731	1450

Options :

8643514161. X = Na ; Y = Mg

8643514162. X = Mg ; Y = Na

8643514163. X = F ; Y = Mg

8643514164. X = Mg ; Y = F

Question Number : 37 Question Id : 8643511387 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The exact volumes of 1 M NaOH solution required to neutralise 50 mL of 1 M  $H_3PO_3$  solution and 100 mL of 2 M  $H_3PO_2$  solution, respectively, are :

Options :

8643514165. 50 mL and 50 mL

8643514166. 100 mL and 50 mL

8643514167. 100 mL and 200 mL

8643514168. 100 mL and 100 mL

Question Number : 37 Question Id : 8643511387 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

1 M  $H_3PO_3$  નાં 50 mL દ્રાવણ અને 2 M  $H_3PO_2$  નાં 100 mL દ્રાવણને તટસ્થીકરણ કરવા 1 M NaOH દ્રાવણનું ચોક્કસ (exact) કદ અનુક્રમે શોધો.

**Options :**

8643514165. 50 mL અને 50 mL
8643514166. 100 mL અને 50 mL
8643514167. 100 mL અને 200 mL
8643514168. 100 mL અને 100 mL

**Question Number : 38 Question Id : 8643511388 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Arrange the following metal complex/compounds in the increasing order of spin only magnetic moment. Presume all the three, high spin system.

(Atomic numbers Ce = 58, Gd = 64 and Eu = 63.)

(a)  $(NH_4)_2[Ce(NO_3)_6]$  (b)  $Gd(NO_3)_3$  and (c)  $Eu(NO_3)_3$

Answer is :

**Options :**

8643514169. (a) < (b) < (c)
8643514170. (a) < (c) < (b)
8643514171. (b) < (a) < (c)
8643514172. (c) < (a) < (b)

**Question Number : 38 Question Id : 8643511388 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

નીચે આપેલા ધાતુ સંકિર્ણ/સંયોજનોને તેમની સ્પીન ફક્ત ચુંબકીય ચાકમાત્રાનાં ચઢતાં ક્રમમાં ગોઠવો. બધા જ ત્રણેય ઉચ્ચ સ્પીન પ્રણાલી વાળા છે તે ધારી લો.

(પરમાણુ ક્રમાંક Ce = 58, Gd = 64 અને Eu = 63.)

(a)  $(\text{NH}_4)_2[\text{Ce}(\text{NO}_3)_6]$  (b)  $\text{Gd}(\text{NO}_3)_3$  અને (c)  $\text{Eu}(\text{NO}_3)_3$

**Options :**

8643514169. (a) < (b) < (c)

8643514170. (a) < (c) < (b)

8643514171. (b) < (a) < (c)

8643514172. (c) < (a) < (b)

**Question Number : 39 Question Id : 8643511389 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

$\text{Fex}_2$  and  $\text{Fey}_3$  are known when  $x$  and  $y$  are :

**Options :**

8643514173.  $x = \text{F, Cl, Br, I}$  and  $y = \text{F, Cl, Br, I}$

8643514174.  $x = \text{F, Cl, Br, I}$  and  $y = \text{F, Cl, Br}$

8643514175.  $x = \text{F, Cl, Br}$  and  $y = \text{F, Cl, Br, I}$

8643514176.  $x = \text{Cl, Br, I}$  and  $y = \text{F, Cl, Br, I}$

**Question Number : 39 Question Id : 8643511389 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

$\text{Fex}_2$  અને  $\text{Fey}_3$  એ જાણીતાં છે જ્યાં  $x$  અને  $y$  અનુક્રમે શોધો.

**Options :**

8643514173.  $x = \text{F, Cl, Br, I}$  અને  $y = \text{F, Cl, Br, I}$

8643514174.  $x = F, Cl, Br, I$  અને  $y = F, Cl, Br$

8643514175.  $x = F, Cl, Br$  અને  $y = F, Cl, Br, I$

8643514176.  $x = Cl, Br, I$  અને  $y = F, Cl, Br, I$

**Question Number : 40 Question Id : 8643511390 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

The green house gas/es is (are) :

- (A) Carbon dioxide
- (B) Oxygen
- (C) Water vapour
- (D) Methane

Choose the most appropriate answer from the options given below :

**Options :**

8643514177. (A) only

8643514178. (A) and (C) only

8643514179. (A), (C) and (D) only

8643514180. (A) and (B) only

**Question Number : 40 Question Id : 8643511390 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ગ્રીનહાલિસ વાયુ (ઓ) છે તે શોધો.

- (A) કાર્બન ડાયોક્સાઇડ
- (B) ઓક્સિજન
- (C) પાણી બાષ્પ
- (D) મિથેન

નીચે આપેલા વિકલ્પોમાંથી સૌથી વધુ બંધબેસતો જવાબ પસંદ કરો.

**Options :**

8643514177. ફક્ત (A)

8643514178. ફક્ત (A) અને (C)

8643514179. ફક્ત (A), (C) અને (D)

8643514180. ફક્ત (A) અને (B)

**Question Number : 41 Question Id : 8643511391 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
Test/Reagents/Observation(s)	Species detected
(a) Lassaigne's Test	(i) Carbon
(b) Cu(II) oxide	(ii) Sulphur
(c) Silver nitrate	(iii) N, S, P, and halogen
(d) The sodium fusion extract gives black precipitate with acetic acid and lead acetate	(iv) Halogen Specifically

The correct match is :

**Options :**

8643514181. (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)

8643514182. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

8643514183. (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)

8643514184. (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)

**Question Number : 41 Question Id : 8643511391 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

સૂચિ-I સાથે સૂચિ-II ને જોડો.

સૂચિ-I

કસોટી/પ્રક્રિયકો/અવલોકન(નો)

- (a) લેસાઈન કસોટી
- (b) Cu(II) ઓક્સાઈડ
- (c) સિલ્વર નાઈટ્રેટ
- (d) સોડિયમ ફ્યુઝન ( પીગાળેલ) નિષ્કર્ષણ એસિટિક

એસિડ અને લેડ એસિટેટ સાથે કાળા અવક્ષેપ આપે છે.

સાચી જોડ શોધો.

સૂચિ-II

શોધાયેલ સ્પીસીઝો

- (i) કાર્બન
- (ii) સલ્ફર
- (iii) N, S, P અને હેલોજન
- (iv) હેલોજન ઓક્સાઇડ

**Options :**

8643514181. (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)

8643514182. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

8643514183. (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)

8643514184. (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)

**Question Number : 42 Question Id : 8643511392 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

**Statement I :** Sodium hydride can be used as an oxidising agent.

**Statement II :** The lone pair of electrons on nitrogen in pyridine makes it basic.

Choose the **CORRECT** answer from the options given below :

**Options :**

8643514185. Both statement I and statement II are true

8643514186. Both statement I and statement II are false

8643514187. Statement I is true but statement II is false

8643514188. Statement I is false but statement II is true

**Question Number : 42 Question Id : 8643511392 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

**વિધાન I :** સોડિયમ હાઈડ્રાઈડનો ઓક્સિડેશનકર્તા તરીકે ઉપયોગ કરી શકાય છે.

**વિધાન II :** પિરિડીનમાં નાઈટ્રોજન ઉપર ઈલેક્ટ્રોનનાં અબંધકારક યુગ્મો તેને બેઝિક બનાવે છે.

નીચે આપેલા વિકલ્પોમાંથી સાચો જવાબ પસંદ કરો.

**Options :**

8643514185. બંને વિધાન I અને વિધાન II સાચાં છે.

8643514186. બંને વિધાન I અને વિધાન II ખોટા છે.

8643514187. વિધાન I સાચું છે પણ વિધાન II ખોટું છે.

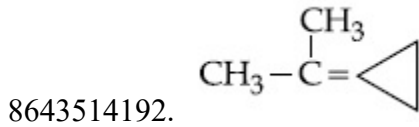
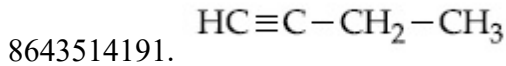
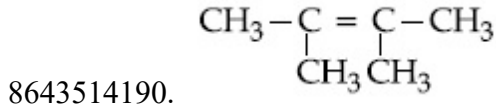
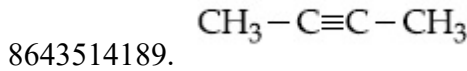
8643514188. વિધાન I ખોટું છે પણ વિધાન II સાચું છે.

**Question Number : 43 Question Id : 8643511393 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

An unsaturated hydrocarbon X on ozonolysis gives A. Compound A when warmed with ammonical silver nitrate forms a bright silver mirror along the sides of the test tube. The unsaturated hydrocarbon X is :

Options :

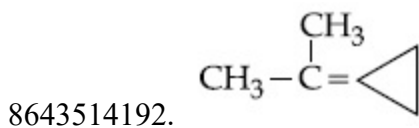
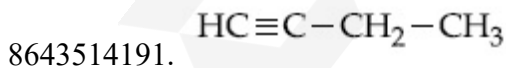
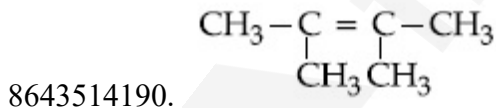
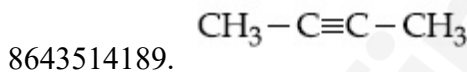


Question Number : 43 Question Id : 8643511393 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

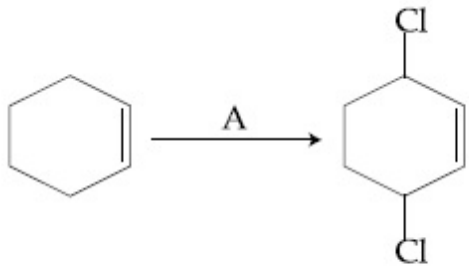
એક અસંતૃપ્ત હાઈડ્રોકાર્બન X નું ઓઝોનાલિસિસ કરતાં A આપે છે. સંયોજન A ને જ્યારે એમોનિકલ સિલ્વર નાઈટ્રેટ સાથે હુંફાળું ગરમ કરતાં કસનળીનાં બાજુનાં ભાગમાં ચળકતું સિલ્વર દર્પણ બનાવે છે. અસંતૃપ્ત હાઈડ્રોકાર્બન X શોધો.

Options :



Question Number : 44 Question Id : 8643511394 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



Identify the reagent(s) 'A' and condition(s) for the reaction

Options :

8643514193. A = Cl<sub>2</sub> ; dark, Anhydrous AlCl<sub>3</sub>

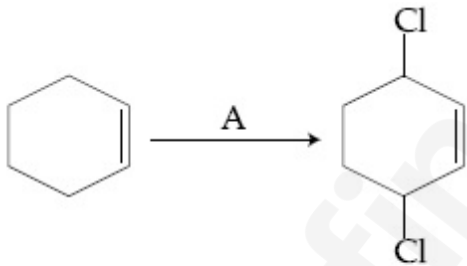
8643514194. A = HCl, ZnCl<sub>2</sub>

8643514195. A = Cl<sub>2</sub> ; UV light

8643514196. A = HCl ; Anhydrous AlCl<sub>3</sub>

Question Number : 44 Question Id : 8643511394 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



પ્રક્રિયા માટે પ્રક્રિયક(કો) 'A' અને પરિસ્થિતિ(ઓ) શોધો.

Options :

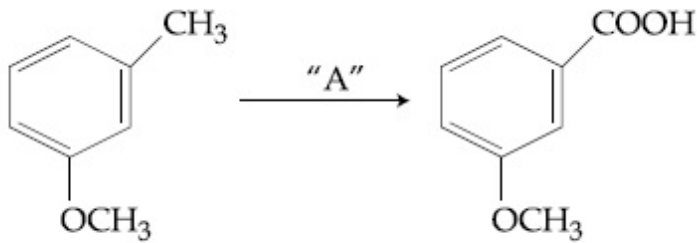
8643514193. A = Cl<sub>2</sub> ; અંધારું, નિર્જળ AlCl<sub>3</sub>

8643514194. A = HCl ; ZnCl<sub>2</sub>

8643514195. A = Cl<sub>2</sub> ; UV પ્રકાશ

8643514196. A = HCl ; નિર્જળ AlCl<sub>3</sub>

Question Number : 45 Question Id : 8643511395 Question Type : MCQ Option Shuffling : Yes Is  
 Question Mandatory : No  
 Correct Marks : 4 Wrong Marks : 1

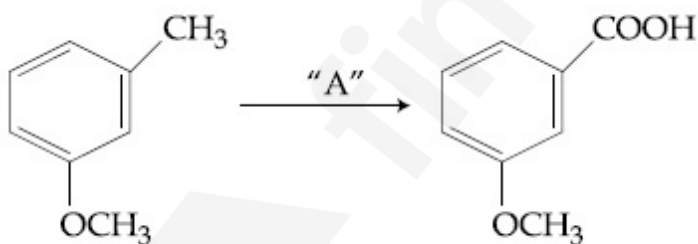


In the above reaction, the reagent "A" is :

Options :

- 8643514197.  $\text{LiAlH}_4$
- 8643514198. Alkaline  $\text{KMnO}_4$ ,  $\text{H}^+$
- 8643514199.  $\text{HCl}$ ,  $\text{Zn} - \text{Hg}$
- 8643514200.  $\text{NaBH}_4$ ,  $\text{H}_3\text{O}^+$

Question Number : 45 Question Id : 8643511395 Question Type : MCQ Option Shuffling : Yes Is  
 Question Mandatory : No  
 Correct Marks : 4 Wrong Marks : 1



ઉપરની પ્રક્રિયામાં, પ્રક્રિયક "A" શોધો.

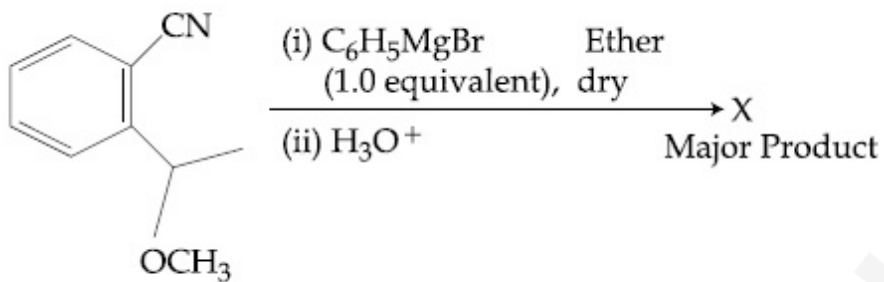
Options :

- 8643514197.  $\text{LiAlH}_4$
- 8643514198. Alkaline  $\text{KMnO}_4$ ,  $\text{H}^+$
- 8643514199.  $\text{HCl}$ ,  $\text{Zn} - \text{Hg}$

8643514200.  $\text{NaBH}_4, \text{H}_3\text{O}^+$

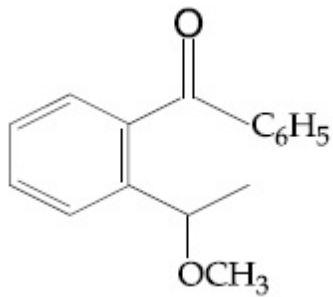
Question Number : 46 Question Id : 8643511396 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

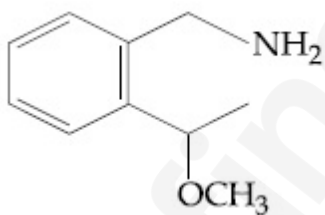


The structure of X is :

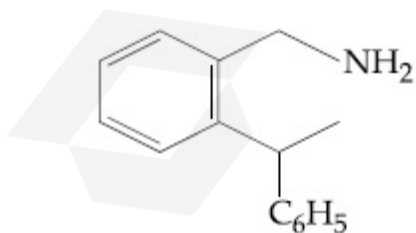
Options :



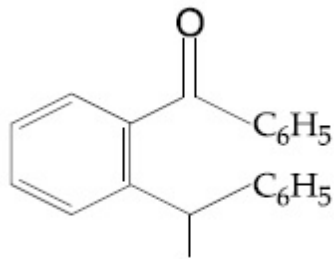
8643514201.



8643514202.



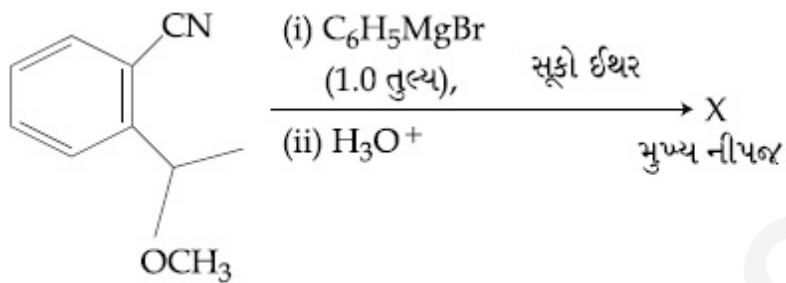
8643514203.



8643514204.

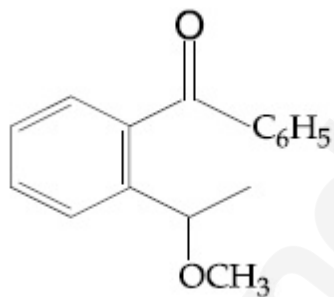
Question Number : 46 Question Id : 8643511396 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

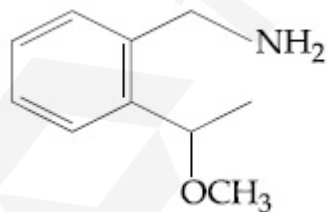


બંધારણ X શોધો.

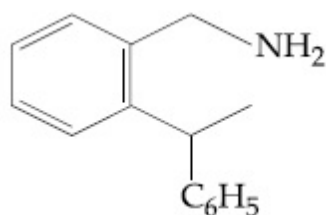
Options :



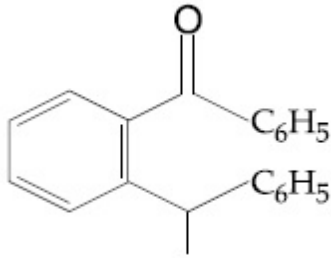
8643514201.



8643514202.



8643514203.



8643514204.

Question Number : 47 Question Id : 8643511397 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which of the following is least basic ?

Options :

8643514205.  $(\text{CH}_3\text{CO})_2\ddot{\text{N}}\text{H}$

8643514206.  $(\text{C}_2\text{H}_5)_2\ddot{\text{N}}\text{H}$

8643514207.  $(\text{CH}_3\text{CO})\ddot{\text{N}}\text{HC}_2\text{H}_5$

8643514208.  $(\text{C}_2\text{H}_5)_3\ddot{\text{N}}$

Question Number : 47 Question Id : 8643511397 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

નીચે આપેલામાંથી કયો સૌથી ઓછો બેઝિક છે ?

Options :

8643514205.  $(\text{CH}_3\text{CO})_2\ddot{\text{N}}\text{H}$

8643514206.  $(\text{C}_2\text{H}_5)_2\ddot{\text{N}}\text{H}$

8643514207.  $(\text{CH}_3\text{CO})\ddot{\text{N}}\text{HC}_2\text{H}_5$

8643514208.  $(\text{C}_2\text{H}_5)_3\ddot{\text{N}}$

Question Number : 48 Question Id : 8643511398 Question Type : MCQ Option Shuffling : Yes Is  
Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Ammonolysis of Alkyl halides followed by the treatment with NaOH solution can be used to prepare primary, secondary and tertiary amines. The purpose of NaOH in the reaction is :

Options :

8643514209. to remove basic impurities
8643514210. to activate  $\text{NH}_3$  used in the reaction
8643514211. to increase the reactivity of alkyl halide
8643514212. to remove acidic impurities

Question Number : 48 Question Id : 8643511398 Question Type : MCQ Option Shuffling : Yes Is  
Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

આલ્કાઈલ હેલાઈડોનું એમોનાલિસિસ અને ત્યારબાદ તેની NaOH નાં દ્રાવણ સાથે પ્રક્રિયા કરીને તેનો ઉપયોગ પ્રાથમિક, દ્વિતીયક અને તૃતીયક એમાઈનો બનાવવા માટે કરી શકાય છે. પ્રક્રિયામાં NaOH નો હેતુ શોધો :

Options :

8643514209. બેઝિક અશુદ્ધિઓને દૂર કરવા માટે
8643514210.  $\text{NH}_3$  ને સક્રિય કરી તેનો ઉપયોગ પ્રક્રિયામાં
8643514211. આલ્કાઈલ હેલાઈડની સક્રિયતા વધારવા માટે
8643514212. એસિડિક અશુદ્ધિઓને દૂર કરવા માટે

Question Number : 49 Question Id : 8643511399 Question Type : MCQ Option Shuffling : Yes Is  
Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Which of the following polymer is used in the manufacture of wood laminates ?

Options :

8643514213. Melamine formaldehyde resin

8643514214. Urea formaldehyde resin

8643514215. *cis*-poly isoprene

8643514216. Phenol and formaldehyde resin

**Question Number : 49 Question Id : 8643511399 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

લાકડા સ્તરીયો (wood laminates) ની બનાવટમાં નીચે આપેલામાંથી કયો બહુલકનો ઉપયોગ થાય છે ?

**Options :**

8643514213. મેલેમાઈન ફોર્માલ્ડીહાઈડ રેઝિન

8643514214. યુરિયા ફોર્માલ્ડીહાઈડ રેઝિન

8643514215. સીસ-પોલી આઈસોપ્રિન

8643514216. ફિનોલ અને ફોર્માલ્ડીહાઈડ રેઝિન

**Question Number : 50 Question Id : 8643511400 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

The secondary structure of protein is stabilised by :

**Options :**

8643514217. van der Waals forces

8643514218. Peptide bond

8643514219. Hydrogen bonding

8643514220. glycosidic bond

Question Number : 50 Question Id : 8643511400 Question Type : MCQ Option Shuffling : Yes Is  
Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

પ્રોટીનનું દ્વિતીયક અંધારણ નીચેનાં વડે સ્થિરતાં પ્રાપ્ત કરે છે :

Options :

8643514217. વાન્ડર વાલ્સ બળો

8643514218. પેપ્ટાઈડ બંધ

8643514219. હાઈડ્રોજન બંધન

8643514220. ગ્લાયકોસાઈડીક બંધ

## Chemistry Section B

Section Id :	86435194
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 :	86435194
Question Shuffling Allowed :	Yes

Question Number : 51 Question Id : 8643511401 Question Type : SA  
Correct Marks : 4 Wrong Marks : 0

When 35 mL of 0.15 M lead nitrate solution is mixed with 20 mL of 0.12 M chromic sulphate solution, \_\_\_\_\_  $\times 10^{-5}$  moles of lead sulphate precipitate out. (Round off to the Nearest Integer).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 51 Question Id : 8643511401 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

જ્યારે 35 mL 0.15 M લેડ નાઈટ્રેટ દ્રાવણને 0.12 M ક્રોમિક સલ્ફેટનાં 20 mL દ્રાવણ સાથે મિશ્ર કરવામાં આવે છે ત્યારે લેડ સલ્ફેટનાં \_\_\_\_\_  $\times 10^{-5}$  મોલ્સ (moles)નું અવક્ષેપન થશે. (નજીકનાં પૂર્ણાંકમાં રાઉન્ડ ઓફ કરો)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 52 Question Id : 8643511402 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Ga (atomic mass 70 u) crystallizes in a hexagonal close packed structure. The total number of voids in 0.581 g of Ga is \_\_\_\_\_  $\times 10^{21}$ . (Round off to the Nearest Integer).

[Given :  $N_A = 6.023 \times 10^{23}$ ]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 52 Question Id : 8643511402 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Ga (પરમાણ્વીય દળ 70 u) હેક્ઝાગોનલ ક્લોઝ પેક બંધારણમાં સ્ફટિકીકરણ પામે છે. Ga નાં 0.581 g માં છિદ્રોની કુલ સંખ્યા \_\_\_\_\_  $\times 10^{21}$  છે. (નજીકનાં પૂર્ણાંકમાં રાઉન્ડ ઓફ કરો)

[આપેલ :  $N_A = 6.023 \times 10^{23}$ ]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 53 Question Id : 8643511403 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The number of orbitals with  $n=5$ ,  $m_l = +2$  is \_\_\_\_\_. (Round off to the Nearest Integer).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 53 Question Id : 8643511403 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$n=5$ ,  $m_l = +2$  સાથે કક્ષકોની સંખ્યા \_\_\_\_\_ છે. (નજીકનાં પૂર્ણાંકમાં રાઉન્ડ ઓફ કરો)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 54 Question Id : 8643511404 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

At  $25^\circ\text{C}$ , 50 g of iron reacts with HCl to form  $\text{FeCl}_2$ . The evolved hydrogen gas expands against a constant pressure of 1 bar. The work done by the gas during this expansion is \_\_\_\_\_ J.

(Round off to the Nearest Integer).

[Given :  $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$ . Assume, hydrogen is an ideal gas]

[Atomic mass of Fe is 55.85 u]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

Question Number : 54 Question Id : 8643511404 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

25°C પર, 50 g આયર્ન સાથે HCl ની પ્રક્રિયા થતાં FeCl<sub>2</sub> બનાવે છે. 1 bar નાં અચળ દબાણે ઉત્પન્ન થતો હાઈડ્રોજન વાયુ વિસ્તરે છે. આ વિસ્તરણ દરમિયાન વાયુ વડે થતું કાર્ય \_\_\_\_\_ J છે.

(નજીકનાં પૂર્ણાંકમાં રાઉન્ડ ઓફ કરો.)

[આપેલ :  $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$ . ધારી લો કે હાઈડ્રોજન એ એક આદર્શ વાયુ છે]

[પરમાણ્વીય દળ Fe = 55.85 u છે.]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 55 Question Id : 8643511405 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

At 363 K, the vapour pressure of A is 21 kPa and that of B is 18 kPa. One mole of A and 2 moles of B are mixed. Assuming that this solution is ideal, the vapour pressure of the mixture is \_\_\_\_\_ kPa. (Round off to the Nearest Integer).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 55 Question Id : 8643511405 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

363 K પર, A નું બાષ્પ દબાણ 21 kPa અને B નું 18 kPa છે. A નાં એક મોલ અને B નાં 2 મોલ્સ (moles) ને મિશ્ર કરવામાં આવે છે. ધારી લો કે આ દ્રાવણ આદર્શ છે. મિશ્રણનું બાષ્પદબાણ \_\_\_\_\_ kPa છે.

(નજીકનાં પૂર્ણાંકમાં રાઉન્ડ ઓફ કરો)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 56 Question Id : 8643511406 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Sulphurous acid ( $\text{H}_2\text{SO}_3$ ) has  $K_{a_1} = 1.7 \times 10^{-2}$  and  $K_{a_2} = 6.4 \times 10^{-8}$ . The pH of 0.588 M  $\text{H}_2\text{SO}_3$  is \_\_\_\_\_. (Round off to the Nearest Integer).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 56 Question Id : 8643511406 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

સલ્ફ્યુરસ એસિડ ( $\text{H}_2\text{SO}_3$ )  $K_{a_1} = 1.7 \times 10^{-2}$  અને  $K_{a_2} = 6.4 \times 10^{-8}$  ધરાવે છે. 0.588 M  $\text{H}_2\text{SO}_3$  ની pH \_\_\_\_\_ છે. (નજીકનાં પૂર્ણાંકમાં રાઉન્ડ ઓફ કરો)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 57 Question Id : 8643511407 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A 5.0 m mol  $\text{dm}^{-3}$  aqueous solution of KCl has a conductance of 0.55 mS when measured in a cell of cell constant  $1.3 \text{ cm}^{-1}$ . The molar conductivity of this solution is \_\_\_\_\_  $\text{mSm}^2 \text{ mol}^{-1}$ . (Round off to the Nearest Integer).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 57 Question Id : 8643511407 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

જ્યારે એક કોષમાં કોષ અચળાંક  $1.3 \text{ cm}^{-1}$  માપવામાં આવે છે ત્યારે KCl નું  $5.0 \text{ mol dm}^{-3}$  જલીય દ્રાવણ  $0.55 \text{ mS}$  વાહકતા ધરાવે છે. તો આ દ્રાવણની મોલર વાહકતા \_\_\_\_\_  $\text{mSm}^2 \text{ mol}^{-1}$  છે.

(નજીકનાં પૂર્ણાંકમાં રાઉન્ડ ઓફ કરો)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 58 Question Id : 8643511408 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A and B decompose via first order kinetics with half-lives 54.0 min and 18.0 min respectively. Starting from an equimolar non reactive mixture of A and B, the time taken for the concentration of A to become 16 times that of B is \_\_\_\_\_ min. (Round off to the Nearest Integer).

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 58 Question Id : 8643511408 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A અને B પ્રથમ ક્રમ ગતિકી વડે વિઘટન પામે છે જેનો અર્ધ-આયુષ્ય અનુક્રમે 54.0 min અને 18.0 min છે. A અને B નાં નોન-સક્રિય મિશ્રણમાં (જે માં પ્રક્રિયા ના થતી હોય તેવું મિશ્રણ) સમ મોલર થી શરૂઆત કરીએ તો, A ની સાંદ્રતાં B નાં કરતાં 16 ગણી વધારે રહે તે માટેનો લાગતો સમય \_\_\_\_\_ min. છે. (નજીકનાં પૂર્ણાંકમાં રાઉન્ડ ઓફ કરો)

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 59 Question Id : 8643511409 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$  absorbs light of wavelength 498 nm during a d – d transition. The octahedral splitting energy for the above complex is \_\_\_\_\_  $\times 10^{-19}$  J. (Round off to the Nearest Integer).  $h = 6.626 \times 10^{-34}$  Js;  $c = 3 \times 10^8$  ms<sup>-1</sup>

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 59 Question Id : 8643511409 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

d – d સંક્રાંતિ દરમિયાન  $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$  એ 498 nm તરંગલંબાઈવાળા પ્રકાશનું શોષણ કરે છે. તો ઉપરનાં સંકીર્ણ માટે અષ્ટફલકીય વિભાજન ઊર્જા \_\_\_\_\_  $\times 10^{-19}$  J છે. (નજીકનાં પૂર્ણાંકમાં રાઉન્ડ ઓફ કરો)

$h = 6.626 \times 10^{-34}$  Js;  $c = 3 \times 10^8$  ms<sup>-1</sup>

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 60 Question Id : 8643511410 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

In Duma's method of estimation of nitrogen, 0.1840 g of an organic compound gave 30 mL of nitrogen collected at 287 K and 758 mm of Hg pressure. The percentage composition of nitrogen in the compound is \_\_\_\_\_. (Round off to the Nearest Integer).

[Given : Aqueous tension at 287 K = 14 mm of Hg]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 60 Question Id : 8643511410 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

નાઈટ્રોજનનાં પરિમાપનની ડ્યુમાં પધ્ધતિમાં, 0.1840 g એક કાર્બનિક સંયોજન 30 mL નાઈટ્રોજન આપે છે જેને 287 K અને 758 mm ના Hg દબાણે ભેગો કરવામાં આવ્યો. તો સંયોજનમાં નાઈટ્રોજનની ઘટક (સંઘટકો) ટકાવારી \_\_\_\_\_ છે. (નજીકનાં પૂર્ણાંકમાં રાઉન્ડ ઓફ કરો )

[આપેલ : 287 K પર જલીય તાણ = 14 mm of Hg]

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

## Mathematics Section A

Section Id :	86435195
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 :	86435195
Question Shuffling Allowed :	Yes

Question Number : 61 Question Id : 8643511411 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the foot of the perpendicular from point (4, 3, 8) on the line  $L_1 : \frac{x-a}{l} = \frac{y-2}{3} = \frac{z-b}{4}$ ,

$l \neq 0$  is (3, 5, 7), then the shortest distance between the line  $L_1$  and line

$L_2 : \frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$  is equal to :

Options :

8643514231.  $\frac{1}{\sqrt{6}}$

8643514232.  $\frac{1}{2}$

8643514233.  $\frac{1}{\sqrt{3}}$

8643514234.  $\sqrt{\frac{2}{3}}$

Question Number : 61 Question Id : 8643511411 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

બે બિંદુ (4, 3, 8) થી રેખા  $L_1 : \frac{x-a}{l} = \frac{y-2}{3} = \frac{z-b}{4}$ ,  $l \neq 0$  પરનો લંબપદ (3, 5, 7) હોય, તો રેખા  $L_1$

અને રેખા  $L_2 : \frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$  વચ્ચેનું લઘુત્તમ અંતર \_\_\_\_\_ થાય.

Options :

8643514231.  $\frac{1}{\sqrt{6}}$

8643514232.  $\frac{1}{2}$

8643514233.  $\frac{1}{\sqrt{3}}$

8643514234.  $\sqrt{\frac{2}{3}}$

**Question Number : 62 Question Id : 8643511412 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Let the lengths of intercepts on  $x$ -axis and  $y$ -axis made by the circle  $x^2 + y^2 + ax + 2ay + c = 0$ , ( $a < 0$ ) be  $2\sqrt{2}$  and  $2\sqrt{5}$ , respectively. Then the shortest distance from origin to a tangent to this circle which is perpendicular to the line  $x + 2y = 0$ , is equal to :

**Options :**

8643514235.  $\sqrt{10}$

8643514236.  $\sqrt{11}$

8643514237.  $\sqrt{7}$

8643514238.  $\sqrt{6}$

**Question Number : 62 Question Id : 8643511412 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ધારો કે વર્તુળ  $x^2 + y^2 + ax + 2ay + c = 0$ , ( $a < 0$ ) એ  $x$ -અક્ષ તથા  $y$ -અક્ષ સાથે અનુક્રમે

$2\sqrt{2}$  તથા  $2\sqrt{5}$  જેટલો અંતઃખંડ બનાવે છે. તો ઊગમબિંદુ થી રેખા  $x + 2y = 0$  ને લંબ હોય એવા આ વર્તુળનાં

સ્પર્શકનું લઘુત્તમ અંતર \_\_\_\_\_ છે.

**Options :**

8643514235.  $\sqrt{10}$

8643514236.  $\sqrt{11}$

8643514237.  $\sqrt{7}$

8643514238.  $\sqrt{6}$

Question Number : 63 Question Id : 8643511413 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let  $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$  and  $\vec{b} = 2\hat{i} - 3\hat{j} + 5\hat{k}$ . If  $\vec{r} \times \vec{a} = \vec{b} \times \vec{r}$ ,  $\vec{r} \cdot (\alpha\hat{i} + 2\hat{j} + \hat{k}) = 3$

and  $\vec{r} \cdot (2\hat{i} + 5\hat{j} - \alpha\hat{k}) = -1$ ,  $\alpha \in \mathbb{R}$ , then the value of  $\alpha + |\vec{r}|^2$  is equal to :

Options :

8643514239. 9

8643514240. 11

8643514241. 13

8643514242. 15

Question Number : 63 Question Id : 8643511413 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ધારો કે  $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$  અને  $\vec{b} = 2\hat{i} - 3\hat{j} + 5\hat{k}$ . જો  $\vec{r} \times \vec{a} = \vec{b} \times \vec{r}$ ,

$\vec{r} \cdot (\alpha\hat{i} + 2\hat{j} + \hat{k}) = 3$  અને  $\vec{r} \cdot (2\hat{i} + 5\hat{j} - \alpha\hat{k}) = -1$ ,  $\alpha \in \mathbb{R}$  હોય તો  $\alpha + |\vec{r}|^2$  નું મૂલ્ય

\_\_\_\_\_ છે.

Options :

8643514239. 9

8643514240. 11

8643514241. 13

8643514242. 15

Question Number : 64 Question Id : 8643511414 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let  $f$  be a real valued function, defined on  $\mathbb{R} - \{-1, 1\}$  and given by

$$f(x) = 3 \log_e \left| \frac{x-1}{x+1} \right| - \frac{2}{x-1}.$$

Then in which of the following intervals, function  $f(x)$  is increasing ?

Options :

8643514243.  $(-\infty, \infty) - \{-1, 1\}$

8643514244.  $(-\infty, -1) \cup \left( \left[ \frac{1}{2}, \infty \right) - \{1\} \right)$

8643514245.  $(-\infty, \frac{1}{2}] - \{-1\}$

8643514246.  $(-1, \frac{1}{2}]$

Question Number : 64 Question Id : 8643511414 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ધારો કે  $\mathbb{R} - \{-1, 1\}$  પર વ્યાખ્યાયિત વાસ્તવિક મૂલ્યવાળું વિધેય  $f$  એ

$$f(x) = 3 \log_e \left| \frac{x-1}{x+1} \right| - \frac{2}{x-1}$$

મુજબ આપેલ છે. તો નીચેનામાંથી કયા અંતરાલોમાં વિધેય  $f(x)$  વધે છે ?

Options :

8643514243.  $(-\infty, \infty) - \{-1, 1\}$

8643514244.  $(-\infty, -1) \cup \left( \left[ \frac{1}{2}, \infty \right) - \{1\} \right)$

8643514245.  $(-\infty, \frac{1}{2}] - \{-1\}$

8643514246.  $(-1, \frac{1}{2}]$

Question Number : 65 Question Id : 8643511415 Question Type : MCQ Option Shuffling : Yes Is  
Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

If the points of intersections of the ellipse  $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$  and the circle  $x^2 + y^2 = 4b$ ,  $b > 4$  lie on the curve  $y^2 = 3x^2$ , then b is equal to :

Options :

8643514247. 5

8643514248. 6

8643514249. 10

8643514250. 12

Question Number : 65 Question Id : 8643511415 Question Type : MCQ Option Shuffling : Yes Is  
Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

જો ઉપવલય  $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$  અને વર્તુળ  $x^2 + y^2 = 4b$ ,  $b > 4$  નાં છેદબિંદુઓ વક્ર  $y^2 = 3x^2$  પર આવેલ હોય, તો b  
= \_\_\_\_\_

Options :

8643514247. 5

8643514248. 6

8643514249. 10

8643514250. 12

Question Number : 66 Question Id : 8643511416 Question Type : MCQ Option Shuffling : Yes Is  
Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Let C be the locus of the mirror image of a point on the parabola  $y^2 = 4x$  with respect to the line  $y = x$ . Then the equation of tangent to C at P(2, 1) is :

Options :

8643514251.  $x + 3y = 5$

8643514252.  $2x + y = 5$

8643514253.  $x - y = 1$

8643514254.  $x + 2y = 4$

Question Number : 66 Question Id : 8643511416 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ધારો કે પરવલય  $y^2 = 4x$  પરનાં બિંદુનું રેખા  $y = x$  સાપેક્ષ આરસી પ્રતિબિંબનો બિંદુપથ C છે. તો P(2, 1) પાસે C નાં સ્પર્શકનું સમીકરણ \_\_\_\_\_ છે.

Options :

8643514251.  $x + 3y = 5$

8643514252.  $2x + y = 5$

8643514253.  $x - y = 1$

8643514254.  $x + 2y = 4$

Question Number : 67 Question Id : 8643511417 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let A denote the event that a 6-digit integer formed by 0, 1, 2, 3, 4, 5, 6 without repetitions, be divisible by 3. Then probability of event A is equal to :

Options :

8643514255.  $\frac{4}{9}$

8643514256.  $\frac{3}{7}$

8643514257.  $\frac{11}{27}$

8643514258.  $\frac{9}{56}$

**Question Number : 67 Question Id : 8643511417 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ધારો કે A એ 0, 1, 2, 3, 4, 5, 6 માંથી પુનરાવર્તન વગર બનાવેલ 6-અંકનો પૂર્ણાંક 3 વડે વિભાજ્ય હોવાની ઘટના દર્શાવે છે. તો ઘટના A ની સંભાવના \_\_\_\_\_ છે.

**Options :**

8643514255.  $\frac{4}{9}$

8643514256.  $\frac{3}{7}$

8643514257.  $\frac{11}{27}$

8643514258.  $\frac{9}{56}$

**Question Number : 68 Question Id : 8643511418 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

If  $y = y(x)$  is the solution of the differential equation  $\frac{dy}{dx} + (\tan x) y = \sin x$ ,  $0 \leq x \leq \frac{\pi}{3}$ , with

$y(0) = 0$ , then  $y\left(\frac{\pi}{4}\right)$  equal to :

**Options :**

8643514259.  $\left(\frac{1}{2\sqrt{2}}\right) \log_e 2$

8643514260.  $\frac{1}{2} \log_e 2$

8643514261.  $\log_e 2$

8643514262.  $\frac{1}{4} \log_e 2$

**Question Number : 68 Question Id : 8643511418 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

જો  $y=y(x)$  એ વિકલ સમીકરણ  $\frac{dy}{dx} + (\tan x) y = \sin x$ ,  $0 \leq x \leq \frac{\pi}{3}$  નો ઉકેલ હોય, જ્યાં  $y(0) = 0$ , તો  $y\left(\frac{\pi}{4}\right)$   
= \_\_\_\_\_

**Options :**

8643514259.  $\left(\frac{1}{2\sqrt{2}}\right) \log_e 2$

8643514260.  $\frac{1}{2} \log_e 2$

8643514261.  $\log_e 2$

8643514262.  $\frac{1}{4} \log_e 2$

**Question Number : 69 Question Id : 8643511419 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Let  $\alpha \in \mathbb{R}$  be such that the function  $f(x) = \begin{cases} \frac{\cos^{-1}(1 - \{x\}^2) \sin^{-1}(1 - \{x\})}{\{x\} - \{x\}^3}, & x \neq 0 \\ \alpha, & x = 0 \end{cases}$  is

continuous at  $x=0$ , where  $\{x\} = x - [x]$ ,  $[x]$  is the greatest integer less than or equal to  $x$ .  
Then :

**Options :**

8643514263.  $\alpha = 0$

8643514264. no such  $\alpha$  exists

8643514265.  $\alpha = \frac{\pi}{\sqrt{2}}$

8643514266.  $\alpha = \frac{\pi}{4}$

**Question Number : 69 Question Id : 8643511419 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ધારો કે  $\alpha \in \mathbb{R}$  એવો છે કે જેથી વિધેય  $f(x) = \begin{cases} \frac{\cos^{-1}(1 - \{x\}^2) \sin^{-1}(1 - \{x\})}{\{x\} - \{x\}^3}, & x \neq 0 \\ \alpha, & x = 0 \end{cases}$  એ  $x=0$  પાસે

સતત છે, જ્યાં  $\{x\} = x - [x]$ ,  $[x]$  એ  $x$  અથવા  $x$  થી નાનો મહત્તમ પૂર્ણાંક છે. તો

**Options :**

8643514263.  $\alpha = 0$

8643514264. આવા કોઈ  $\alpha$  નું અસ્તિત્વ નથી

8643514265.  $\alpha = \frac{\pi}{\sqrt{2}}$

8643514266.  $\alpha = \frac{\pi}{4}$

**Question Number : 70 Question Id : 8643511420 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

If  $(x, y, z)$  be an arbitrary point lying on a plane P which passes through the points  $(42, 0, 0)$ ,

$(0, 42, 0)$  and  $(0, 0, 42)$ , then the value of the expression

$$3 + \frac{x-11}{(y-19)^2 (z-12)^2} + \frac{y-19}{(x-11)^2 (z-12)^2} + \frac{z-12}{(x-11)^2 (y-19)^2} - \frac{x+y+z}{14(x-11)(y-19)(z-12)}$$

is equal to :

**Options :**

8643514267. - 45

8643514268. 39

8643514269. 0

8643514270. 3

**Question Number : 70 Question Id : 8643511420 Question Type : MCQ Option Shuffling : Yes Is**

**Question Mandatory : No**

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

જો  $(x, y, z)$  એ બિંદુઓ  $(42, 0, 0)$ ,  $(0, 42, 0)$  અને  $(0, 0, 42)$  માંથી પસાર થતાં સમતલ P પરનું સ્વૈર બિંદુ હોય, તો અભિવ્યક્તિ

$$3 + \frac{x-11}{(y-19)^2 (z-12)^2} + \frac{y-19}{(x-11)^2 (z-12)^2} + \frac{z-12}{(x-11)^2 (y-19)^2} - \frac{x+y+z}{14(x-11)(y-19)(z-12)} \text{ નું મૂલ્ય}$$

\_\_\_\_\_ થાય.

**Options :**

8643514267. - 45

8643514268. 39

8643514269. 0

8643514270. 3

Question Number : 71 Question Id : 8643511421 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let  $A = \{2, 3, 4, 5, \dots, 30\}$  and ' $\simeq$ ' be an equivalence relation on  $A \times A$ , defined by  $(a, b) \simeq (c, d)$ , if and only if  $ad = bc$ . Then the number of ordered pairs which satisfy this equivalence relation with ordered pair  $(4, 3)$  is equal to :

Options :

8643514271. 5

8643514272. 6

8643514273. 7

8643514274. 8

Question Number : 71 Question Id : 8643511421 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

ધારો કે  $A = \{2, 3, 4, 5, \dots, 30\}$  અને  $A \times A$  પરનો સામ્ય સંબંધ ' $\simeq$ ' એ  $(a, b) \simeq (c, d)$  તો અને તો જ  $ad = bc$  પ્રમાણે વ્યાખ્યાયિત છે. તો ક્રમયુક્ત જોડ  $(4, 3)$  સાથે સામ્ય સંબંધનું સમાધાન કરે તેવી ક્રમયુક્ત જોડની સંખ્યા \_\_\_\_\_ છે.

Options :

8643514271. 5

8643514272. 6

8643514273. 7

8643514274. 8

Question Number : 72 Question Id : 8643511422 Question Type : MCQ Option Shuffling : Yes Is

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let  $P(x) = x^2 + bx + c$  be a quadratic polynomial with real coefficients such that  $\int_0^1 P(x) dx = 1$  and  $P(x)$  leaves remainder 5 when it is divided by  $(x - 2)$ . Then the value of  $9(b + c)$  is equal to :

Options :

8643514275. <sup>7</sup>
8643514276. <sup>9</sup>
8643514277. <sup>11</sup>
8643514278. <sup>15</sup>

Question Number : 72 Question Id : 8643511422 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

ધારો કે  $P(x) = x^2 + bx + c$  એ વાસ્તવિક સહગુણકો વાળી એવી દ્વિઘાત બહુપદી છે કે જ્યાં  $\int_0^1 P(x) dx = 1$  તથા  $P(x)$  ને  $(x - 2)$  વડે ભાગતાં શેષ 5 મળે છે. તો  $9(b + c)$  નું મૂલ્ય \_\_\_\_\_ છે.

Options :

8643514275. <sup>7</sup>
8643514276. <sup>9</sup>
8643514277. <sup>11</sup>
8643514278. <sup>15</sup>

Question Number : 73 Question Id : 8643511423 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Consider a rectangle ABCD having 5, 7, 6, 9 points in the interior of the line segments AB, CD, BC, DA respectively. Let  $\alpha$  be the number of triangles having these points from different sides as vertices and  $\beta$  be the number of quadrilaterals having these points from different sides as vertices. Then  $(\beta - \alpha)$  is equal to :

Options :

8643514279. 1173

8643514280. 1890

8643514281. 717

8643514282. 795

Question Number : 73 Question Id : 8643511423 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

રેખાખંડ AB, CD, BC, DA નાં આંતરિક (interior) માં અનુક્રમે 5, 7, 6, 9 બિંદુઓ આવેલા હોય તેવો લંબચોરસ ABCD ગણતરીમાં લો. ધારો કે ભિન્ન બાજુઓ પરનાં આ બિંદુઓ જેના શિરોબિંદુઓ હોય તેવા ત્રિકોણોની સંખ્યા  $\alpha$  તથા ભિન્ન બાજુઓ પરનાં આ બિંદુઓ જેના શિરોબિંદુઓ હોય તેવા ચતુષ્કોણોની સંખ્યા  $\beta$  છે. તો  $(\beta - \alpha) =$  \_\_\_\_\_

Options :

8643514279. 1173

8643514280. 1890

8643514281. 717

8643514282. 795

Question Number : 74 Question Id : 8643511424 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider the integral

$$I = \int_0^{10} \frac{[x] e^{[x]}}{e^{x-1}} dx,$$

where  $[x]$  denotes the greatest integer less than or equal to  $x$ . Then the value of  $I$  is equal

to :

Options :

8643514283. 45 (e + 1)

8643514284. 9 (e + 1)

8643514285. 45 (e - 1)

8643514286. 9 (e - 1)

**Question Number : 74 Question Id : 8643511424 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ધારો કે સંકલ  $I = \int_0^{10} \frac{[x] e^{[x]}}{e^{x-1}} dx,$

જ્યાં  $[x]$  એ  $x$  અથવા  $x$  થી નાનો મહત્તમ પૂર્ણાંક દર્શાવે છે. તો  $I =$  \_\_\_\_\_.

**Options :**

8643514283. 45 (e + 1)

8643514284. 9 (e + 1)

8643514285. 45 (e - 1)

8643514286. 9 (e - 1)

**Question Number : 75 Question Id : 8643511425 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Let  $A(-1, 1)$ ,  $B(3, 4)$  and  $C(2, 0)$  be given three points. A line  $y = mx$ ,  $m > 0$ , intersects lines  $AC$  and  $BC$  at point  $P$  and  $Q$  respectively. Let  $A_1$  and  $A_2$  be the areas of  $\Delta ABC$  and  $\Delta PQC$  respectively, such that  $A_1 = 3A_2$ , then the value of  $m$  is equal to :

**Options :**

8643514287. 1

8643514288.  $\frac{4}{15}$

8643514289. 2

8643514290. 3

**Question Number : 75 Question Id : 8643511425 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ધારો કે  $A(-1, 1)$ ,  $B(3, 4)$  અને  $C(2, 0)$  આપેલ ત્રણ બિંદુઓ છે. રેખા  $y = mx$ ,  $m > 0$  એ રેખાઓ AC અને BC ને અનુક્રમે બિંદુઓ P અને Q માં છેદે છે.

ધારો કે  $A_1$  અને  $A_2$  એ અનુક્રમે  $\Delta ABC$  તથા  $\Delta PQC$  નાં ક્ષેત્રફળ છે, જ્યાં  $A_1 = 3A_2$ . તો  $m$  નું મૂલ્ય \_\_\_\_\_ છે.

**Options :**

8643514287. 1

8643514288.  $\frac{4}{15}$

8643514289. 2

8643514290. 3

**Question Number : 76 Question Id : 8643511426 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

The least value of  $|z|$  where  $z$  is complex number which satisfies the inequality

$$\exp\left(\frac{(|z| + 3)(|z| - 1)}{|z| + 1} \log_e 2\right) \geq \log_{\sqrt{2}} |5\sqrt{7} + 9i|, i = \sqrt{-1}, \text{ is equal to :}$$

**Options :**

8643514291. 2

8643514292.  $\sqrt{5}$

8643514293. 3

8643514294. 8

**Question Number : 76 Question Id : 8643511426 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

જો  $z$  એ અસમતા  $\exp\left(\frac{(|z| + 3)(|z| - 1)}{|z| + 1} \log_e 2\right) \geq \log_{\sqrt{2}} |5\sqrt{7} + 9i|$ ,  $i = \sqrt{-1}$ , નું સમાધાન કરતી

સંકર સંખ્યા હોય, તો  $|z|$  નું લઘુત્તમ મૂલ્ય \_\_\_\_\_ થાય.

**Options :**

8643514291. 2

8643514292.  $\sqrt{5}$

8643514293. 3

8643514294. 8

**Question Number : 77 Question Id : 8643511427 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

The maximum value of  $f(x) = \begin{vmatrix} \sin^2 x & 1 + \cos^2 x & \cos 2x \\ 1 + \sin^2 x & \cos^2 x & \cos 2x \\ \sin^2 x & \cos^2 x & \sin 2x \end{vmatrix}$ ,  $x \in \mathbb{R}$  is :

**Options :**

8643514295.  $\sqrt{5}$

8643514296. 5

8643514297.  $\sqrt{7}$

8643514298.  $\frac{3}{4}$

**Question Number : 77 Question Id : 8643511427 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

$$f(x) = \begin{vmatrix} \sin^2 x & 1 + \cos^2 x & \cos 2x \\ 1 + \sin^2 x & \cos^2 x & \cos 2x \\ \sin^2 x & \cos^2 x & \sin 2x \end{vmatrix}, x \in \mathbb{R} \text{ નું મહત્તમ મૂલ્ય } \underline{\hspace{2cm}} \text{ છે.}$$

**Options :**

8643514295.  $\sqrt{5}$

8643514296.  $5$

8643514297.  $\sqrt{7}$

8643514298.  $\frac{3}{4}$

**Question Number : 78 Question Id : 8643511428 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Given that the inverse trigonometric functions take principal values only. Then, the number of real values of  $x$  which satisfy  $\sin^{-1}\left(\frac{3x}{5}\right) + \sin^{-1}\left(\frac{4x}{5}\right) = \sin^{-1}x$  is equal to :

**Options :**

8643514299.  $0$

8643514300.  $1$

8643514301.  $2$

8643514302.  $3$

**Question Number : 78 Question Id : 8643511428 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

પ્રતિષ ત્રિકોણમિતીય વિધેયો ફક્ત મુખ્ય મૂલ્યો જ લઈ શકે તેવું આપેલ છે. તો  $\sin^{-1}\left(\frac{3x}{5}\right) + \sin^{-1}\left(\frac{4x}{5}\right) = \sin^{-1}x$

નું સમાધાન કરે તેવી  $x$  ની વાસ્તવિક કિંમતોની સંખ્યા \_\_\_\_\_ છે.

**Options :**

8643514299. 0

8643514300. 1

8643514301. 2

8643514302. 3

**Question Number : 79 Question Id : 8643511429 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Let  $f: S \rightarrow S$  where  $S = (0, \infty)$  be a twice differentiable function such that  $f(x+1) = xf(x)$ . If  $g: S \rightarrow \mathbb{R}$  be defined as  $g(x) = \log_e f(x)$ , then the value of  $|g''(5) - g''(1)|$  is equal to :

**Options :**

8643514303.  $\frac{205}{144}$

8643514304.  $\frac{197}{144}$

8643514305.  $\frac{187}{144}$

8643514306. 1

**Question Number : 79 Question Id : 8643511429 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ધારો કે દ્વિ-વિકલનીય વિધેય  $f: S \rightarrow S$ , જ્યાં  $S = (0, \infty)$  માટે  $f(x+1) = xf(x)$  છે. જો  $g: S \rightarrow \mathbb{R}$  એ  $g(x) = \log_e f(x)$  મુજબ વ્યાખ્યાયિત હોય, તો  $|g''(5) - g''(1)|$  ની કિંમત \_\_\_\_\_ છે.

**Options :**

$$8643514303. \frac{205}{144}$$

$$8643514304. \frac{197}{144}$$

$$8643514305. \frac{187}{144}$$

$$8643514306. 1$$

**Question Number : 80 Question Id : 8643511430 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Let  $C_1$  be the curve obtained by the solution of differential equation  $2xy \frac{dy}{dx} = y^2 - x^2, x > 0$ .

Let the curve  $C_2$  be the solution of  $\frac{2xy}{x^2 - y^2} = \frac{dy}{dx}$ . If both the curves pass through (1, 1), then

the area enclosed by the curves  $C_1$  and  $C_2$  is equal to :

**Options :**

$$8643514307. \frac{\pi}{4} + 1$$

$$8643514308. \pi - 1$$

$$8643514309. \frac{\pi}{2} - 1$$

$$8643514310. \pi + 1$$

**Question Number : 80 Question Id : 8643511430 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

ધારો કે  $C_1$  એ વિકલ સમીકરણ  $2xy \frac{dy}{dx} = y^2 - x^2, x > 0$  નાં ઉકેલ દ્વારા મળતો વક્ર છે. ધારો કે વક્ર  $C_2$  એ વિકલ

સમીકરણ  $\frac{2xy}{x^2 - y^2} = \frac{dy}{dx}$  નો ઉકેલ છે. બે બંને વક્રો  $(1, 1)$  માંથી પસાર થાય, તો વક્રો  $C_1$  અને  $C_2$  દ્વારા ઘેરાયેલ ક્ષેત્રફળ

\_\_\_\_\_ છે.

Options :

8643514307.  $\frac{\pi}{4} + 1$

8643514308.  $\pi - 1$

8643514309.  $\frac{\pi}{2} - 1$

8643514310.  $\pi + 1$

## Mathematics Section B

Section Id :	86435196
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 :	86435196
Question Shuffling Allowed :	Yes

Question Number : 81 Question Id : 8643511431 Question Type : SA  
Correct Marks : 4 Wrong Marks : 0

For real numbers  $\alpha$ ,  $\beta$ ,  $\gamma$  and  $\delta$ , if

$$\int \frac{(x^2-1) + \tan^{-1}\left(\frac{x^2+1}{x}\right)}{(x^4+3x^2+1) \tan^{-1}\left(\frac{x^2+1}{x}\right)} dx$$

$$= \alpha \log_e \left( \tan^{-1} \left( \frac{x^2+1}{x} \right) \right) + \beta \tan^{-1} \left( \frac{\gamma(x^2-1)}{x} \right) + \delta \tan^{-1} \left( \frac{x^2+1}{x} \right) + C$$

where C is an arbitrary constant, then the value of  $10(\alpha + \beta\gamma + \delta)$  is equal to \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 81 **Question Id :** 8643511431 **Question Type :** SA

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

વાસ્તવિક સંખ્યાઓ  $\alpha$ ,  $\beta$ ,  $\gamma$  અને  $\delta$  માટે, જો

$$\int \frac{(x^2-1) + \tan^{-1}\left(\frac{x^2+1}{x}\right)}{(x^4+3x^2+1) \tan^{-1}\left(\frac{x^2+1}{x}\right)} dx$$

$$= \alpha \log_e \left( \tan^{-1} \left( \frac{x^2+1}{x} \right) \right) + \beta \tan^{-1} \left( \frac{\gamma(x^2-1)}{x} \right) + \delta \tan^{-1} \left( \frac{x^2+1}{x} \right) + C$$

(જ્યાં C સ્વૈર અચળ છે) હોય તો  $10(\alpha + \beta\gamma + \delta)$  નું મૂલ્ય \_\_\_\_\_ છે.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

Possible Answers :

100

Question Number : 82 Question Id : 8643511432 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

In  $\Delta ABC$ , the lengths of sides AC and AB are 12 cm and 5 cm, respectively. If the area of  $\Delta ABC$  is  $30 \text{ cm}^2$  and R and r are respectively the radii of circumcircle and incircle of  $\Delta ABC$ , then the value of  $2R + r$  (in cm) is equal to \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 82 Question Id : 8643511432 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

$\Delta ABC$  માં, બાજુઓ AC અને AB ની લંબાઈ અનુક્રમે 12 cm અને 5 cm છે. જો  $\Delta ABC$  નું ક્ષેત્રફળ  $30 \text{ cm}^2$  હોય તથા R અને r એ અનુક્રમે પરિવૃત્ત અને અંતઃવૃત્તની ત્રિજ્યા હોય, તો  $2R + r$  ની કિંમત (સે.મી.માં) \_\_\_\_\_ છે.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 83 Question Id : 8643511433 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If the distance of the point  $(1, -2, 3)$  from the plane  $x + 2y - 3z + 10 = 0$  measured parallel to

the line,  $\frac{x-1}{3} = \frac{2-y}{m} = \frac{z+3}{1}$  is  $\sqrt{\frac{7}{2}}$ , then the value of  $|m|$  is equal to \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

Question Number : 83 Question Id : 8643511433 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

જો રેખા  $\frac{x-1}{3} = \frac{2-y}{m} = \frac{z+3}{1}$  થી સમાંતર માપતા બિંદુ  $(1, -2, 3)$  નું સમતલ  $x+2y-3z+10=0$  થી

અંતર  $\sqrt{\frac{7}{2}}$  હોય, તો  $|m| = \underline{\hspace{2cm}}$ .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 84 Question Id : 8643511434 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let  $\vec{c}$  be a vector perpendicular to the vectors  $\vec{a} = \hat{i} + \hat{j} - \hat{k}$  and  $\vec{b} = \hat{i} + 2\hat{j} + \hat{k}$ . If

$\vec{c} \cdot (\hat{i} + \hat{j} + 3\hat{k}) = 8$  then the value of  $\vec{c} \cdot (\vec{a} \times \vec{b})$  is equal to  $\underline{\hspace{2cm}}$ .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 84 Question Id : 8643511434 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ધારો કે  $\vec{c}$  એ સદિશો  $\vec{a} = \hat{i} + \hat{j} - \hat{k}$  અને  $\vec{b} = \hat{i} + 2\hat{j} + \hat{k}$  ને લંબ સદિશ છે. જો

$\vec{c} \cdot (\hat{i} + \hat{j} + 3\hat{k}) = 8$  હોય, તો  $\vec{c} \cdot (\vec{a} \times \vec{b})$  નું મૂલ્ય  $\underline{\hspace{2cm}}$  છે.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 85 Question Id : 8643511435 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  and  $g: \mathbb{R} \rightarrow \mathbb{R}$  be defined as

$$f(x) = \begin{cases} x + a, & x < 0 \\ |x - 1|, & x \geq 0 \end{cases} \text{ and } g(x) = \begin{cases} x + 1, & x < 0 \\ (x - 1)^2 + b, & x \geq 0 \end{cases}$$

where  $a, b$  are non-negative real numbers. If  $(g \circ f)(x)$  is continuous for all  $x \in \mathbb{R}$ , then  $a + b$  is equal to \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 85 Question Id : 8643511435 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ધારો કે  $f: \mathbb{R} \rightarrow \mathbb{R}$  તથા  $g: \mathbb{R} \rightarrow \mathbb{R}$  એ

$$f(x) = \begin{cases} x + a, & x < 0 \\ |x - 1|, & x \geq 0 \end{cases} \text{ તથા } g(x) = \begin{cases} x + 1, & x < 0 \\ (x - 1)^2 + b, & x \geq 0 \end{cases}$$

પ્રમાણે વ્યાખ્યાયિત છે, જ્યાં  $a, b$  અનૃણ (non-negative) વાસ્તવિક સંખ્યાઓ છે. જો દરેક  $x \in \mathbb{R}$  માટે  $(g \circ f)(x)$  સતત હોય, તો  $a + b =$  \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 86 Question Id : 8643511436 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Consider the statistics of two sets of observations as follows :

	Size	Mean	Variance
Observation I	10	2	2
Observation II	n	3	1

If the variance of the combined set of these two observations is  $\frac{17}{9}$ , then the value of n is equal to \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 86 Question Id : 8643511436 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

અવલોકનોનાં બે ગણના આંકડાઓ નીચે મુજબ આપેલ છે :

	કદ	મધ્યક	વિચરણ
અવલોકન I	10	2	2
અવલોકન II	n	3	1

જો બંને અવલોકનોનાં સંયુક્ત ગણનો વિચરણ  $\frac{17}{9}$  હોય, તો n નું મૂલ્ય \_\_\_\_\_ છે.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 87 Question Id : 8643511437 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let  $n$  be a positive integer. Let  $A = \sum_{k=0}^n (-1)^k n C_k \left[ \left(\frac{1}{2}\right)^k + \left(\frac{3}{4}\right)^k + \left(\frac{7}{8}\right)^k + \left(\frac{15}{16}\right)^k + \left(\frac{31}{32}\right)^k \right]$

If  $63A = 1 - \frac{1}{2^{30}}$ , then  $n$  is equal to \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 87 **Question Id :** 8643511437 **Question Type :** SA

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

ધારો કે  $n$  ધન પૂર્ણાંક છે. ધારો કે

$$A = \sum_{k=0}^n (-1)^k n C_k \left[ \left(\frac{1}{2}\right)^k + \left(\frac{3}{4}\right)^k + \left(\frac{7}{8}\right)^k + \left(\frac{15}{16}\right)^k + \left(\frac{31}{32}\right)^k \right].$$

જો  $63A = 1 - \frac{1}{2^{30}}$  હોય, તો  $n =$  \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 88 **Question Id :** 8643511438 **Question Type :** SA

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

Let  $A = \begin{bmatrix} a_1 \\ a_2 \end{bmatrix}$  and  $B = \begin{bmatrix} b_1 \\ b_2 \end{bmatrix}$  be two  $2 \times 1$  matrices with real entries such that  $A = XB$ , where

$X = \frac{1}{\sqrt{3}} \begin{bmatrix} 1 & -1 \\ 1 & k \end{bmatrix}$ , and  $k \in \mathbb{R}$ . If  $a_1^2 + a_2^2 = \frac{2}{3}(b_1^2 + b_2^2)$  and  $(k^2 + 1) b_2^2 \neq -2 b_1 b_2$ , then the

value of  $k$  is \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 88 Question Id : 8643511438 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ધારો કે  $A = \begin{bmatrix} a_1 \\ a_2 \end{bmatrix}$  અને  $B = \begin{bmatrix} b_1 \\ b_2 \end{bmatrix}$  એ બંને વાસ્તવિક ઘટકો વાળા એવા  $2 \times 1$  શ્રેણિક છે કે જેથી  $A = XB$  થાય, જ્યાં

$X = \frac{1}{\sqrt{3}} \begin{bmatrix} 1 & -1 \\ 1 & k \end{bmatrix}$ , અને  $k \in \mathbb{R}$ . જો  $a_1^2 + a_2^2 = \frac{2}{3}(b_1^2 + b_2^2)$  અને  $(k^2 + 1) b_2^2 \neq -2 b_1 b_2$ , તો  $k$  ની કિંમત

\_\_\_\_\_ છે.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 89 Question Id : 8643511439 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let  $\frac{1}{16}$ ,  $a$  and  $b$  be in G.P. and  $\frac{1}{a}$ ,  $\frac{1}{b}$ ,  $6$  be in A.P., where  $a, b > 0$ . Then  $72(a + b)$  is equal to

\_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 89 Question Id : 8643511439 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

ધારો કે  $\frac{1}{16}, a, b$  એ સમગુણોત્તર શ્રેણીમાં અને  $\frac{1}{a}, \frac{1}{b}, 6$  એ સમાંતર શ્રેણીમાં છે, જ્યાં  $a, b > 0$ . તો  $72(a+b) =$

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 90 **Question Id :** 8643511440 **Question Type :** SA

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

Let

$$S_n(x) = \log_{a/2} x + \log_{a/3} x + \log_{a/6} x + \log_{a/11} x + \log_{a/18} x + \log_{a/27} x + \dots \text{ up to } n\text{-terms,}$$

where  $a > 1$ . If  $S_{24}(x) = 1093$  and  $S_{12}(2x) = 265$ , then value of  $a$  is equal to \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

**Question Number :** 90 **Question Id :** 8643511440 **Question Type :** SA

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

$$\text{ધારો કે } S_n(x) = \log_{a/2} x + \log_{a/3} x + \log_{a/6} x + \log_{a/11} x \\ + \log_{a/18} x + \log_{a/27} x + \dots \text{ (n-પદો સુધી),}$$

જ્યાં  $a > 1$ . જો  $S_{24}(x) = 1093$  અને  $S_{12}(2x) = 265$ , તો  $a$  નું મૂલ્ય \_\_\_\_\_ છે.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100