

# National Testing Agency

**Question Paper Name :** B TECH 3rd Aug 2021 Shift 1  
**Subject Name :** B TECH  
**Creation Date :** 2021-08-03 12:59:12  
**Duration :** 180  
**Total Marks :** 300  
**Display Marks:** Yes

## B TECH

**Group Number :** 1  
**Group Id :** 67603313  
**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 :** 67603373  
**Section Number :** 1  
**Section type :** Online  
**Mandatory or Optional :** Mandatory  
**Number of Questions :** 20  
**Number of Questions to be attempted :** 20  
**Section Marks :** 80



**Enable Mark as Answered Mark for Review and Clear Response :** Yes  
**Sub-Section Number :** 1  
**Sub-Section Id :** 67603373  
**Question Shuffling Allowed :** Yes

**Question Number : 1 Question Id : 6760331081 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**  
**Correct Marks : 4 Wrong Marks : 1**

Least count corresponding to the main scale and circular scale of a screw gauge are 0.5 mm and 0.005 mm, respectively. A wire of diameter 2.675 mm is measured with the screw gauge. What would be the reading of divisions on circular scale of the screw gauge, if the zero error of the screw gauge is +0.02 mm ?

**Options :**

6760333241. 31

6760333242. 35

6760333243. 39

6760333244. 61

**Question Number : 2 Question Id : 6760331082 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**  
**Correct Marks : 4 Wrong Marks : 1**

For the one-dimensional motion described by  $x(t) = t - \sin t$

- A.  $v(t) < 0$  for all  $t > 0$
- B.  $x(t) > 0$  for all  $t > 0$
- C.  $v(t)$  lies in between 0 and 2
- D.  $a(t) > 0$  for all  $t > 0$
- E.  $a(t)$  lies in between 2 and 3

Choose the correct answer from the options given below :

**Options :**

6760333245. A, D, E only

6760333246. B, C only

6760333247. B, C, E only

6760333248. C, E only

**Question Number : 3 Question Id : 6760331083 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

A body moving with an initial velocity of  $10 \text{ m/s}$ , maintains a constant acceleration for  $20 \text{ s}$ . If it covers a distance of  $88 \text{ m}$  in its last second, what is its acceleration ?

**Options :**

6760333249.  $3 \text{ m/s}^2$

6760333250.  $4 \text{ m/s}^2$

6760333251.  $2 \text{ m/s}^2$

6760333252.  $0.5 \text{ m/s}^2$

**Question Number : 4 Question Id : 6760331084 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A constant power is fed to an object, starting from rest, moving along a straight line. The distance travelled by the body in time  $t$  is proportional to -

**Options :**

6760333253.  $t^{7/2}$

6760333254.  $t^{5/2}$

6760333255.  $t^{3/2}$

6760333256.  $t^{1/2}$

**Question Number : 5 Question Id : 6760331085 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A carnot engine working at source temperature  $400 \text{ K}$ , takes  $500 \text{ J}$  heat from the source and rejects  $300 \text{ J}$  to sink. What is the temperature of sink ?

**Options :**

6760333257.  $200 \text{ K}$

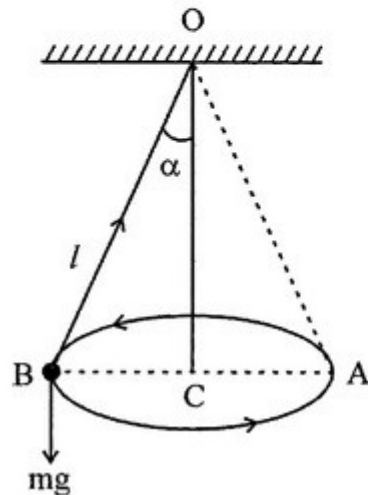
6760333258. 230 K

6760333259. 220 K

6760333260. 240 K

**Question Number : 6 Question Id : 6760331086 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

As shown in the figure, a string of length ' $l$ ' holds a small bob of mass ' $m$ ' while suspended from a point 'O'. The bob revolves about a vertical line OC passing through the point of suspension on a horizontal circle such that the string always remains inclined to the vertical at an angle ' $\alpha$ '. The angular frequency of revolution will be -



Options :

$$\sqrt{\frac{g}{l \cos \alpha}}$$

6760333261.

6760333262.  $\sqrt{\frac{g}{l \sin \alpha}}$

6760333263.  $\sqrt{\frac{g}{l \tan \alpha}}$

6760333264.  $\sqrt{\frac{g}{l}}$

**Question Number : 7 Question Id : 6760331087 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A gas has a constant volume filled in a glass bulb and its pressure becomes 71.00 cm and 100 cm of Hg at 0°C and 100°C respectively. The value of pressure at 30°C is -

**Options :**

6760333265. 73 cm of Hg

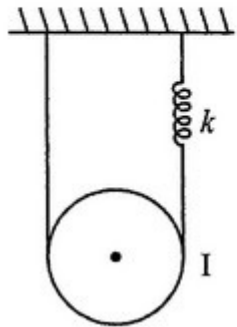
6760333266. 27 cm of Hg

6760333267. 79.7 cm of Hg

6760333268. 78 cm of Hg

Question Number : 8 Question Id : 6760331088 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

A pulley of mass  $m$  and moment of inertia  $I$  about its axis is suspended as shown in the diagram. The spring has spring constant ' $k$ ' and the string does not slip over the pulley. Find the extension in the spring under equilibrium condition.



Options :

6760333269.  $\frac{2k}{mg}$

6760333270.  $\frac{k}{mg}$

6760333271.  $\frac{mg}{k}$

6760333272.  $\frac{mg}{2k}$

Question Number : 9 Question Id : 6760331089 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A sinusoidal wave  $f_1(t) = 3 \sin \omega t$  is superposed on another periodic wave  $f_2(t)$  which is also oscillating with the same frequency. If the resultant wave is a sinusoidal wave, which is out of phase with  $f_1(t)$  by  $53.1^\circ$  ; then the wave  $f_2(t)$  would be -

[Given  $\tan 53.1^\circ = 1.33$ ]

Options :

6760333273.  $f_2(t) = 3 \sin (\omega t)$

6760333274.  $f_2(t) = 4 \sin (\omega t + 53.1^\circ)$

6760333275.  $f_2(t) = 3 \cos (\omega t - 53.1^\circ)$

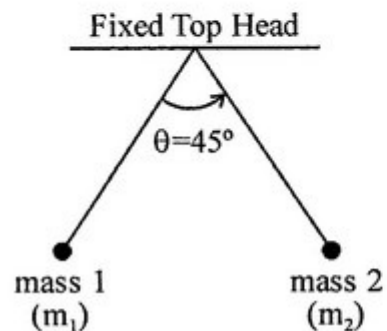
6760333276.  $f_2(t) = 4 \cos (\omega t)$

Question Number : 10 Question Id : 6760331090 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



The diagram shows a scheme of two unequal masses,  $m_1 = 2m$  and  $m_2 = m$  having unequal positive charge on them. They are suspended by two mass-less threads of unequal lengths from a common point such that, during equilibrium,  $m_1$  and  $m_2$  are on same horizontal level. Angle between two strings is  $\theta = 45^\circ$  in this position. Electrostatic force of interaction between the masses will be -



Options :

$$F = \left( \frac{\sqrt{17} - 3}{2} \right) mg$$

6760333277.

$$F = (\sqrt{17} - 3) mg$$

6760333278.

$$F = mg$$

6760333279.

$$F = \left( \frac{\sqrt{11} - 3}{2} \right) mg$$

6760333280.

Question Number : 11 Question Id : 6760331091 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1



Two conducting spheres of radii  $15\text{ cm}$  and  $12\text{ cm}$  are charged and joined by a wire. The ratio of electric fields on the surfaces of the first and the second sphere is -

Options :

6760333281.  $\frac{4}{5}$

6760333282.  $\frac{5}{4}$

6760333283.  $\frac{16}{25}$

6760333284.  $\frac{64}{125}$

**Question Number : 12 Question Id : 6760331092 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Consider the case of a non-homogeneous solid cylinder of radius  $R$  carrying a current ' $I$ ' such that the current density depends on the radial distance ' $r$ ' from the axis of the cylinder as  $J = \sigma r$ , ( $\sigma$  is constant). The magnetic field at a point 'P' at a perpendicular distance  $r (< R)$  from the axis of the cylinder is -

Options :

6760333285.  $\frac{\mu_0 I R^2}{2\pi r^3}$

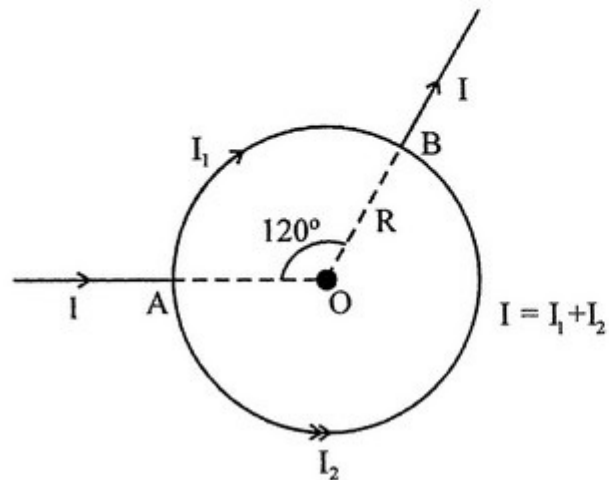
6760333286.  $\frac{\mu_0 I r^2}{2 \pi R^3}$

6760333287.  $\frac{\mu_0 I r^2}{2 \pi R^2}$

6760333288.  $\frac{\mu_0 I R}{2 \pi r^2}$

Question Number : 13 Question Id : 6760331093 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

A current  $I$  enters a circular coil of radius  $R$ , branches into two parts at  $A$  and then recombines at  $B$  (as shown in figure). The resultant magnetic field at the centre of the coil is -



**Options :**

6760333289.  $\frac{2}{3} \left( \frac{\mu_0 I}{2R} \right)$

6760333290.  $\frac{1}{2} \left( \frac{\mu_0 I}{2R} \right)$

6760333291.  $\frac{\mu_0 I}{2R}$

6760333292. Zero

**Question Number : 14 Question Id : 6760331094 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

20 mA current can pass through a galvanometer of resistance  $50 \Omega$  . What resistance in series should be connected through it, so that it is converted into a voltmeter measuring upto 200 Volt ?

**Options :**

6760333293.  $0.995 \Omega$

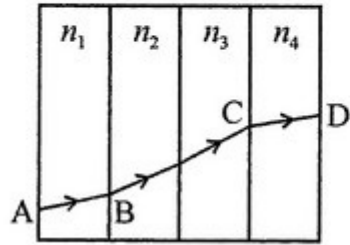
6760333294.  $99.50 \Omega$

6760333295.  $995 \Omega$

6760333296.  $9950 \Omega$

Question Number : 15 Question Id : 6760331095 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

In the given figure, a ray of light passes through four transparent media with refractive indices  $n_1$ ,  $n_2$ ,  $n_3$  and  $n_4$ . The surfaces of all the media are parallel. If the emergent ray CD is parallel to the incident ray AB, we must have -



Options :

6760333297.  $n_1 = n_2$

6760333298.  $n_2 = n_3$

6760333299.  $n_3 = n_4$

6760333300.  $n_4 = n_1$

Question Number : 16 Question Id : 6760331096 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

A beam of light is incident on the surface of a transparent liquid at an angle of  $60^\circ$ . The reflected and refracted lights are found to be perpendicular to each other. The refractive index of transparent liquid is -

Options :

6760333301.  $\sqrt{5}$

6760333302.  $\sqrt{3}$

6760333303.  $\sqrt{2}$

6760333304. 1

**Question Number : 17 Question Id : 6760331097 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

A compound microscope has a magnification of 30. Assuming that the final image is formed at the least distance of distinct vision ( $25\text{ cm}$ ), find the magnification produced by the objective lens of the microscope. Given focal length of the eye piece is  $5\text{ cm}$ .

**Options :**

6760333305. 4

6760333306. 5

6760333307. 3

6760333308. 2

**Question Number : 18 Question Id : 6760331098 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

An amount of  $8 \times 10^{20}$  photons per second are emitting from a monochromatic source of light operated at 500W, with 80% efficiency. The wavelength of the light is \_\_\_\_\_. (Take  $h = 6.63 \times 10^{-34} \text{ Js}$ ).

**Options :**

6760333309. 460 nm

6760333310. 450 nm

6760333311. 425 nm

6760333312. 398 nm

**Question Number : 19 Question Id : 6760331099 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Given below are two statements :

**Statement I :** A two input OR gate and a two input AND gate have similar inputs. but outputs may be same or different.

**Statement II :** An AND gate has inputs A and B. The input B is always low, the state of input A can effect the output.

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

**Options :**

6760333313. Both Statement I and Statement II are true.

6760333314. Both Statement I and Statement II are false.

6760333315. Statement I is true but Statement II is false.

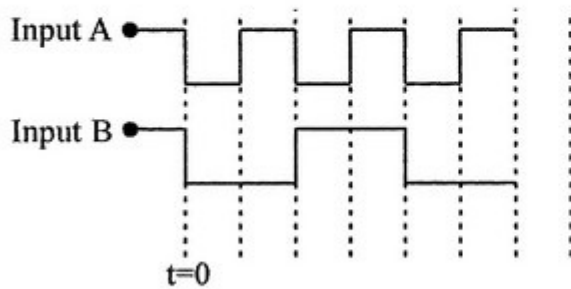
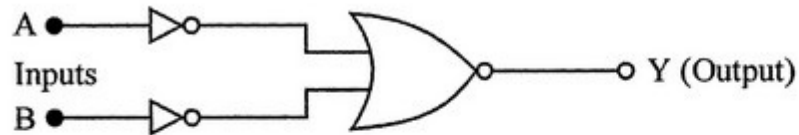




6760333316. Statement I is false but Statement II is true.

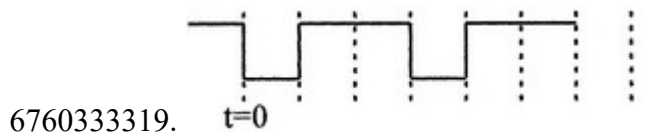
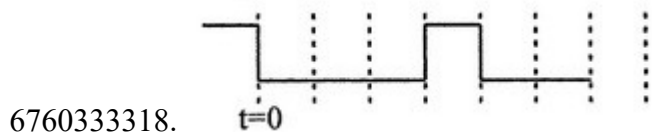
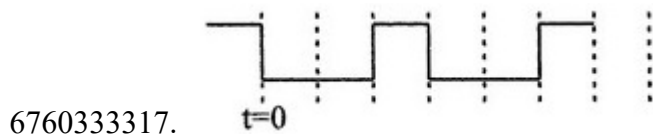
Question Number : 20 Question Id : 6760331100 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

In the given figure, a logic circuit has the input waveforms 'A' and 'B'.



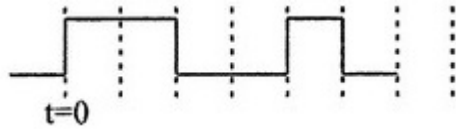
The correct output waveform will be -

Options :





6760333320.



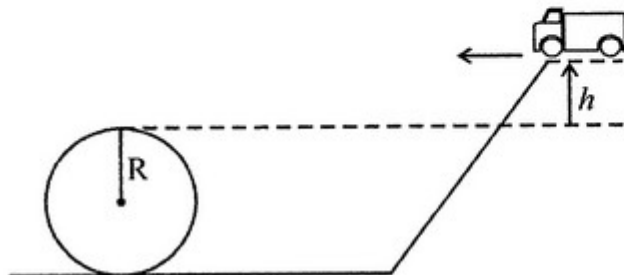
## Physics Section B

Section Id :	67603374
Section Number :	2
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	67603374
Question Shuffling Allowed :	Yes

Question Number : 21 Question Id : 6760331101 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The given figure shows a loop-the-loop track having radius  $760 \text{ cm}$ . A car without engine starts from a platform at a distance ' $h$ ' above the top of the loop and goes around the loop without falling off the track. The minimum value of ' $h$ ' required for a successful looping is \_\_\_\_\_  $\text{cm}$ . (Ignore friction)



**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 :** 6760331102 **Question Type :** SA

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

A steam engine intakes 80 g steam at 100°C per minute and cools it down to 30°C. The heat energy consumed by the steam engine per minute is \_\_\_\_\_ Cal. (Latent heat of vaporization of steam = 540 Cal/g)

**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 :** 6760331103 **Question Type :** SA

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

The length of a wire is increased by 20% by stretching. The percentage increase in resistance of wire will be \_\_\_\_\_.

**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 : 6760331104 Question Type : SA**

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

An inductor coil stores 32 J of magnetic field energy and dissipates energy as heat at the rate of 64 W when a current of 8 A is passed through it. When this coil is joined across an ideal battery, the time constant of the circuit is \_\_\_\_\_ s (second).

**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 : 6760331105 Question Type : SA**

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

A photoelectric metal of work function 1 eV is used for photoelectric effect. When a radiation of wavelength 621 nm is incident on the photometal, the maximum kinetic energy of photoelectrons approximately is \_\_\_\_\_ (in eV). [Given  $hc=1242$  eV-nm]

**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 : 6760331106 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Two particles having position vectors  $\vec{r}_1 = (2\vec{i} + 3\vec{j})m$  and

$\vec{r}_2 = (-10\vec{i} + 3\vec{j})m$  are moving with velocities  $\vec{v}_1 = (\vec{i} - 2\vec{j})m/s$  and

$\vec{v}_2 = (5\vec{i} - b\vec{j})m/s$ . If they meet after 3 second, the value of 'b' is \_\_\_\_\_.

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 : 6760331107 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Two rods X and Y of identical dimensions are at temperature  $40^\circ\text{C}$ . If X is heated upto  $200^\circ\text{C}$  and Y is heated upto  $T^\circ\text{C}$ , then also the new lengths are the same. If the ratio of the coefficients of linear expansion of X and Y is 8 : 10 then the value of T is \_\_\_\_\_ K.

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 : 6760331108 Question Type : SA**

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

The time period of a satellite of earth is 10 hours. If the separation between the earth and the satellite is increased to 16 times the previous value, the new time period will become \_\_\_\_\_ minutes.

**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 : 6760331109 Question Type : SA**

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

A steel bar of mass  $16 \times 10^{-3} \text{ kg}$  and density  $8 \times 10^3 \text{ kg/m}^3$  is used to make a bar magnet. The magnetic moment of the bar magnet is  $4 \text{ A-m}^2$ . The intensity of magnetization of the magnet will be \_\_\_\_\_  $\times 10^6 \text{ A/m}$ .

**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 : 6760331110 Question Type : SA**

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

A ray of monochromatic light is incident on one refracting face of prism of angle  $75^\circ$ . It passes through the prism and is incident on the other face at the critical angle. If the refractive index of the material of the prism is  $\sqrt{2}$ , the angle of incidence on the first face of the prism is \_\_\_\_\_. (degree).

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

## Chemistry Section A

<b>Section Id :</b>	67603375
<b>Section Number :</b>	3
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	20
<b>Number of Questions to be attempted :</b>	20
<b>Section Marks :</b>	80
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	67603375
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 31 Question Id : 6760331111 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**





The true value of a result is 5.0g and a student 'A' takes two measurements and reports the result as 5.3 and 5.4g. Another student 'B' repeats the measurement and reports 4.6 and 4.7g. Pick the statement from below that correctly describes the reports of A and B.

**Options :**

6760333331. Reports of both A and B are both precise and accurate
6760333332. Reports of both A and B are neither precise nor accurate
6760333333. Reports of A and B are both precise but not accurate
6760333334. Reports of A and B are both accurate but not precise.

**Question Number : 32 Question Id : 6760331112 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Given below are two statements :

**Statement I :** In  $\text{CH}_2\text{F}_2$  molecule  $\angle\text{FCF}$  is less than  $109.5^\circ$

**Statement II :** In  $\text{CH}_2\text{F}_2$  molecule both  $\angle\text{FCF}$  and  $\angle\text{HCH}$  are equal

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

**Options :**

6760333335. Both Statement I and Statement II are correct



6760333336. Both Statement I and Statement II are incorrect

6760333337. Statement I is correct but Statement II is incorrect

6760333338. Statement I is incorrect but Statement II is correct.

**Question Number : 33 Question Id : 6760331113 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The correct order of second ionization enthalpy is

**Options :**

6760333339.  $V > Cr > Mn > Fe$

6760333340.  $Fe > Mn > Cr > V$

6760333341.  $Cr > Fe > Mn > V$

6760333342.  $Fe > Cr > Mn > V$

**Question Number : 34 Question Id : 6760331114 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Ellingham diagram does not predict the

**Options :**

6760333343. reducing ability of a metal

6760333344. rate of a reaction



6760333345. overall free energy of a reaction

6760333346. feasibility of a reaction

**Question Number : 35 Question Id : 6760331115 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Sodium chromate reacts with hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) in the presence of dilute sulphuric acid to yield

**Options :**

6760333347. Chromyl chloride

6760333348. Chromium pentoxide

6760333349. Sodium dichromate

6760333350. Chromium sulphate

**Question Number : 36 Question Id : 6760331116 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

The percentage of oxides in Portland Cement decreases in the order

**Options :**

6760333351.  $\text{CaO} > \text{SiO}_2 > \text{Al}_2\text{O}_3 > \text{MgO}$



6760333352.  $\text{CaO} > \text{Al}_2\text{O}_3 > \text{MgO} > \text{SiO}_2$

6760333353.  $\text{SiO}_2 > \text{CaO} > \text{MgO} > \text{Al}_2\text{O}_3$

6760333354.  $\text{SiO}_2 > \text{CaO} > \text{Al}_2\text{O}_3 > \text{MgO}$

**Question Number : 37 Question Id : 6760331117 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Select from the following, the correct order of reducing property

**Options :**

6760333355.  $\text{H}_2\text{S} > \text{H}_2\text{Se} > \text{H}_2\text{Te}$

6760333356.  $\text{H}_2\text{Te} > \text{H}_2\text{Se} > \text{H}_2\text{S}$

6760333357.  $\text{H}_2\text{Te} > \text{H}_2\text{S} > \text{H}_2\text{Se}$

6760333358.  $\text{H}_2\text{Se} > \text{H}_2\text{S} > \text{H}_2\text{Te}$

**Question Number : 38 Question Id : 6760331118 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Identify the actinoid which shows +5 oxidation state :

**Options :**

6760333359. Curium (Atomic no. 96)

6760333360. Thorium (Atomic no. 90)

6760333361. Americium (Atomic no. 95)

6760333362. Fermium (Atomic no. 100)

**Question Number : 39 Question Id : 6760331119 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1**

The correct statement for permanganate ion is

**Options :**

6760333363. It has highly distorted tetrahedral structure.

6760333364. It has two Mn—O double bonds.

6760333365. It can be made by reduction of  $\text{MnO}_4^{2-}$ .

6760333366. It has three  $\pi$ -bonds.

**Question Number : 40 Question Id : 6760331120 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1**

Match List I with List II :

<b>List I :</b>	<b>List II :</b>
A. 'Blue baby' syndrome	I. Mercury
B. Eutrophication	II. Cadmium
C. Minimata disease	III. Nitrate
D. Itai-Itai disease	IV. Phosphate

Choose the correct answer from the options given below :

**Options :**

6760333367. A-III, B-IV, C-II, D-I

6760333368. A-III, B-IV, C-I, D-II

6760333369. A-IV, B-III, C-II, D-I

6760333370. A-IV, B-II, C-I, D-III

**Question Number : 41 Question Id : 6760331121 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1**

Given below are two statements :

**Statement I :** Histamine on Lassaigne's test gives blue colour.

**Statement II :** Pencillin on Lassaigne's test gives blue colour.

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

**Options :**

6760333371. Both Statement I and Statement II are correct

6760333372. Both Statement I and Statement II are incorrect

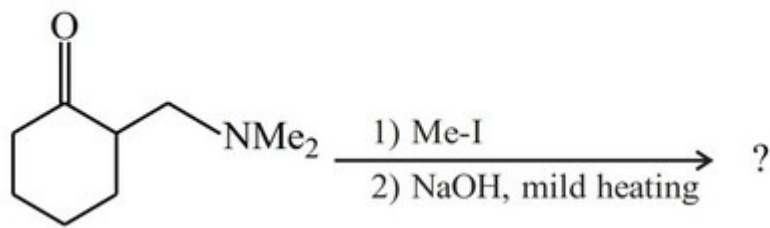
6760333373. Statement I is correct but Statement II is incorrect

6760333374. Statement I is incorrect but Statement II is correct.

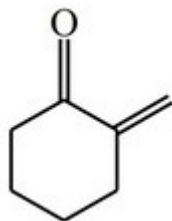
**Question Number : 42 Question Id : 6760331122 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

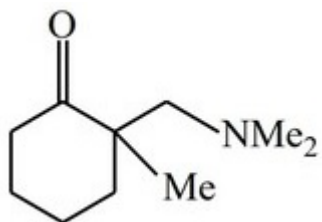
Find out the correct major product from the following reaction (Me = - CH<sub>3</sub>)



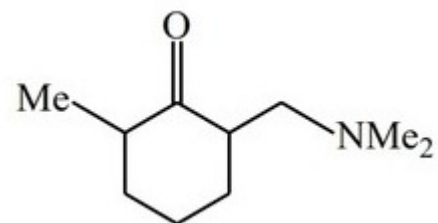
**Options :**



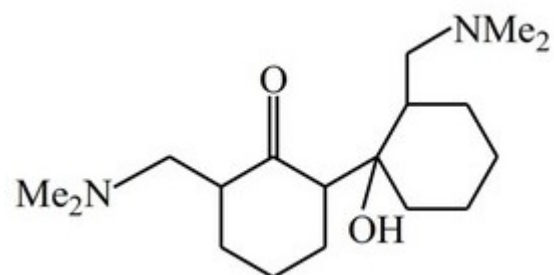
6760333375.



6760333376.



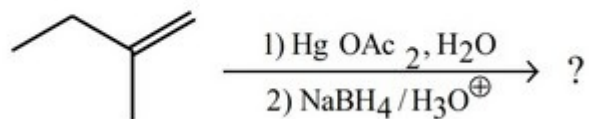
6760333377.



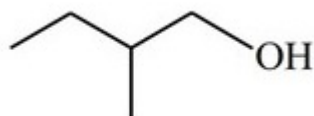
6760333378.

Question Number : 43 Question Id : 6760331123 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Find out the major product of the following reaction



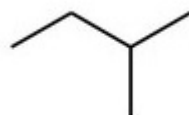
Options :



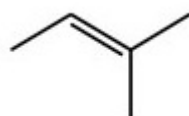
6760333379.



6760333380.



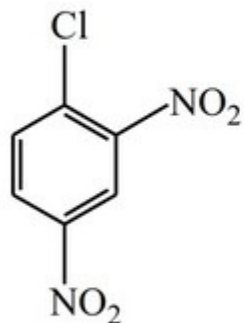
6760333381.



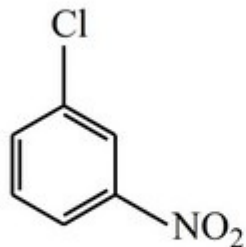
6760333382.

Question Number : 44 Question Id : 6760331124 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

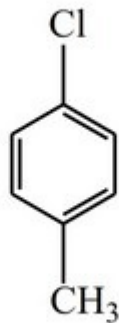
The correct arrangement of the following compounds in the order of increasing difficulty towards nucleophilic substitution is



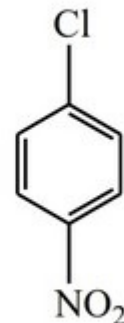
I



II



III



IV

Options :

6760333383. I, II, IV, III

6760333384. IV, III, I, II

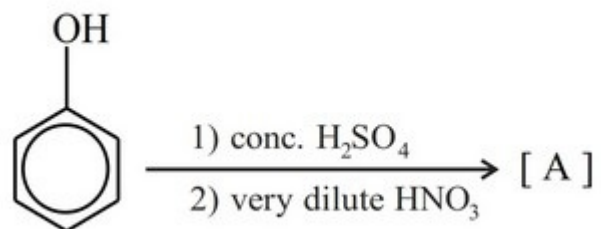
6760333385. I, II, III, IV

6760333386. I, IV, II, III

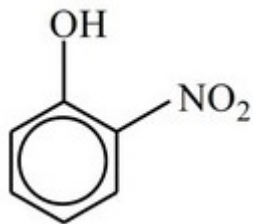
Question Number : 45 Question Id : 6760331125 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1



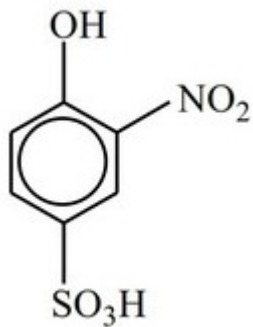
Product [A] obtained in the following transformation is



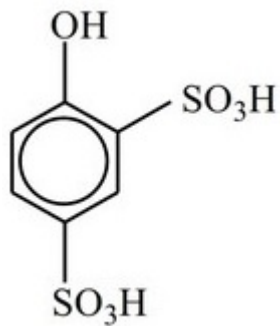
Options :



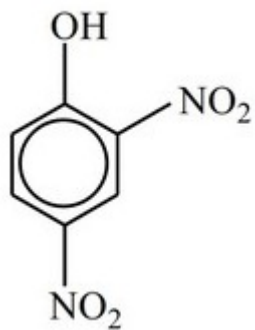
6760333387.



6760333388.



6760333389.



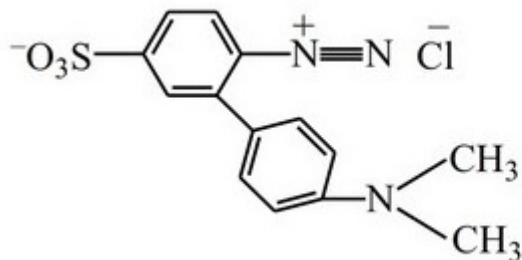
6760333390.

**Question Number : 46 Question Id : 6760331126 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

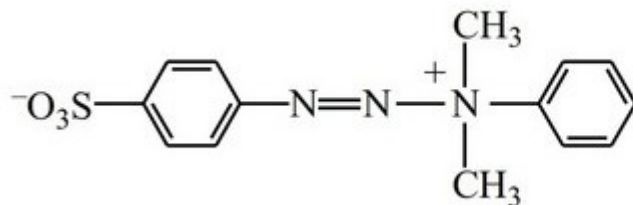
Sulphanilic acid on diazotisation and then reaction with N,N-dimethylaniline gives which of the following? Mark if their common name is correctly matched.

**Options :**



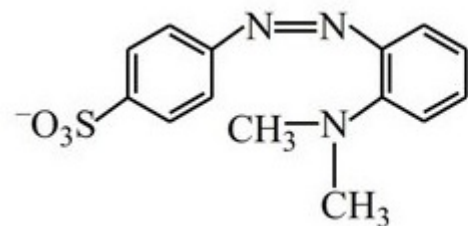
– Orange-II

6760333391.



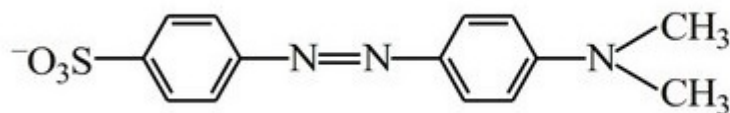
– Pink-I dye

6760333392.



– Para red

6760333393.



– Methyl orange

6760333394.

**Question Number : 47 Question Id : 6760331127 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

**Match List I with List II :**

List I - Polymer	List II - Type
A. Bakelite	I. Branched chain
B. HDP	II. Linear
C. LDP	III. Network
D. Rayon	IV. Semi-synthetic

Choose the correct answer from the options given below :

**Options :**

6760333395. A → III, B → II, C → I, D → IV

6760333396. A → IV, B → I, C → II, D → III

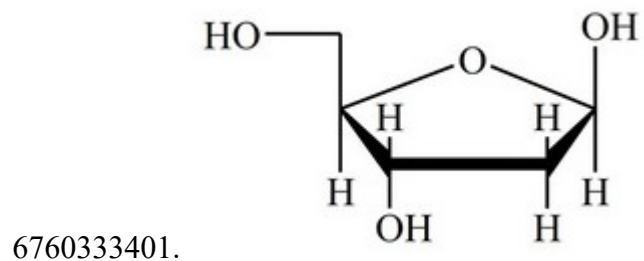
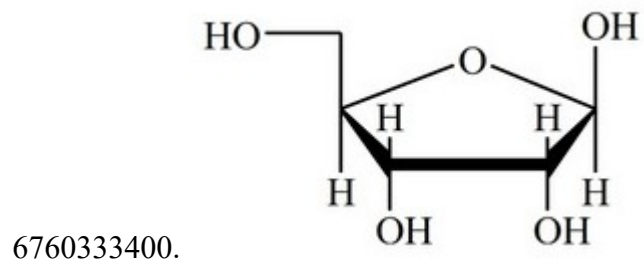
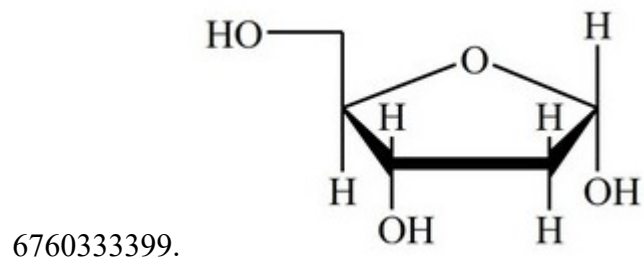
6760333397. A → III, B → I, C → II, D → IV

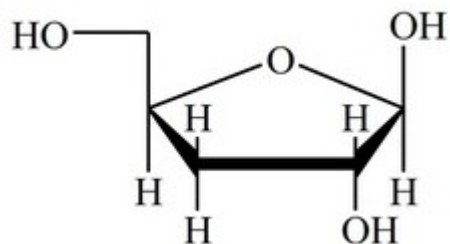
6760333398. A → II, B → III, C → I, D → IV

**Question Number : 48 Question Id : 6760331128 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The correct structure of  $\beta$ -D-deoxyribose present in DNA is

**Options :**





6760333402.

Question Number : 49 Question Id : 6760331129 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match List I with List II :

List I	List II
A. Hell-Volhard-Zelinsky reaction	I. Test for primary amines
B. Hinsberg's reagent	II. Preparation of $\alpha$ -halocarboxylic acids
C. Isocyanide test	III. Preparation of primary amines
D. Hoffmann bromamide degradation	IV. Differentiates 1 <sup>o</sup> , 2 <sup>o</sup> and 3 <sup>o</sup> amines.

Choose the correct answer from the options given below :

Options :

6760333403. A  $\rightarrow$  II, B  $\rightarrow$  IV, C  $\rightarrow$  I, D  $\rightarrow$  III

6760333404. A  $\rightarrow$  III, B  $\rightarrow$  IV, C  $\rightarrow$  I, D  $\rightarrow$  II

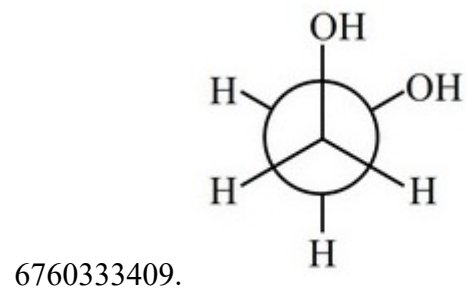
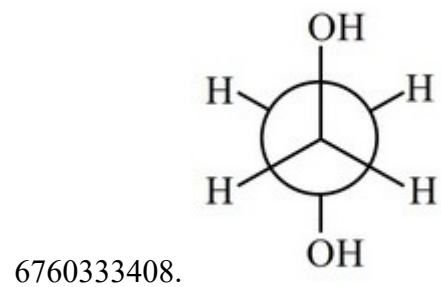
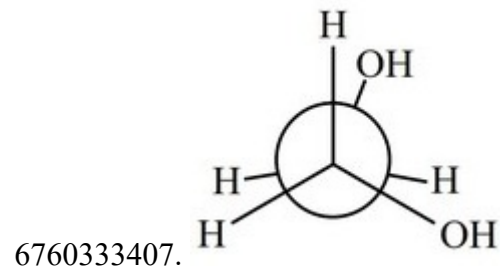
6760333405. A  $\rightarrow$  II, B  $\rightarrow$  I, C  $\rightarrow$  IV, D  $\rightarrow$  III

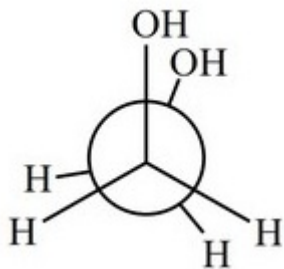
6760333406. A → III, B → I, C → II, D → IV

Question Number : 50 Question Id : 6760331130 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Which of the following is the most stable conformer?

Options :





6760333410.

## Chemistry Section B

<b>Section Id :</b>	67603376
<b>Section Number :</b>	4
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	10
<b>Number of Questions to be attempted :</b>	5
<b>Section Marks :</b>	20
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	67603376
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 51 Question Id : 6760331131 Question Type : SA**  
**Correct Marks : 4 Wrong Marks : 0**

Assuming  $H_2$  is an ideal gas, consider the quantity “ $P.d$ ”, where ‘ $P$ ’ is the pressure in atm and ‘ $d$ ’ is the density in  $g L^{-1}$ . For  $P = 8.21$  atm, it is observed that

$$\left(\frac{\partial(Pd)}{\partial P}\right)_T = 10.0 \text{ g L}^{-1}. \text{ The corresponding temperature in K is } \underline{\hspace{2cm}}.$$

(Nearest integer)

[Assume  $R = 0.0821 \text{ L atm mol}^{-1} \text{ K}^{-1}$ ]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

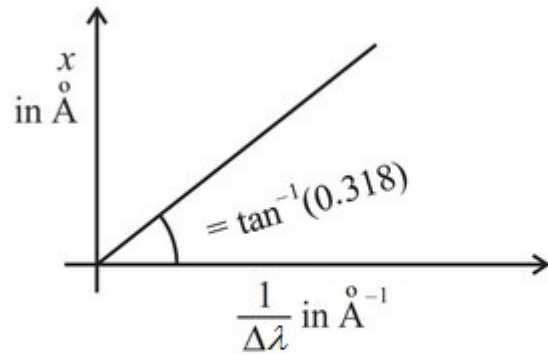
100

**Question Number :** 52 **Question Id :** 6760331132 **Question Type :** SA

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



A graph of the uncertainty in position against the inverse of the uncertainty in wavelength of an electron is shown.



The wavelength of the electron in  $\text{Å}$  is \_\_\_\_\_. (Nearest integer)

[Assume minimum uncertainty product. Use  $\pi = 3.142$ , Use  $\Delta(g(y)) = |g'(y)| \Delta y$  ; where  $g$  is an arbitrary function of  $y$ .]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

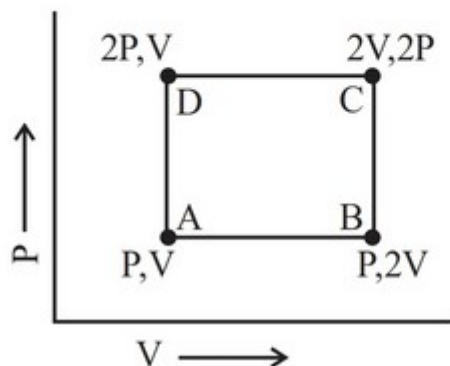
**Possible Answers :**

100

**Question Number :** 53 **Question Id :** 6760331133 **Question Type :** SA

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

An ideal monoatomic gas traverses the cycle ABCD as shown below in the figure. The work done during the cycle is  $xPV$ . The value of  $x$  is \_\_\_\_\_. (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 :** 54 **Question Id :** 6760331134 **Question Type :** SA

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

The amount of ethyl alcohol ( $C_2H_5OH$ ) that should be added to 1kg of water so that the solution does not freeze at  $-4^\circ F$  ( $K_f = 1.86 \text{ K kg mol}^{-1}$ ) in g is \_\_\_\_\_. (Nearest integer) (Given Atomic mass C=12.0, H=1.0, O=16.0 u)

**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 : 6760331135 Question Type : SA**

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

If 1 M solution of acetic acid is diluted  $x$  times so that pH of the solution is doubled.

The value of  $x$  is ( $K_a = 1.8 \times 10^{-5}$ ) \_\_\_\_\_. (Nearest integer)

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

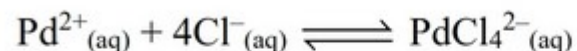
**Possible Answers :**

100

**Question Number : 56 Question Id : 6760331136 Question Type : SA**

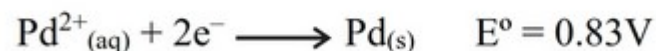
**Correct Marks : 4 Wrong Marks : 0**

The logarithm of equilibrium constant ( $\log_{10}K$ ) for the reaction



is  $x \times 10^{-1}$ . The value of  $x$  is \_\_\_\_\_. (Nearest integer)

[Given emf for the half-cell at 25°C



**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

Question Number : 57 Question Id : 6760331137 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The following results have been obtained during the kinetic studies of the reaction.



Experiment	[A], mol L <sup>-1</sup>	[B], mol L <sup>-1</sup>	Initial rate of formation of [C], mol L <sup>-1</sup> min <sup>-1</sup>
1	0.60	0.60	0.20
2	0.60	1.20	0.80
3	1.20	0.60	0.40

The order of the reaction with respect to B is \_\_\_\_\_.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

Question Number : 58 Question Id : 6760331138 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

200 mL of 0.85M acetic acid is shaken with 2g activated charcoal. The final concentration of the solution after adsorption is 0.75M. The mass of acetic acid in grams adsorbed per gram of charcoal is equal to \_\_\_\_\_  $\times 10^{-1}$ . (Nearest integer)  
(Given Atomic mass : C=12.0, H=1.0, O=16.0 u)

**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 :** 6760331139 **Question Type :** SA

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

The number of ions produced in an aqueous solution from the octahedral complex with stoichiometry  $\text{CoCl}_3 \cdot 5\text{H}_2\text{O}$ , is \_\_\_\_\_.

**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 :** 6760331140 **Question Type :** SA

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

The strength of 25 volume solution of hydrogen peroxide in percentage is \_\_\_\_\_  $\times 10^{-1}$ . (Nearest integer)

**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 :	67603377
Section Number :	5
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	67603377
Question Shuffling Allowed :	Yes

Question Number : 61 Question Id : 6760331141 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If  $S_1 = \{x \in \mathbb{R} : x^2 + |x| - 2 = 0\}$  and  $S_2 = \{x \in \mathbb{R} : x^2 + x - 2 = 0\}$ , then

Options :

6760333421.  $S_1 \cup S_2$  has 4 elements.

6760333422.  $S_1 \cup S_2$  has 2 elements.

6760333423.  $S_1 \cap S_2$  has 2 elements.

6760333424.  $S_1 \cap S_2$  has 1 element.

**Question Number : 62 Question Id : 6760331142 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

$$\text{Let } A = \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix} \text{ and } B = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix}.$$

Then the set  $\{n \in \mathbb{N} \mid A^n + A^{n+1} + A^{n+2} = B\}$  is

**Options :**

6760333425. an empty set

6760333426. a finite set

6760333427. a proper infinite subset of  $\mathbb{N}$

6760333428. equal to  $\mathbb{N}$

**Question Number : 63 Question Id : 6760331143 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

Let  $A$  be a square matrix of order 3 and  $|A| = 3$ .

If  $|\text{Adj}(3 \text{Adj}(4A))| = 2^m \cdot 3^n$ , then the ordered pair  $(m, n)$  is equal to



**Options :**

6760333429. (20, 8)

6760333430. (20, 10)

6760333431. (24, 9)

6760333432. (24, 10)

**Question Number : 64 Question Id : 6760331144 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

For the system of linear equations

$$x + 3y + 2z = 7$$

$$x + \lambda y + 3z = 8$$

$$x - 2y + 7z = \mu,$$

which of the following statements is **NOT** true?

**Options :**

6760333433. The system has infinitely many solutions if  $\lambda = 2$  and  $\mu = 12$ .

6760333434. The system has no solution if  $\lambda = 2$  and  $\mu \neq 12$ .

6760333435. The system has a unique solution if  $\lambda \neq 2$  and  $\mu = 12$ .

6760333436. The system has no solution if  $\lambda \neq 2$  and  $\mu \neq 12$ .

Question Number : 65 Question Id : 6760331145 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

The value of the limit :  $\lim_{x \rightarrow 4} 2^x + 2^{5-x} - 17 \frac{1}{8-2^{3x/4}}$  is equal to

Options :

6760333437.  $e^{7/3}$

6760333438.  $e^{-7/3}$

6760333439.  $e^{3/7}$

6760333440.  $3e^7$

Question Number : 66 Question Id : 6760331146 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No  
Correct Marks : 4 Wrong Marks : 1

Suppose that the function

$$f(x) = \begin{cases} x^2 - [x] + 2a; & x < -1 \\ 4x + 5 - b; & -1 \leq x < 2 \\ 3x^2 + 6[x] - 2a; & x \geq 2 \end{cases}$$

is continuous on  $(-2, 3)$  for some values of  $a$  and  $b$  where  $[x]$  denotes the greatest integer function. Then the value of  $8ab$  is

Options :

6760333441. 135

6760333442. -117

6760333443. -104

6760333444. 99

**Question Number : 67 Question Id : 6760331147 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The sum of the intercepts on the coordinate axes made by the tangent at any point on the curve,  $\sqrt{x} + \sqrt{y} = 3$  is

**Options :**

6760333445. 3

6760333446. 6

6760333447. 9

6760333448. 12

**Question Number : 68 Question Id : 6760331148 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A plane passes through the points A(1, 2, 3), B(3, 5, 2) and C(2, 1, 5). If P(a, b, c) be a point such that  $a(b + c) = bc$ , then the acute angle which the line OP (O is the origin and  $P \neq O$ ) makes with the plane is

Options :

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

6760333449.

$$\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$$

6760333450.

$$\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$$

6760333451.

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

6760333452.

**Question Number : 69 Question Id : 6760331149 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

$$\text{If } \int \frac{4x+13}{\sqrt{x^2+5x+6}} dx = A\sqrt{x^2+5x+6} + B \log_e \left| \left( x + \frac{5}{2} \right) + \sqrt{x^2+5x+6} \right| + C$$

(C is a constant of integration), then the ordered pair (A, B) is equal to

Options :

6760333453. (3, 4)

6760333454.  $\left(4, \frac{3}{2}\right)$

6760333455.  $(2, 3)$

6760333456.  $(4, 3)$

**Question Number : 70 Question Id : 6760331150 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

$\int_1^2 [x^2 - 1] + [x^2 + 1] dx$  is equal to ( $[t]$  denotes the greatest integer  $\leq t$ )

**Options :**

6760333457.  $\frac{14}{3}$

6760333458.  $5 - \sqrt{2} - \sqrt{3}$

6760333459.  $1$

6760333460.  $10 - 2\sqrt{2} - 2\sqrt{3}$

**Question Number : 71 Question Id : 6760331151 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If  $x = x(y)$  is the solution of the differential equation,

$$2 \cdot \sqrt{\sin x + \tan^{-1} y} \cdot \frac{dy}{dx} = \left( \cos x + \frac{1}{1+y^2} \frac{dy}{dx} \right) \text{ satisfying } x(0) = 0 \text{ and } x(1) = b, \text{ then}$$

Options :

6760333461.  $4 \sin b + \pi = 4$

6760333462.  $4 \cos b + \pi = 4$

6760333463.  $2 \sin b + \pi = 2$

6760333464.  $2 \cos b + \pi = 2$

**Question Number : 72 Question Id : 6760331152 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The sum of the values of 'a' for which circles of radius  $\frac{\sqrt{5}}{3}$ , touch the straight lines,  $x - 2y - a = 0$  and  $3x - 6y + 7 = 0$ , is

Options :

6760333465.  $\frac{14}{3}$

6760333466.  $-\frac{20}{3}$



6760333467.  $\frac{10}{3}$

6760333468.  $-\frac{14}{3}$

**Question Number : 73 Question Id : 6760331153 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If the line  $\alpha x + \beta y = 1$  touches the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ , then the locus of the point

$(\alpha, \beta)$  is

**Options :**

6760333469.  $a^2x^2 - b^2y^2 = 1$

6760333470.  $b^2x^2 - a^2y^2 = 1$

6760333471.  $a^2x^2 + b^2y^2 = 1$

6760333472.  $b^2x^2 + a^2y^2 = 1$

**Question Number : 74 Question Id : 6760331154 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If the tangents at the points  $(2, y)$  on the ellipse,  $\frac{x^2}{16} + \frac{y^2}{4} = 1$  meet the tangent at  $(4, y_1)$  on it at the points A and B, then the length of the line segment AB is

Options :

6760333473.  $2\sqrt{3}$

6760333474.  $\frac{2\sqrt{3}}{3}$

6760333475.  $\frac{4\sqrt{3}}{3}$

6760333476.  $4\sqrt{3}$

**Question Number : 75 Question Id : 6760331155 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The distance of the origin from the point of intersection of the line,  $\frac{x}{2} = \frac{y+1}{3} = \frac{z-1}{-1}$  and the plane,  $2x + y + 6z + 1 = 0$  is

Options :

6760333477.  $4\sqrt{6}$

6760333478.  $2\sqrt{3}$



6760333479.  $\sqrt{544}$

6760333480.  $\sqrt{554}$

**Question Number : 76 Question Id : 6760331156 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

The plane which is parallel to  $\vec{r} \cdot (\hat{i} + 2\hat{j} + 3\hat{k}) = 6$  and passes through (1, 2, 3), also passes through the point

**Options :**

6760333481. (2, 6, 1)

6760333482. (2, 6, 0)

6760333483. (3, 6, -1)

6760333484. (3, 5, 1)

**Question Number : 77 Question Id : 6760331157 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If  $\sum_{i=1}^{16} a_i - 6 = 8$  and  $\sum_{i=1}^{16} a_i - 6^2 = 40$ , then the standard deviation of  $a_1, a_2, \dots, a_{16}$  is

**Options :**

6760333485.  $\frac{2}{3}$

6760333486.  $\frac{3}{2}$

6760333487.  $\frac{5}{2}$

6760333488.  $\frac{2}{5}$

**Question Number : 78 Question Id : 6760331158 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No**

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

Let  $A = \{0, 1, 2, 3, 4, 5\}$ . Then the probability that a randomly selected onto function  $f$  from  $A$  to  $A$  satisfies  $f(1) + f(2) = f(3)$  is

**Options :**

6760333489.  $\frac{1}{10}$

6760333490.  $\frac{3}{20}$

6760333491.  $\frac{1}{20}$

6760333492.  $\frac{1}{15}$

**Question Number : 79 Question Id : 6760331159 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

A vertical pole consists of two portions, the lower being  $\frac{1}{3}$ rd of the whole. If the upper portion subtends an angle  $\tan^{-1}\left(\frac{1}{2}\right)$  at a point on a horizontal plane drawn through the foot of the pole and at a distance 40 m from it, then the height (in m) of the pole can be

**Options :**

6760333493. 36

6760333494. 35

6760333495. 40

6760333496. 60

**Question Number : 80 Question Id : 6760331160 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1**

If  $\square, \diamond \in \{\wedge, \vee\}$  such that  $(\sim q \wedge p) \square (q \diamond \sim p)$  is a tautology, then

**Options :**

6760333497.  $\square = \wedge$  and  $\diamond = \wedge$

6760333498.  $\square = \wedge$  and  $\diamond = \vee$

6760333499.  $\square = \vee$  and  $\diamond = \wedge$

6760333500.  $\square = \vee$  and  $\diamond = \vee$

## Mathematics Section B

<b>Section Id :</b>	67603378
<b>Section Number :</b>	6
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	10
<b>Number of Questions to be attempted :</b>	5
<b>Section Marks :</b>	20
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	67603378
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 81 Question Id : 6760331161 Question Type : SA**

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

If  $x^2 - x + 1 = 0$ , then the value of  $\sum_{n=1}^5 \left( x^n + \frac{1}{x^n} \right)^2$  is \_\_\_\_\_.

**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 : 6760331162 Question Type : SA**

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

The sum of modulus of all non-real roots of the equation,  
 $(x^2 + 4x + 6)(2x^2 + 8x + 14) = 12$  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 : 83 Question Id : 6760331163 Question Type : SA**

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

If the number of permutations of the word “STATISTICS” in which all ‘S’ do not come together, is  $(56)^2k$ , then ‘k’ 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 : 84 Question Id : 6760331164 Question Type : SA**

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



The remainder when  $(2020)^{2022}$  is divided by 337 is \_\_\_\_\_.

**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 :** 6760331165 **Question Type :** SA

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

Let  $n \geq 1$  be an odd integer and  $S_n = n^3 - (n-1)^3 + (n-2)^3 - \dots + (-1)^{n-1} 1^3$ .

If  $S_{199} - 4 S_{99} = 10^6 \lambda$ , then the value of  $\lambda$  is \_\_\_\_\_.

**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 :** 6760331166 **Question Type :** SA

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

Let  $f(x) = x + 1$  and  $g$  be maps on  $\mathbb{R}$  and  $h(n) = (g \circ f)(n+1) - (g \circ f)(n)$ ,  $n \in \mathbb{N}$ .

Further,  $h(1), h(2), h(3), h(4), \dots$ , is an A.P. and  $h(25) = 53$ ,  $h(101) = 205$ .

If  $g(48) - g(2) = 100k$ , then 'k' 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 : 6760331167 Question Type : SA**

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

If the area of the region enclosed by the curve  $y = x^2$  and the line  $y = ax$  is 36 sq. units, then  $|a|$  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 : 88 Question Id : 6760331168 Question Type : SA**

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

If the area of  $\Delta ABC$  with vertices  $A(0, 1)$ ,  $B(2, 3)$  and  $C(4, b)$  is 6 sq. units, then the positive value of ' $b$ ' is \_\_\_\_\_.

**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 : 6760331169 Question Type : SA**

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



If  $f(x)$  be a differentiable function such that  $f(9) = 9$  and  $f'(9) = 4$ , then  $\lim_{x \rightarrow 9} \frac{\sqrt{f(x)} - 3}{\sqrt{x} - 3}$

is \_\_\_\_\_.

**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 :** 6760331170 **Question Type :** SA

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

The number of solutions of the equation  $x^2 = \cot x$  in  $[0, 2\pi]$  is \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

100

