

### JEE Mains Paper I Exam 26 27 31 Aug 1 Sep 21

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| Application No |                    |
| Candidate Name |                    |
| Roll No.       |                    |
| Test Date      | 26/08/2021         |
| Test Time      | 9:00 AM - 12:00 PM |
| Subject        | B TECH             |

Section : Physics Section A

- Q.1** Inside a uniform spherical shell :
- (a) the gravitational field is zero.
  - (b) the gravitational potential is zero.
  - (c) the gravitational field is same everywhere.
  - (d) the gravitation potential is same everywhere.
  - (e) all of the above

Choose the **most appropriate** answer from the options given below :

- Options**
- 1. (a), (b) and (c) only
  - 2. (e) only
  - 3. (a), (c) and (d) only
  - 4. (b), (c) and (d) only

Question Type : **MCQ**  
Question ID : **86435120004**  
Option 1 ID : **86435166608**  
Option 2 ID : **86435166610**  
Option 3 ID : **86435166609**  
Option 4 ID : **86435166607**  
Status : **Answered**  
Chosen Option : **2**

**Q.2** A series LCR circuit driven by 300 V at a frequency of 50 Hz contains a resistance  $R = 3 \text{ k}\Omega$ , an inductor of inductive reactance  $X_L = 250\pi \Omega$  and an unknown capacitor. The value of capacitance to maximize the average power should be :  
(take  $\pi^2 = 10$ )

- Options
1.  $400 \mu\text{F}$
  2.  $40 \mu\text{F}$
  3.  $4 \mu\text{F}$
  4.  $25 \mu\text{F}$

Question Type : **MCQ**

Question ID : **86435119999**

Option 1 ID : **86435166587**

Option 2 ID : **86435166588**

Option 3 ID : **86435166590**

Option 4 ID : **86435166589**

Status : **Not Answered**

Chosen Option : --

**Q.3** The initial mass of a rocket is 1000 kg. Calculate at what rate the fuel should be burnt so that the rocket is given an acceleration of  $20 \text{ ms}^{-2}$ . The gases come out at a relative speed of  $500 \text{ ms}^{-1}$  with respect to the rocket :  
[Use  $g = 10 \text{ m/s}^2$ ]

- Options
1.  $500 \text{ kg s}^{-1}$
  2.  $60 \text{ kg s}^{-1}$
  3.  $10 \text{ kg s}^{-1}$
  4.  $6.0 \times 10^2 \text{ kg s}^{-1}$

Question Type : **MCQ**

Question ID : **86435120005**

Option 1 ID : **86435166613**

Option 2 ID : **86435166611**

Option 3 ID : **86435166614**

Option 4 ID : **86435166612**

Status : **Not Answered**

Chosen Option : --

**Q.4** A particular hydrogen like ion emits radiation of frequency  $2.92 \times 10^{15}$  Hz when it makes transition from  $n=3$  to  $n=1$ . The frequency in Hz of radiation emitted in transition from  $n=2$  to  $n=1$  will be :

- Options
1.  $2.46 \times 10^{15}$
  2.  $0.44 \times 10^{15}$
  3.  $4.38 \times 10^{15}$
  4.  $6.57 \times 10^{15}$

Question Type : **MCQ**

Question ID : **86435119994**

Option 1 ID : **86435166570**

Option 2 ID : **86435166569**

Option 3 ID : **86435166567**

Option 4 ID : **86435166568**

Status : **Answered**

Chosen Option : **1**

**Q.5** If E, L, M and G denote the quantities as energy, angular momentum, mass and constant of gravitation respectively, then the dimensions of P in the formula  $P = EL^2M^{-5}G^{-2}$  are :

- Options
1.  $[M^0 L^0 T^0]$
  2.  $[M^1 L^1 T^{-2}]$
  3.  $[M^{-1} L^{-1} T^2]$
  4.  $[M^0 L^1 T^0]$

Question Type : **MCQ**

Question ID : **86435120009**

Option 1 ID : **86435166630**

Option 2 ID : **86435166627**

Option 3 ID : **86435166628**

Option 4 ID : **86435166629**

Status : **Answered**

Chosen Option : **3**

**Q.6** What equal length of an iron wire and a copper-nickel alloy wire, each of 2 mm diameter connected parallel to give an equivalent resistance of  $3 \Omega$  ?  
(Given resistivities of iron and copper-nickel alloy wire are  $12 \mu\Omega \text{ cm}$  and  $51 \mu\Omega \text{ cm}$  respectively)

- Options
1. 90 m
  2. 110 m
  3. 82 m
  4. 97 m

Question Type : **MCQ**  
Question ID : **86435120006**  
Option 1 ID : **86435166617**  
Option 2 ID : **86435166615**  
Option 3 ID : **86435166618**  
Option 4 ID : **86435166616**  
Status : **Not Answered**  
Chosen Option : --

**Q.7** **Statement I :**  
By doping silicon semiconductor with pentavalent material, the electrons density increases.  
**Statement II :**  
The n-type semiconductor has net negative charge.  
In the light of the above statements, choose the **most appropriate** answer from the options given below :

- Options
1. **Both Statement I and Statement II are false.**
  2. **Both Statement I and Statement II are true.**
  3. **Statement I is true but Statement II is false.**
  4. **Statement I is false but Statement II is true.**

Question Type : **MCQ**  
Question ID : **86435120008**  
Option 1 ID : **86435166624**  
Option 2 ID : **86435166623**  
Option 3 ID : **86435166625**  
Option 4 ID : **86435166626**  
Status : **Not Answered**  
Chosen Option : --

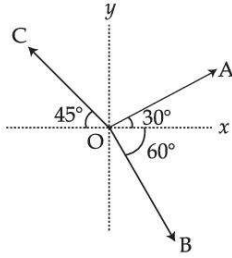
**Q.8** An inductor coil stores 64 J of magnetic field energy and dissipates energy at the rate of 640 W when a current of 8 A is passed through it. If this coil is joined across an ideal battery, find the time constant of the circuit in seconds :

- Options**
1. 0.125
  2. 0.8
  3. 0.2
  4. 0.4

Question Type : **MCQ**  
Question ID : **86435119998**  
Option 1 ID : **86435166586**  
Option 2 ID : **86435166585**  
Option 3 ID : **86435166583**  
Option 4 ID : **86435166584**  
Status : **Not Answered**  
Chosen Option : --

**Q.9** The magnitude of vectors  $\vec{OA}$ ,  $\vec{OB}$  and  $\vec{OC}$  in the given figure are equal. The direction of

$\vec{OA} + \vec{OB} - \vec{OC}$  with x-axis will be :



Options

1.  $\tan^{-1} \frac{(\sqrt{3} - 1 + \sqrt{2})}{(1 - \sqrt{3} + \sqrt{2})}$
2.  $\tan^{-1} \frac{(1 - \sqrt{3} - \sqrt{2})}{(1 + \sqrt{3} + \sqrt{2})}$
3.  $\tan^{-1} \frac{(1 + \sqrt{3} - \sqrt{2})}{(1 - \sqrt{3} - \sqrt{2})}$
4.  $\tan^{-1} \frac{(\sqrt{3} - 1 + \sqrt{2})}{(1 + \sqrt{3} - \sqrt{2})}$

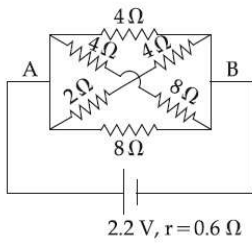
Question Type : **MCQ**  
 Question ID : **86435120007**  
 Option 1 ID : **86435166622**  
 Option 2 ID : **86435166619**  
 Option 3 ID : **86435166621**  
 Option 4 ID : **86435166620**  
 Status : **Not Answered**  
 Chosen Option : --

**Q.10** An electric appliance supplies 6000 J/min heat to the system. If the system delivers a power of 90 W. How long it would take to increase the internal energy by  $2.5 \times 10^3$  J ?

- Options
1.  $2.4 \times 10^3$  s
  2.  $2.5 \times 10^1$  s
  3.  $2.5 \times 10^2$  s
  4.  $4.1 \times 10^1$  s

Question Type : **MCQ**  
 Question ID : **86435119993**  
 Option 1 ID : **86435166565**  
 Option 2 ID : **86435166563**  
 Option 3 ID : **86435166564**  
 Option 4 ID : **86435166566**  
 Status : **Not Answered**  
 Chosen Option : --

**Q.11** In the given figure, the emf of the cell is 2.2 V and if internal resistance is 0.6 Ω. Calculate the power dissipated in the whole circuit :



- Options
1. 4.4 W
  2. 0.65 W
  3. 1.32 W
  4. 2.2 W

Question Type : **MCQ**  
 Question ID : **86435120001**  
 Option 1 ID : **86435166596**  
 Option 2 ID : **86435166597**  
 Option 3 ID : **86435166598**  
 Option 4 ID : **86435166595**  
 Status : **Answered**  
 Chosen Option : **4**

**Q.12** In a photoelectric experiment ultraviolet light of wavelength 280 nm is used with lithium cathode having work function  $\phi = 2.5$  eV. If the wavelength of incident light is switched to 400 nm, find out the change in the stopping potential. ( $h = 6.63 \times 10^{-34}$  Js,  $c = 3 \times 10^8$  ms $^{-1}$ )

- Options
1. 1.9 V
  2. 0.6 V
  3. 1.3 V
  4. 1.1 V

Question Type : **MCQ**  
Question ID : **86435119996**  
Option 1 ID : **86435166576**  
Option 2 ID : **86435166577**  
Option 3 ID : **86435166575**  
Option 4 ID : **86435166578**  
Status : **Answered**  
Chosen Option : **4**

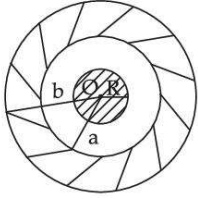
**Q.13** Car B overtakes another car A at a relative speed of 40 ms $^{-1}$ . How fast will the image of car B appear to move in the mirror of focal length 10 cm fitted in car A, when the car B is 1.9 m away from the car A ?

- Options
1. 4 ms $^{-1}$
  2. 0.1 ms $^{-1}$
  3. 0.2 ms $^{-1}$
  4. 40 ms $^{-1}$

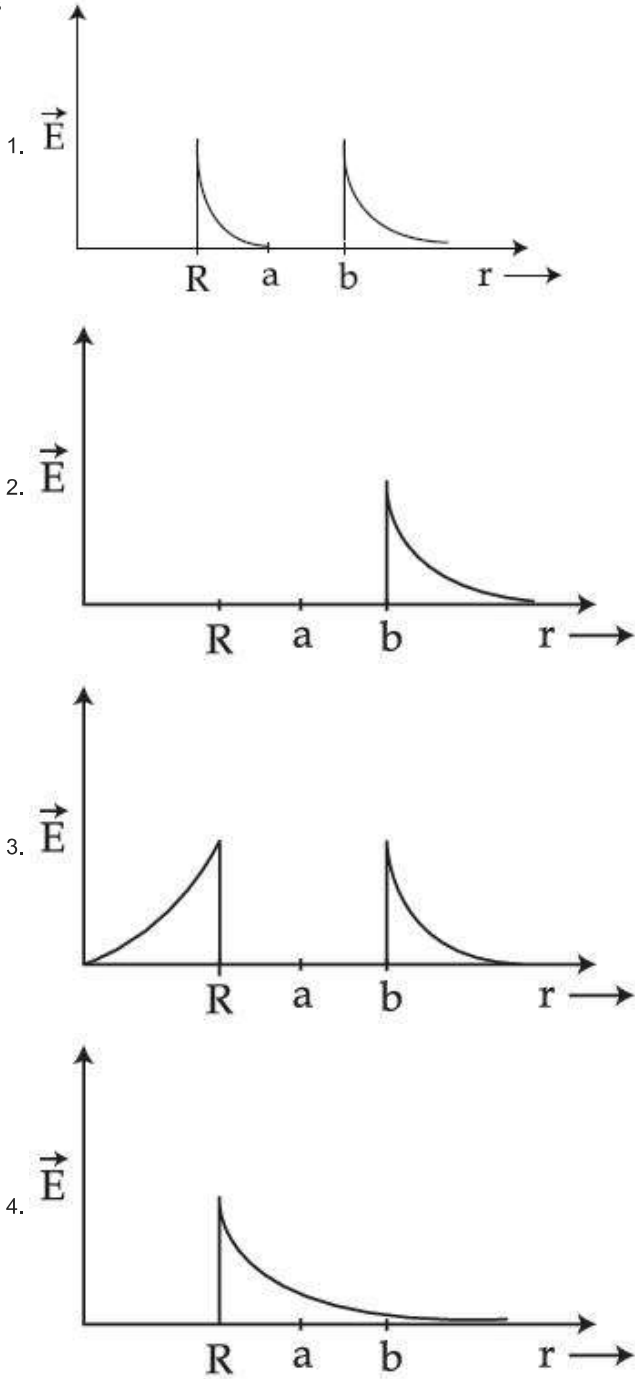
Question Type : **MCQ**  
Question ID : **86435119997**  
Option 1 ID : **86435166582**  
Option 2 ID : **86435166579**  
Option 3 ID : **86435166580**  
Option 4 ID : **86435166581**  
Status : **Not Answered**  
Chosen Option : **--**



**Q.14** A solid metal sphere of radius  $R$  having charge  $q$  is enclosed inside the concentric spherical shell of inner radius  $a$  and outer radius  $b$  as shown in figure. The approximate variation electric field  $\vec{E}$  as a function of distance  $r$  from centre  $O$  is given by :



Options



Question Type : **MCQ**  
 Question ID : **8643512002**  
 Option 1 ID : **86435166601**  
 Option 2 ID : **86435166600**

Option 3 ID : 86435166599  
 Option 4 ID : 86435166602  
 Status : Answered  
 Chosen Option : 3

**Q.15** The material filled between the plates of a parallel plate capacitor has resistivity  $200 \Omega\text{m}$ . The value of capacitance of the capacitor is  $2 \text{ pF}$ . If a potential difference of  $40 \text{ V}$  is applied across the plates of the capacitor, then the value of leakage current flowing out of the capacitor is : (given the value of relative permittivity of material is 50)

- Options
1.  $0.9 \mu\text{A}$
  2.  $0.9 \text{ mA}$
  3.  $9.0 \text{ mA}$
  4.  $9.0 \mu\text{A}$

Question Type : MCQ  
 Question ID : 86435120003  
 Option 1 ID : 86435166605  
 Option 2 ID : 86435166604  
 Option 3 ID : 86435166603  
 Option 4 ID : 86435166606  
 Status : Not Answered  
 Chosen Option : --

**Q.16** The fractional change in the magnetic field intensity at a distance 'r' from centre on the axis of current carrying coil of radius 'a' to the magnetic field intensity at the centre of the same coil is : (Take  $r < a$ ).

- Options
1.  $\frac{3}{2} \frac{a^2}{r^2}$
  2.  $\frac{2}{3} \frac{a^2}{r^2}$
  3.  $\frac{3}{2} \frac{r^2}{a^2}$
  4.  $\frac{2}{3} \frac{r^2}{a^2}$

Question Type : MCQ  
 Question ID : 86435120000  
 Option 1 ID : 86435166591  
 Option 2 ID : 86435166592  
 Option 3 ID : 86435166594  
 Option 4 ID : 86435166593  
 Status : Answered  
 Chosen Option : 1

**Q.17** In a Screw Gauge, fifth division of the circular scale coincides with the reference line when the ratchet is closed. There are 50 divisions on the circular scale, and the main scale moves by 0.5 mm on a complete rotation. For a particular observation the reading on the main scale is 5 mm and the 20<sup>th</sup> division of the circular scale coincides with reference line. Calculate the true reading.

- Options
1. 5.15 mm
  2. 5.25 mm
  3. 5.20 mm
  4. 5.00 mm

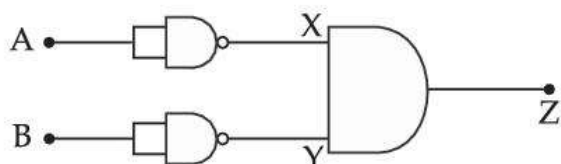
Question Type : **MCQ**  
Question ID : **86435119990**  
Option 1 ID : **86435166553**  
Option 2 ID : **86435166552**  
Option 3 ID : **86435166551**  
Option 4 ID : **86435166554**  
Status : **Answered**  
Chosen Option : **1**

**Q.18** The rms speeds of the molecules of Hydrogen, Oxygen and Carbondioxide at the same temperature are  $V_H$ ,  $V_O$  and  $V_C$  respectively then :

- Options
1.  $V_H > V_O > V_C$
  2.  $V_H = V_O = V_C$
  3.  $V_C > V_O > V_H$
  4.  $V_H = V_O > V_C$

Question Type : **MCQ**  
Question ID : **86435119991**  
Option 1 ID : **86435166557**  
Option 2 ID : **86435166555**  
Option 3 ID : **86435166558**  
Option 4 ID : **86435166556**  
Status : **Answered**  
Chosen Option : **1**

**Q.19** Identify the logic operation carried out by the given circuit :



- Options
1. OR
  2. NOR
  3. AND
  4. NAND

Question Type : **MCQ**  
 Question ID : **86435119992**  
 Option 1 ID : **86435166560**  
 Option 2 ID : **86435166562**  
 Option 3 ID : **86435166559**  
 Option 4 ID : **86435166561**  
 Status : **Answered**  
 Chosen Option : **1**

**Q.20** Two narrow bores of diameter 5.0 mm and 8.0 mm are joined together to form a U-shaped tube open at both ends. If this U-tube contains water, what is the difference in the level of two limbs of the tube.  
 [Take surface tension of water  $T = 7.3 \times 10^{-2} \text{ Nm}^{-1}$ , angle of contact = 0,  $g = 10 \text{ ms}^{-2}$  and density of water =  $1.0 \times 10^3 \text{ kg m}^{-3}$ ]

- Options
1. 2.19 mm
  2. 4.97 mm
  3. 3.62 mm
  4. 5.34 mm

Question Type : **MCQ**  
 Question ID : **86435119995**  
 Option 1 ID : **86435166574**  
 Option 2 ID : **86435166573**  
 Option 3 ID : **86435166572**  
 Option 4 ID : **86435166571**  
 Status : **Not Answered**  
 Chosen Option : **--**

Section : **Physics Section B**

**Q.1** A soap bubble of radius 3 cm is formed inside the another soap bubble of radius 6 cm. The radius of an equivalent soap bubble which has the same excess pressure as inside the smaller bubble with respect to the atmospheric pressure is \_\_\_\_\_ cm.

Given 4  
 Answer :

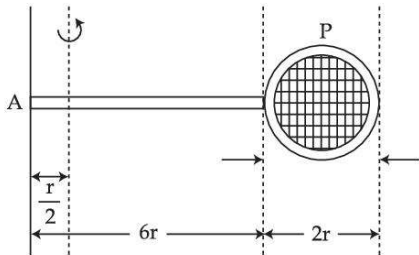
Question Type : **SA**  
 Question ID : **86435120012**  
 Status : **Answered**

**Q.2** Two spherical balls having equal masses with radius of 5 cm each are thrown upwards along the same vertical direction at an interval of 3 s with the same initial velocity of 35 m/s, then these balls collide at a height of \_\_\_\_\_ m.  
(take  $g = 10 \text{ m/s}^2$ )

Given 7  
Answer :

Question Type : SA  
Question ID : 86435120018  
Status : Answered

**Q.3** Consider a badminton racket with length scales as shown in the figure.



If the mass of the linear and circular portions of the badminton racket are same ( $M$ ) and the mass of the threads are negligible, the moment of inertia of the racket about an axis perpendicular to the handle and in the plane of the ring, at  $\frac{r}{2}$  distance from the end A of the handle will be \_\_\_\_\_  $Mr^2$ .

Given --  
Answer :

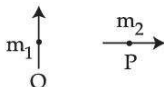
Question Type : SA  
Question ID : 86435120011  
Status : Not Answered

**Q.4** An amplitude modulated wave is represented by  $C_m(t) = 10(1 + 0.2 \cos 12560t) \sin (111 \times 10^4 t)$  volts. The modulating frequency in kHz will be \_\_\_\_\_.

Given --  
Answer :

Question Type : SA  
Question ID : 86435120017  
Status : Not Answered

**Q.5** Two short magnetic dipoles  $m_1$  and  $m_2$  each having magnetic moment of  $1 \text{ Am}^2$  are placed at point O and P respectively. The distance between OP is 1 meter. The torque experienced by the magnetic dipole  $m_2$  due to the presence of  $m_1$  is \_\_\_\_\_  $\times 10^{-7} \text{ Nm}$ .



Given 3  
Answer :

Question Type : SA  
Question ID : 86435120014  
Status : Answered

**Q.6** A source and a detector move away from each other in absence of wind with a speed of 20 m/s with respect to the ground. If the detector detects a frequency of 1800 Hz of the sound coming from the source, then the original frequency of source considering speed of sound in air 340 m/s will be \_\_\_\_\_ Hz.

Given --  
Answer :

Question Type : SA  
Question ID : 86435120019  
Status : Not Answered

**Q.7** White light is passed through a double slit and interference is observed on a screen 1.5 m away. The separation between the slits is 0.3 mm. The first violet and red fringes are formed 2.0 mm and 3.5 mm away from the central white fringes. The difference in wavelengths of red and violet light is \_\_\_\_\_ nm.

Given --  
Answer :

Question Type : SA  
Question ID : 86435120016  
Status : Not Answered

**Q.8** The electric field in a plane electromagnetic wave is given by

$$\vec{E} = 200 \cos \left[ \left( \frac{0.5 \times 10^3}{\text{m}} \right) x - \left( 1.5 \times 10^{11} \frac{\text{rad}}{\text{s}} \times t \right) \right] \frac{\text{V}}{\text{m}} \hat{j}$$

If this wave falls normally on a perfectly reflecting surface having an area of 100 cm<sup>2</sup>. If the radiation pressure exerted by the E.M. wave on the surface during a 10 minute exposure is

$$\frac{x}{10^9} \frac{\text{N}}{\text{m}^2}. \text{ Find the value of } x.$$

Given 1  
Answer :

Question Type : SA  
Question ID : 86435120015  
Status : Answered

**Q.9** Two travelling waves produces a standing wave represented by equation.  
 $y = 1.0 \text{ mm} \cos(1.57 \text{ cm}^{-1}) x \sin(78.5 \text{ s}^{-1})t$ . The node closest to the origin in the region  $x > 0$  will be at  $x =$  \_\_\_\_\_ cm.

Given 1  
Answer :

Question Type : SA  
Question ID : 86435120013  
Status : Answered

- Q.10** A uniform chain of length 3 meter and mass 3 kg overhangs a smooth table with 2 meter laying on the table. If  $k$  is the kinetic energy of the chain in joule as it completely slips off the table, then the value of  $k$  is \_\_\_\_\_.  
(Take  $g = 10 \text{ m/s}^2$ )

Given --  
Answer :

Question Type : **SA**  
Question ID : **86435120010**  
Status : **Not Answered**

Section : **Chemistry Section A**

- Q.1** What are the products formed in sequence when excess of  $\text{CO}_2$  is passed in slaked lime ?

- Options**
1.  $\text{Ca}(\text{HCO}_3)_2, \text{CaCO}_3$
  2.  $\text{CaO}, \text{CaCO}_3$
  3.  $\text{CaCO}_3, \text{Ca}(\text{HCO}_3)_2$
  4.  $\text{CaO}, \text{Ca}(\text{HCO}_3)_2$

Question Type : **MCQ**  
Question ID : **86435120026**  
Option 1 ID : **86435166666**  
Option 2 ID : **86435166667**  
Option 3 ID : **86435166665**  
Option 4 ID : **86435166668**  
Status : **Answered**  
Chosen Option : **2**

- Q.2** The correct sequential addition of reagents in the preparation of 3-nitrobenzoic acid from benzene is :

- Options**
1.  $\text{HNO}_3/\text{H}_2\text{SO}_4, \text{Br}_2/\text{AlBr}_3, \text{Mg/ether}, \text{CO}_2, \text{H}_3\text{O}^+$
  2.  $\text{Br}_2/\text{AlBr}_3, \text{NaCN}, \text{H}_3\text{O}^+, \text{HNO}_3/\text{H}_2\text{SO}_4$
  3.  $\text{Br}_2/\text{AlBr}_3, \text{HNO}_3/\text{H}_2\text{SO}_4, \text{Mg/ether}, \text{CO}_2, \text{H}_3\text{O}^+$
  4.  $\text{Br}_2/\text{AlBr}_3, \text{HNO}_3/\text{H}_2\text{SO}_4, \text{NaCN}, \text{H}_3\text{O}^+$

Question Type : **MCQ**  
Question ID : **86435120037**  
Option 1 ID : **86435166709**  
Option 2 ID : **86435166710**  
Option 3 ID : **86435166712**  
Option 4 ID : **86435166711**  
Status : **Answered**  
Chosen Option : **3**



**Q.3** Excess of isobutane on reaction with  $\text{Br}_2$  in presence of light at  $125^\circ\text{C}$  gives which one of the following, as the major product ?

Options

1. 
$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{Br} \\ | \\ \text{CH}_3 \end{array}$$
2. 
$$\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_2\text{Br} \\ | \\ \text{CH}_2\text{Br} \end{array}$$
3. 
$$\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_2\text{Br} \\ | \\ \text{CH}_3 \end{array}$$
4. 
$$\begin{array}{c} \text{Br} \\ | \\ \text{CH}_3 - \text{C} - \text{CH}_2 - \text{Br} \\ | \\ \text{CH}_3 \end{array}$$

Question Type : **MCQ**

Question ID : **86435120031**

Option 1 ID : **86435166686**

Option 2 ID : **86435166688**

Option 3 ID : **86435166685**

Option 4 ID : **86435166687**

Status : **Answered**

Chosen Option : **2**

**Q.4** Which one of the following complexes is violet in colour ?

Options

1.  $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3 \cdot \text{H}_2\text{O}$
2.  $[\text{Fe}(\text{CN})_5 \text{NOS}]^{4-}$
3.  $[\text{Fe}(\text{CN})_6]^{4-}$
4.  $[\text{Fe}(\text{SCN})_6]^{4-}$

Question Type : **MCQ**

Question ID : **86435120030**

Option 1 ID : **86435166683**

Option 2 ID : **86435166682**

Option 3 ID : **86435166684**

Option 4 ID : **86435166681**

Status : **Not Answered**

Chosen Option : **--**



**Q.5** Given below are two statements :

**Statement I :** Frenkel defects are vacancy as well as interstitial defects.

**Statement II :** Frenkel defect leads to colour in ionic solids due to presence of F-centres.

Choose the **most appropriate** answer for the statements from the options given below :

**Options** 1.

1. **Both Statement I and Statement II are false**
2. **Statement I is false but Statement II is true**
3. **Statement I is true but Statement II is false**
4. **Both Statement I and Statement II are true**

Question Type : **MCQ**

Question ID : **86435120020**

Option 1 ID : **86435166642**

Option 2 ID : **86435166644**

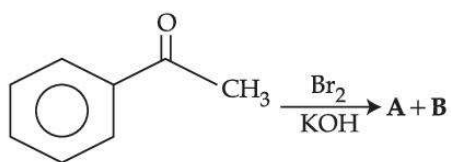
Option 3 ID : **86435166643**

Option 4 ID : **86435166641**

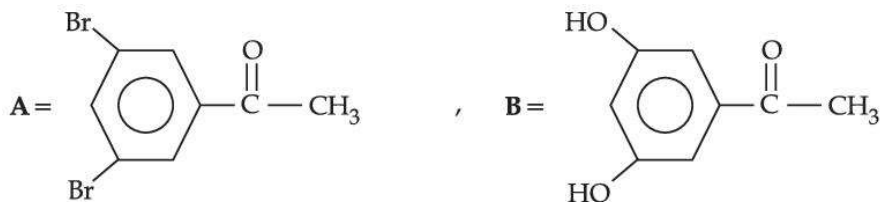
Status : **Answered**

Chosen Option : **4**

**Q.6** The major products formed in the following reaction sequence **A** and **B** are :



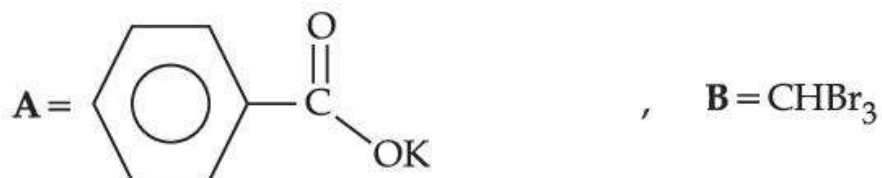
Options 1.



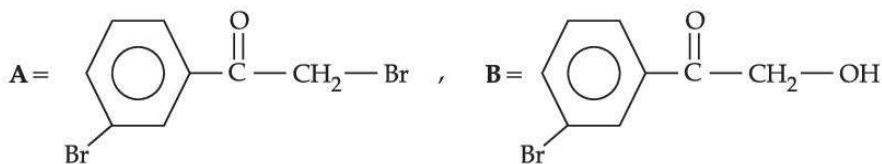
2.



3.



4.



Question Type : **MCQ**

Question ID : **86435120034**

Option 1 ID : **86435166698**

Option 2 ID : **86435166700**

Option 3 ID : **86435166697**

Option 4 ID : **86435166699**

Status : **Answered**

Chosen Option : **4**

**Q.7** Which one of the following methods is most suitable for preparing deionized water ?

**Options**

1. Calgon's method
2. Clark's method
3. Permutit method
4. Synthetic resin method

Question Type : **MCQ**

Question ID : **86435120025**

Option 1 ID : **86435166663**

Option 2 ID : **86435166661**

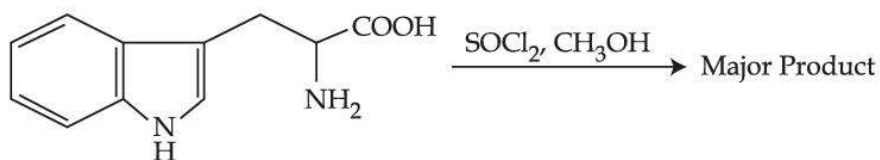
Option 3 ID : **86435166664**

Option 4 ID : **86435166662**

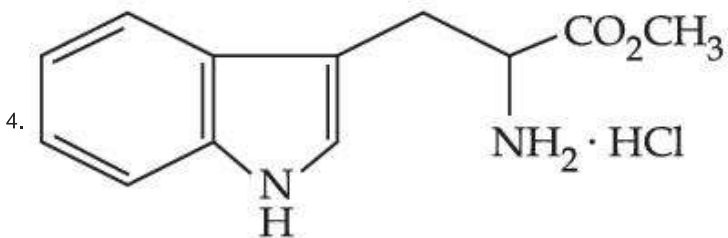
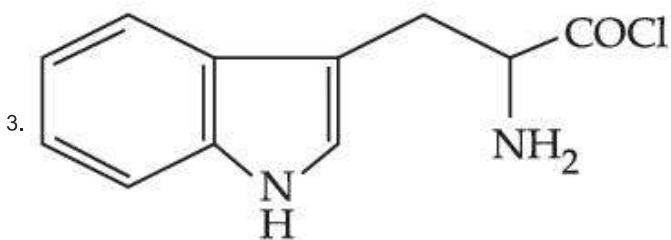
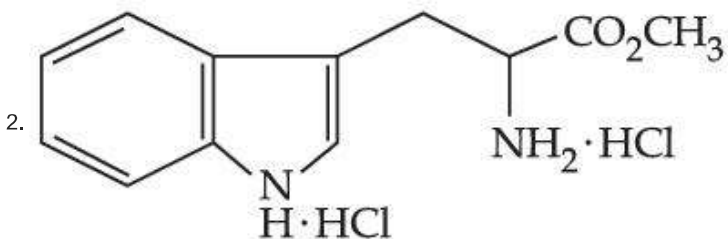
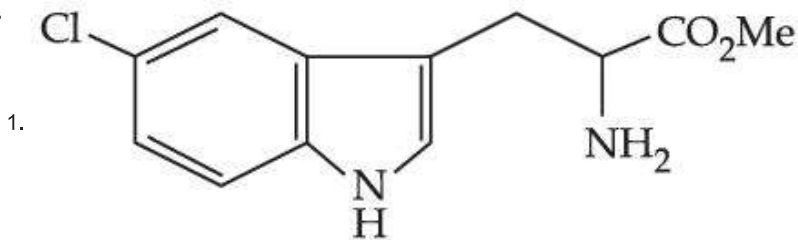
Status : **Not Answered**

Chosen Option : --

Q.8 The major product formed in the following reaction is :



Options



Question Type : **MCQ**

Question ID : **86435120036**

Option 1 ID : **86435166708**

Option 2 ID : **86435166707**

Option 3 ID : **86435166705**

Option 4 ID : **86435166706**

Status : **Answered**

Chosen Option : **4**

**Q.9** Given below are two statements :

**Statement I :** In the titration between strong acid and weak base methyl orange is suitable as an indicator.

**Statement II :** For titration of acetic acid with NaOH phenolphthalein is not a suitable indicator.

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

- Options
1. **Statement I is true but Statement II is false**
  2. **Both Statement I and Statement II are false**
  3. **Both Statement I and Statement II are true**
  4. **Statement I is false but Statement II is true**

Question Type : **MCQ**  
Question ID : **86435120039**  
Option 1 ID : **86435166719**  
Option 2 ID : **86435166718**  
Option 3 ID : **86435166717**  
Option 4 ID : **86435166720**  
Status : **Answered**  
Chosen Option : **1**

**Q.10** The conversion of hydroxyapatite occurs due to presence of  $F^-$  ions in water. The correct formula of hydroxyapatite is :

- Options
1.  $[Ca_3(PO_4)_2 \cdot CaF_2]$
  2.  $[3Ca_3(PO_4)_2 \cdot Ca(OH)_2]$
  3.  $[3Ca(OH)_2 \cdot CaF_2]$
  4.  $[3Ca_3(PO_4)_2 \cdot CaF_2]$

Question Type : **MCQ**  
Question ID : **86435120029**  
Option 1 ID : **86435166678**  
Option 2 ID : **86435166679**  
Option 3 ID : **86435166680**  
Option 4 ID : **86435166677**  
Status : **Not Answered**  
Chosen Option : **--**

**Q.11** The **incorrect** statement is :

- Options
1.  $\text{Cl}_2$  is more reactive than  $\text{ClF}$ .
  2.  $\text{F}_2$  is a stronger oxidizing agent than  $\text{Cl}_2$  in aqueous solution.
  3. On hydrolysis  $\text{ClF}$  forms  $\text{HOCl}$  and  $\text{HF}$ .
  4.  $\text{F}_2$  is more reactive than  $\text{ClF}$ .

Question Type : **MCQ**  
Question ID : **86435120027**  
Option 1 ID : **86435166669**  
Option 2 ID : **86435166672**  
Option 3 ID : **86435166671**  
Option 4 ID : **86435166670**  
Status : **Answered**  
Chosen Option : **3**

**Q.12** Given below are two statements.

**Statement I :** The choice of reducing agents for metals extraction can be made by using Ellingham diagram, a plot of  $\Delta G$  vs temperature.

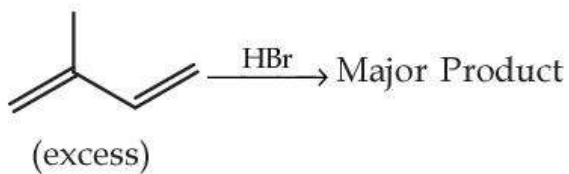
**Statement II :** The value of  $\Delta S$  increases from left to right in Ellingham diagram.

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

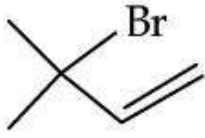
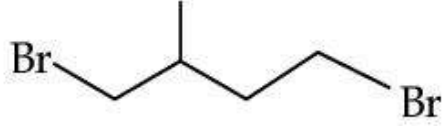
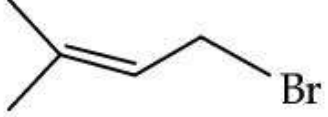
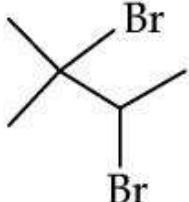
- Options
1. **Statement I is false but Statement II is true**
  2. **Both Statement I and Statement II are false**
  3. **Statement I is true but Statement II is false**
  4. **Both Statement I and Statement II are true**

Question Type : **MCQ**  
Question ID : **86435120024**  
Option 1 ID : **86435166660**  
Option 2 ID : **86435166658**  
Option 3 ID : **86435166659**  
Option 4 ID : **86435166657**  
Status : **Answered**  
Chosen Option : **3**

Q.13 The major product formed in the following reaction is :



Options

- 
- 
- 
- 

Question Type : MCQ

Question ID : 86435120032

Option 1 ID : 86435166692

Option 2 ID : 86435166689

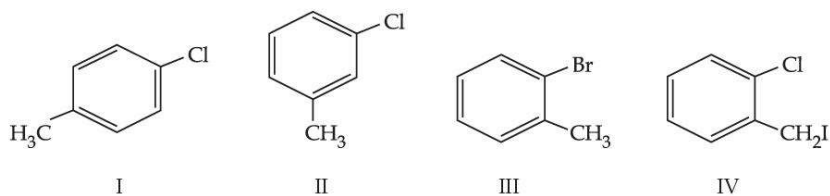
Option 3 ID : 86435166690

Option 4 ID : 86435166691

Status : Answered

Chosen Option : 4

**Q.14** Among the following compounds I-IV, which one forms a yellow precipitate on reacting sequentially with (i) NaOH (ii) dil. HNO<sub>3</sub> (iii) AgNO<sub>3</sub>?



- Options**
1. **IV**
  2. **I**
  3. **II**
  4. **III**

Question Type : **MCQ**  
 Question ID : **86435120033**  
 Option 1 ID : **86435166696**  
 Option 2 ID : **86435166693**  
 Option 3 ID : **86435166694**  
 Option 4 ID : **86435166695**  
 Status : **Not Answered**  
 Chosen Option : --

**Q.15** The polymer formed on heating Novolac with formaldehyde is :

- Options**
1. **Melamine**
  2. **Nylon 6,6**
  3. **Bakelite**
  4. **Polyester**

Question Type : **MCQ**  
 Question ID : **86435120038**  
 Option 1 ID : **86435166713**  
 Option 2 ID : **86435166716**  
 Option 3 ID : **86435166714**  
 Option 4 ID : **86435166715**  
 Status : **Answered**  
 Chosen Option : **3**



**Q.16** Given below are two statements :

**Statement I :** The limiting molar conductivity of KCl (strong electrolyte) is higher compared to that of  $\text{CH}_3\text{COOH}$  (weak electrolyte).

**Statement II :** Molar conductivity decreases with decrease in concentration of electrolyte.

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

- Options**
1. **Both Statement I and Statement II are true**
  2. **Both Statement I and Statement II are false**
  3. **Statement I is false but Statement II is true**
  4. **Statement I is true but Statement II is false**

Question Type : **MCQ**

Question ID : **86435120022**

Option 1 ID : **86435166649**

Option 2 ID : **86435166650**

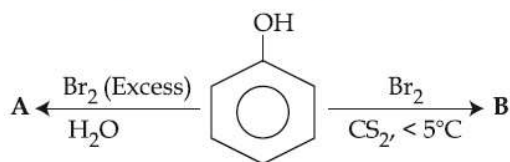
Option 3 ID : **86435166652**

Option 4 ID : **86435166651**

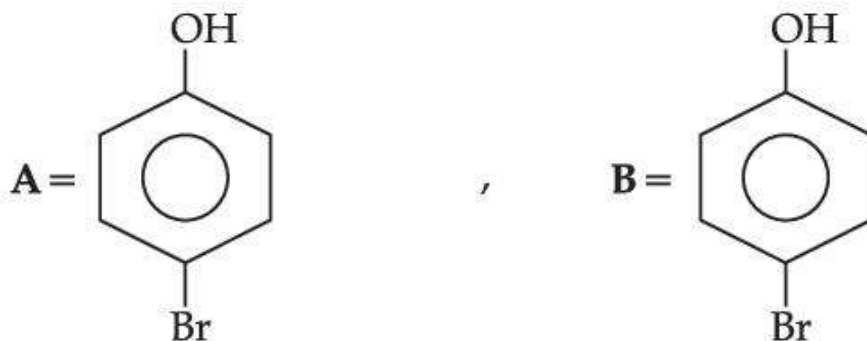
Status : **Answered**

Chosen Option : **1**

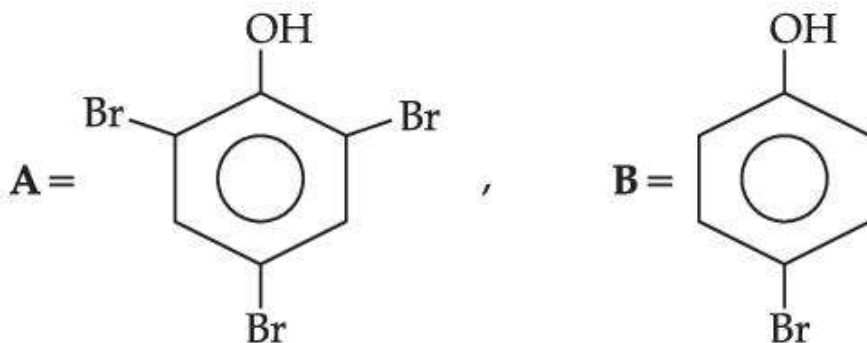
**Q.17** The correct options for the products **A** and **B** of the following reactions are :



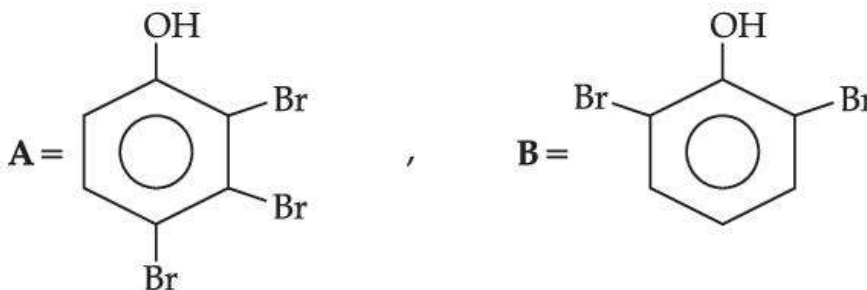
Options 1.



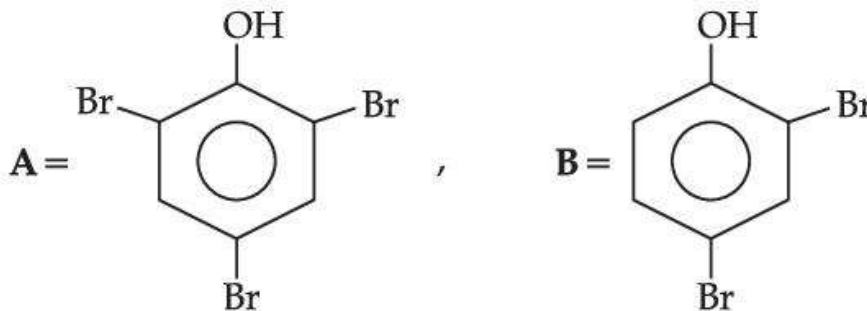
2.



3.



4.



Question Type : **MCQ**

Question ID : **86435120035**

Option 1 ID : **86435166701**

Option 2 ID : **86435166703**

Option 3 ID : **86435166702**

Option 4 ID : **86435166704**

Status : **Answered**

Chosen Option : 2

**Q.18** Given below are two statements :

**Statement I :** According to Bohr's model of an atom, qualitatively the magnitude of velocity of electron increases with decrease in positive charges on the nucleus as there is no strong hold on the electron by the nucleus.

**Statement II :** According to Bohr's model of an atom, qualitatively the magnitude of velocity of electron increases with decrease in principal quantum number.

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

- Options
1. Both Statement I and Statement II are false
  2. Statement I is true but Statement II is false
  3. Both Statement I and Statement II are true
  4. Statement I is false but Statement II is true

Question Type : MCQ

Question ID : 86435120021

Option 1 ID : 86435166646

Option 2 ID : 86435166647

Option 3 ID : 86435166645

Option 4 ID : 86435166648

Status : Answered

Chosen Option : 1

**Q.19** Which one of the following when dissolved in water gives coloured solution in nitrogen atmosphere ?

- Options
1. AgCl
  2. Cu<sub>2</sub>Cl<sub>2</sub>
  3. CuCl<sub>2</sub>
  4. ZnCl<sub>2</sub>

Question Type : MCQ

Question ID : 86435120028

Option 1 ID : 86435166676

Option 2 ID : 86435166675

Option 3 ID : 86435166674

Option 4 ID : 86435166673

Status : Answered

Chosen Option : 4

**Q.20** Which one of the following is correct for the adsorption of a gas at a given temperature on a solid surface ?

- Options
1.  $\Delta H > 0, \Delta S < 0$
  2.  $\Delta H > 0, \Delta S > 0$
  3.  $\Delta H < 0, \Delta S > 0$
  4.  $\Delta H < 0, \Delta S < 0$

Question Type : **MCQ**  
Question ID : **86435120023**  
Option 1 ID : **86435166655**  
Option 2 ID : **86435166653**  
Option 3 ID : **86435166654**  
Option 4 ID : **86435166656**  
Status : **Answered**  
Chosen Option : **1**

Section : **Chemistry Section B**

**Q.1** The ratio of number of water molecules in Mohr's salt and potash alum is \_\_\_\_\_  $\times 10^{-1}$ .  
(Integer answer)

Given **2**  
Answer :

Question Type : **SA**  
Question ID : **86435120048**  
Status : **Answered**

**Q.2** The number of *4f* electrons in the ground state electronic configuration of  $Gd^{2+}$  is \_\_\_\_\_.  
[Atomic number of Gd = 64]

Given **12**  
Answer :

Question Type : **SA**  
Question ID : **86435120047**  
Status : **Answered**

**Q.3**  $AB_3$  is an interhalogen T-shaped molecule. The number of lone pairs of electrons on A is \_\_\_\_\_. (Integer answer)

Given **2**  
Answer :

Question Type : **SA**  
Question ID : **86435120041**  
Status : **Answered**

**Q.4** The total number of negative charge in the tetrapeptide, Gly-Glu-Asp-Tyr, at pH 12.5 will be \_\_\_\_\_. (Integer answer)

Given --  
Answer :

Question Type : SA  
Question ID : 86435120049  
Status : Not Answered

**Q.5** An aqueous KCl solution of density  $1.20 \text{ g mL}^{-1}$  has a molality of  $3.30 \text{ mol kg}^{-1}$ . The molarity of the solution in  $\text{mol L}^{-1}$  is \_\_\_\_\_. (Nearest integer)  
[ Molar mass of KCl = 74.5 ]

Given --  
Answer :

Question Type : SA  
Question ID : 86435120040  
Status : Not Answered

**Q.6** Of the following four aqueous solutions, total number of those solutions whose freezing point is lower than that of  $0.10 \text{ M C}_2\text{H}_5\text{OH}$  is \_\_\_\_\_. (Integer answer)

- (i)  $0.10 \text{ M Ba}_3(\text{PO}_4)_2$
- (ii)  $0.10 \text{ M Na}_2\text{SO}_4$
- (iii)  $0.10 \text{ M KCl}$
- (iv)  $0.10 \text{ M Li}_3\text{PO}_4$

Given --  
Answer :

Question Type : SA  
Question ID : 86435120043  
Status : Not Answered

**Q.7** The  $\text{OH}^-$  concentration in a mixture of  $5.0 \text{ mL}$  of  $0.0504 \text{ M NH}_4\text{Cl}$  and  $2 \text{ mL}$  of  $0.0210 \text{ M NH}_3$  solution is  $x \times 10^{-6} \text{ M}$ . The value of  $x$  is \_\_\_\_\_. (Nearest integer)  
[ Given  $K_w = 1 \times 10^{-14}$  and  $K_b = 1.8 \times 10^{-5}$  ]

Given **100**  
Answer :

Question Type : SA  
Question ID : 86435120044  
Status : Answered

**Q.8** The Born-Haber cycle for KCl is evaluated with the following data :

$$\Delta_f H^\ominus \text{ for KCl} = -436.7 \text{ kJ mol}^{-1}; \Delta_{\text{sub}} H^\ominus \text{ for K} = 89.2 \text{ kJ mol}^{-1};$$

$$\Delta_{\text{ionization}} H^\ominus \text{ for K} = 419.0 \text{ kJ mol}^{-1}; \Delta_{\text{electron gain}} H^\ominus \text{ for Cl}_{(g)} = -348.6 \text{ kJ mol}^{-1};$$

$$\Delta_{\text{bond}} H^\ominus \text{ for Cl}_2 = 243.0 \text{ kJ mol}^{-1}$$

The magnitude of lattice enthalpy of KCl in  $\text{kJ mol}^{-1}$  is \_\_\_\_\_. (Nearest integer)

Given --  
Answer :

Question Type : SA  
Question ID : 86435120042  
Status : Not Answered

**Q.9** These are physical properties of an element

- (A) Sublimation enthalpy
- (B) Ionisation enthalpy
- (C) Hydration enthalpy
- (D) Electron gain enthalpy

The total number of above properties that affect the reduction potential is \_\_\_\_\_.  
(Integer answer)

Given 4

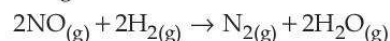
Answer :

Question Type : SA

Question ID : 86435120046

Status : Answered

**Q.10** The following data was obtained for chemical reaction given below at 975 K.



|     | [NO]                | [H <sub>2</sub> ]   | Rate                                |
|-----|---------------------|---------------------|-------------------------------------|
|     | mol L <sup>-1</sup> | mol L <sup>-1</sup> | mol L <sup>-1</sup> s <sup>-1</sup> |
| (A) | $8 \times 10^{-5}$  | $8 \times 10^{-5}$  | $7 \times 10^{-9}$                  |
| (B) | $24 \times 10^{-5}$ | $8 \times 10^{-5}$  | $2.1 \times 10^{-8}$                |
| (C) | $24 \times 10^{-5}$ | $32 \times 10^{-5}$ | $8.4 \times 10^{-8}$                |

The order of the reaction with respect to NO is \_\_\_\_\_. [Integer answer]

Given --

Answer :

Question Type : SA

Question ID : 86435120045

Status : Not Answered

Section : Mathematics Section A

**Q.1**

The value of  $\int_{-\frac{1}{\sqrt{2}}}^{\frac{1}{\sqrt{2}}} \left( \left( \frac{x+1}{x-1} \right)^2 + \left( \frac{x-1}{x+1} \right)^2 - 2 \right)^{\frac{1}{2}} dx$  is :

- Options
1.  $4 \log_e (3 + 2\sqrt{2})$
  2.  $2 \log_e 16$
  3.  $\log_e 16$
  4.  $\log_e 4$

Question Type : MCQ

Question ID : 86435120058

Option 1 ID : 86435166763

Option 2 ID : 86435166766

Option 3 ID : 86435166765

Option 4 ID : 86435166764

Status : Answered

Chosen Option : 1

**Q.2** A plane P contains the line  $x + 2y + 3z + 1 = 0 = x - y - z - 6$ , and is perpendicular to the plane  $-2x + y + z + 8 = 0$ . Then which of the following points lies on P ?

- Options**
1.  $(2, -1, 1)$
  2.  $(1, 0, 1)$
  3.  $(0, 1, 1)$
  4.  $(-1, 1, 2)$

Question Type : **MCQ**  
Question ID : **86435120064**  
Option 1 ID : **86435166787**  
Option 2 ID : **86435166789**  
Option 3 ID : **86435166788**  
Option 4 ID : **86435166790**  
Status : **Not Answered**  
Chosen Option : --

**Q.3** The equation  $\arg\left(\frac{z-1}{z+1}\right) = \frac{\pi}{4}$  represents a circle with :

- Options**
1. centre at  $(0, 1)$  and radius  $\sqrt{2}$
  2. centre at  $(0, -1)$  and radius  $\sqrt{2}$
  3. centre at  $(0, 0)$  and radius  $\sqrt{2}$
  4. centre at  $(0, 1)$  and radius 2

Question Type : **MCQ**  
Question ID : **86435120051**  
Option 1 ID : **86435166737**  
Option 2 ID : **86435166738**  
Option 3 ID : **86435166735**  
Option 4 ID : **86435166736**  
Status : **Answered**  
Chosen Option : **3**

**Q.4** Let  $\vec{a} = \hat{i} + \hat{j} + \hat{k}$  and  $\vec{b} = \hat{j} - \hat{k}$ . If  $\vec{c}$  is a vector such that  $\vec{a} \times \vec{c} = \vec{b}$  and  $\vec{a} \cdot \vec{c} = 3$ , then  $\vec{a} \cdot (\vec{b} \times \vec{c})$  is equal to :

- Options**
1. 2
  2. 6
  3. -6
  4. -2

Question Type : **MCQ**  
 Question ID : **86435120066**  
 Option 1 ID : **86435166796**  
 Option 2 ID : **86435166798**  
 Option 3 ID : **86435166797**  
 Option 4 ID : **86435166795**  
 Status : **Answered**  
 Chosen Option : **1**

**Q.5** Let A and B be independent events such that  $P(A) = p$ ,  $P(B) = 2p$ . The largest value of p, for which  $P(\text{exactly one of A, B occurs}) = \frac{5}{9}$ , is :

- Options**
1.  $\frac{2}{9}$
  2.  $\frac{4}{9}$
  3.  $\frac{5}{12}$
  4.  $\frac{1}{3}$

Question Type : **MCQ**  
 Question ID : **86435120068**  
 Option 1 ID : **86435166806**  
 Option 2 ID : **86435166804**  
 Option 3 ID : **86435166805**  
 Option 4 ID : **86435166803**  
 Status : **Not Answered**  
 Chosen Option : **--**



**Q.6**

The sum of solutions of the equation  $\frac{\cos x}{1 + \sin x} = |\tan 2x|$ ,  $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right) - \left\{\frac{\pi}{4}, -\frac{\pi}{4}\right\}$  is :

**Options**

1.  $-\frac{\pi}{15}$
2.  $-\frac{7\pi}{30}$
3.  $\frac{\pi}{10}$
4.  $-\frac{11\pi}{30}$

Question Type : **MCQ**  
Question ID : **86435120060**  
Option 1 ID : **86435166774**  
Option 2 ID : **86435166773**  
Option 3 ID : **86435166771**  
Option 4 ID : **86435166772**  
Status : **Not Answered**  
Chosen Option : --

**Q.7** Out of all the patients in a hospital 89% are found to be suffering from heart ailment and 98% are suffering from lungs infection. If K% of them are suffering from both ailments, then K can **not** belong to the set :

**Options**

1. {80, 83, 86, 89}
2. {84, 87, 90, 93}
3. {84, 86, 88, 90}
4. {79, 81, 83, 85}

Question Type : **MCQ**  
Question ID : **86435120050**  
Option 1 ID : **86435166732**  
Option 2 ID : **86435166734**  
Option 3 ID : **86435166731**  
Option 4 ID : **86435166733**  
Status : **Answered**  
Chosen Option : **2**

**Q.8**

The sum of the series  $\frac{1}{x+1} + \frac{2}{x^2+1} + \frac{2^2}{x^4+1} + \dots + \frac{2^{100}}{x^{2^{100}}+1}$  when  $x=2$  is :

**Options**

1.  $1 - \frac{2^{101}}{4^{101} - 1}$

2.  $1 + \frac{2^{100}}{4^{101} - 1}$

3.  $1 - \frac{2^{100}}{4^{100} - 1}$

4.  $1 + \frac{2^{101}}{4^{101} - 1}$

Question Type : **MCQ**  
 Question ID : **86435120054**  
 Option 1 ID : **86435166747**  
 Option 2 ID : **86435166750**  
 Option 3 ID : **86435166748**  
 Option 4 ID : **86435166749**  
 Status : **Answered**  
 Chosen Option : **3**

**Q.9**

Let ABC be a triangle with A  $(-3, 1)$  and  $\angle ACB = \theta, 0 < \theta < \frac{\pi}{2}$ . If the equation of the median through B is  $2x + y - 3 = 0$  and the equation of angle bisector of C is  $7x - 4y - 1 = 0$ , then  $\tan\theta$  is equal to :

**Options**

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

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

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

4.  $2$

Question Type : **MCQ**  
 Question ID : **86435120061**  
 Option 1 ID : **86435166776**  
 Option 2 ID : **86435166775**  
 Option 3 ID : **86435166777**  
 Option 4 ID : **86435166778**  
 Status : **Not Answered**  
 Chosen Option : **--**

**Q.10** The mean and standard deviation of 20 observations were calculated as 10 and 2.5 respectively. It was found that by mistake one data value was taken as 25 instead of 35. If  $\alpha$  and  $\sqrt{\beta}$  are the mean and standard deviation respectively for correct data, then  $(\alpha, \beta)$  is :

- Options**
1. (11, 26)
  2. (10.5, 26)
  3. (11, 25)
  4. (10.5, 25)

Question Type : **MCQ**  
Question ID : **86435120069**  
Option 1 ID : **86435166808**  
Option 2 ID : **86435166809**  
Option 3 ID : **86435166807**  
Option 4 ID : **86435166810**  
Status : **Not Answered**  
Chosen Option : --

**Q.11** On the ellipse  $\frac{x^2}{8} + \frac{y^2}{4} = 1$  let P be a point in the second quadrant such that the tangent at P to the ellipse is perpendicular to the line  $x + 2y = 0$ . Let S and S' be the foci of the ellipse and e be its eccentricity. If A is the area of the triangle SPS' then, the value of  $(5 - e^2) \cdot A$  is :

- Options**
1. 14
  2. 6
  3. 12
  4. 24

Question Type : **MCQ**  
Question ID : **86435120063**  
Option 1 ID : **86435166784**  
Option 2 ID : **86435166786**  
Option 3 ID : **86435166785**  
Option 4 ID : **86435166783**  
Status : **Not Answered**  
Chosen Option : --

Q.12

The value of  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{r=0}^{2n-1} \frac{n^2}{n^2 + 4r^2}$  is :

Options

1.  $\frac{1}{4} \tan^{-1}(4)$
2.  $\tan^{-1}(4)$
3.  $\frac{1}{2} \tan^{-1}(2)$
4.  $\frac{1}{2} \tan^{-1}(4)$

Question Type : **MCQ**Question ID : **86435120059**Option 1 ID : **86435166767**Option 2 ID : **86435166769**Option 3 ID : **86435166770**Option 4 ID : **86435166768**Status : **Answered**Chosen Option : **4**

Q.13

Let  $\theta \in \left(0, \frac{\pi}{2}\right)$ . If the system of linear equations.

$$(1 + \cos^2\theta) x + \sin^2\theta y + 4 \sin 3\theta z = 0$$

$$\cos^2\theta x + (1 + \sin^2\theta) y + 4 \sin 3\theta z = 0$$

$$\cos^2\theta x + \sin^2\theta y + (1 + 4 \sin 3\theta)z = 0$$

has a non-trivial solution, then the value of  $\theta$  is :

Options

1.  $\frac{4\pi}{9}$

2.  $\frac{5\pi}{18}$

3.  $\frac{7\pi}{18}$

4.  $\frac{\pi}{18}$

Question Type : **MCQ**

Question ID : **86435120053**

Option 1 ID : **86435166746**

Option 2 ID : **86435166745**

Option 3 ID : **86435166744**

Option 4 ID : **86435166743**

Status : **Not Answered**

Chosen Option : --

**Q.14**

If  $A = \begin{pmatrix} 1 & 2 \\ \sqrt{5} & \sqrt{5} \\ -2 & 1 \\ \sqrt{5} & \sqrt{5} \end{pmatrix}$ ,  $B = \begin{pmatrix} 1 & 0 \\ i & 1 \end{pmatrix}$ ,  $i = \sqrt{-1}$ , and  $Q = A^T B A$ , then the inverse of the matrix

$A Q^{2021} A^T$  is equal to :

**Options**

1.  $\begin{pmatrix} 1 & 0 \\ 2021 i & 1 \end{pmatrix}$
2.  $\begin{pmatrix} 1 & 0 \\ -2021 i & 1 \end{pmatrix}$
3.  $\begin{pmatrix} \frac{1}{\sqrt{5}} & -2021 \\ 2021 & \frac{1}{\sqrt{5}} \end{pmatrix}$
4.  $\begin{pmatrix} 1 & -2021 i \\ 0 & 1 \end{pmatrix}$

Question Type : **MCQ**  
 Question ID : **86435120052**  
 Option 1 ID : **86435166742**  
 Option 2 ID : **86435166739**  
 Option 3 ID : **86435166740**  
 Option 4 ID : **86435166741**  
 Status : **Answered**  
 Chosen Option : **3**

**Q.15** If the truth value of the Boolean expression  $((p \vee q) \wedge (q \rightarrow r) \wedge (\sim r)) \rightarrow (p \wedge q)$  is false, then the truth values of the statements p, q, r respectively can be :

**Options**

1. **F F T**
2. **F T F**
3. **T F F**
4. **T F T**

Question Type : **MCQ**  
 Question ID : **86435120067**  
 Option 1 ID : **86435166800**  
 Option 2 ID : **86435166801**  
 Option 3 ID : **86435166802**  
 Option 4 ID : **86435166799**  
 Status : **Answered**  
 Chosen Option : **3**

**Q.16**

Let  $f(x) = \cos\left(2\tan^{-1}\sin\left(\cot^{-1}\sqrt{\frac{1-x}{x}}\right)\right)$ ,  $0 < x < 1$ . Then :

**Options**

1.  $(1+x)^2 f'(x) + 2(f(x))^2 = 0$
2.  $(1-x)^2 f'(x) - 2(f(x))^2 = 0$
3.  $(1+x)^2 f'(x) - 2(f(x))^2 = 0$
4.  $(1-x)^2 f'(x) + 2(f(x))^2 = 0$

Question Type : **MCQ**  
 Question ID : **86435120057**  
 Option 1 ID : **86435166760**  
 Option 2 ID : **86435166759**  
 Option 3 ID : **86435166762**  
 Option 4 ID : **86435166761**  
 Status : **Not Answered**  
 Chosen Option : --

**Q.17** If a line along a chord of the circle  $4x^2 + 4y^2 + 120x + 675 = 0$ , passes through the point  $(-30, 0)$  and is tangent to the parabola  $y^2 = 30x$ , then the length of this chord is :

**Options**

1. **5**
2.  $3\sqrt{5}$
3.  $5\sqrt{3}$
4. **7**

Question Type : **MCQ**  
 Question ID : **86435120062**  
 Option 1 ID : **86435166781**  
 Option 2 ID : **86435166780**  
 Option 3 ID : **86435166782**  
 Option 4 ID : **86435166779**  
 Status : **Not Answered**  
 Chosen Option : --

**Q.18** If the sum of an infinite GP  $a, ar, ar^2, ar^3, \dots$  is 15 and the sum of the squares of its each term is 150, then the sum of  $ar^2, ar^4, ar^6, \dots$  is :

Options

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

2.  $\frac{25}{2}$

3.  $\frac{9}{2}$

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

Question Type : **MCQ**  
Question ID : **86435120056**  
Option 1 ID : **86435166756**  
Option 2 ID : **86435166758**  
Option 3 ID : **86435166757**  
Option 4 ID : **86435166755**  
Status : **Answered**  
Chosen Option : **1**

**Q.19** If  ${}^{20}C_r$  is the co-efficient of  $x^r$  in the expansion of  $(1+x)^{20}$ , then the value of  $\sum_{r=0}^{20} r^2 {}^{20}C_r$  is equal to :

Options

1.  $420 \times 2^{19}$

2.  $380 \times 2^{19}$

3.  $420 \times 2^{18}$

4.  $380 \times 2^{18}$

Question Type : **MCQ**  
Question ID : **86435120055**  
Option 1 ID : **86435166751**  
Option 2 ID : **86435166752**  
Option 3 ID : **86435166754**  
Option 4 ID : **86435166753**  
Status : **Not Answered**  
Chosen Option : **--**



**Q.20** Let  $y = y(x)$  be a solution curve of the differential equation  $(y+1) \tan^2 x \, dx + \tan x \, dy + y \, dx = 0$ ,  $x \in \left(0, \frac{\pi}{2}\right)$ . If  $\lim_{x \rightarrow 0^+} xy(x) = 1$ , then the value of  $y\left(\frac{\pi}{4}\right)$  is :

Options

1.  $-\frac{\pi}{4}$
2.  $\frac{\pi}{4}$
3.  $\frac{\pi}{4} - 1$
4.  $\frac{\pi}{4} + 1$

Question Type : **MCQ**  
 Question ID : **86435120065**  
 Option 1 ID : **86435166793**  
 Option 2 ID : **86435166794**  
 Option 3 ID : **86435166791**  
 Option 4 ID : **86435166792**  
 Status : **Not Answered**  
 Chosen Option : --

Section : **Mathematics Section B**

**Q.1** If  ${}^1P_1 + 2 \cdot {}^2P_2 + 3 \cdot {}^3P_3 + \dots + 15 \cdot {}^{15}P_{15} = {}^qP_{r-s}$ ,  $0 \leq s \leq 1$ , then  ${}^{q+s}C_{r-s}$  is equal to \_\_\_\_\_.

Given 10  
 Answer :

Question Type : **SA**  
 Question ID : **86435120076**  
 Status : **Answered**

**Q.2** Let  $a, b \in \mathbb{R}$ ,  $b \neq 0$ . Define a function

$$f(x) = \begin{cases} a \sin \frac{\pi}{2}(x - 1), & \text{for } x \leq 0 \\ \frac{\tan 2x - \sin 2x}{b x^3}, & \text{for } x > 0. \end{cases}$$

If  $f$  is continuous at  $x=0$ , then  $10 - ab$  is equal to \_\_\_\_\_.

Given 7  
 Answer :

Question Type : **SA**  
 Question ID : **86435120071**  
 Status : **Answered**

**Q.3** Let  $z = \frac{1 - i\sqrt{3}}{2}$ ,  $i = \sqrt{-1}$ . Then the value of

$$21 + \left(z + \frac{1}{z}\right)^3 + \left(z^2 + \frac{1}{z^2}\right)^3 + \left(z^3 + \frac{1}{z^3}\right)^3 + \dots + \left(z^{21} + \frac{1}{z^{21}}\right)^3$$

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

Given --  
Answer :

Question Type : SA  
Question ID : 86435120078  
Status : Answered

**Q.4** The area of the region  $S = \{(x, y) : 3x^2 \leq 4y \leq 6x + 24\}$  is \_\_\_\_\_.

Given --  
Answer :

Question Type : SA  
Question ID : 86435120074  
Status : Not Answered

**Q.5** If  $y = y(x)$  is an implicit function of  $x$  such that  $\log_e(x + y) = 4xy$ , then  $\frac{d^2y}{dx^2}$  at  $x = 0$  is equal to \_\_\_\_\_.

Given --  
Answer :

Question Type : SA  
Question ID : 86435120075  
Status : Not Answered

**Q.6** A wire of length 36 m is cut into two pieces, one of the pieces is bent to form a square and the other is bent to form a circle. If the sum of the areas of the two figures is minimum, and the circumference of the circle is  $k$  (meter), then  $\left(\frac{4}{\pi} + 1\right)k$  is equal to \_\_\_\_\_.

Given --  
Answer :

Question Type : SA  
Question ID : 86435120073  
Status : Not Answered

**Q.7** The sum of all integral values of  $k$  ( $k \neq 0$ ) for which the equation

$$\frac{2}{x - 1} - \frac{1}{x - 2} = \frac{2}{k}$$

in  $x$  has no real roots, is \_\_\_\_\_.

Given --  
Answer :

Question Type : SA  
Question ID : 86435120072  
Status : Not Answered

**Q.8** The locus of a point, which moves such that the sum of squares of its distances from the points  $(0, 0)$ ,  $(1, 0)$ ,  $(0, 1)$   $(1, 1)$  is 18 units, is a circle of diameter  $d$ . Then  $d^2$  is equal to \_\_\_\_\_.

Given --  
Answer :

Question Type : **SA**  
Question ID : **86435120079**  
Status : **Not Answered**

**Q.9** Let the line L be the projection of the line  $\frac{x-1}{2} = \frac{y-3}{1} = \frac{z-4}{2}$  in the plane  $x-2y-z=3$ . If  $d$  is the distance of the point  $(0, 0, 6)$  from L, then  $d^2$  is equal to \_\_\_\_\_.

Given 5  
Answer :

Question Type : **SA**  
Question ID : **86435120077**  
Status : **Answered**

**Q.10** The number of three-digit even numbers, formed by the digits 0, 1, 3, 4, 6, 7 if the repetition of digits is not allowed, is \_\_\_\_\_.

Given 50  
Answer :

Question Type : **SA**  
Question ID : **86435120070**  
Status : **Answered**