**Question 1**

Among the following statements, choose the correct statements,

A. In ionic solid, ions are the constituent particles.
B. Ionic solids are soft.
C. Ionic solids are electrical insulators in the solid state.
D. Ionic solids conduct electricity in molten state.
E. Ionic solids have low melting and boiling points.

Choose the correct answer from the options given below:

A: A, C & D only
B: A, D & E only
C: A, B & C only
D: A, C & E only

---

**Question 2**

Atoms of element B form heptagonal lattice and those of the element A occupy 2/3 rd of tetrahedral voids. What is the formula of the compound formed by the elements A and B?

A: $A_3B_4$
B: $A_2B_3$
C: $A_2B_3$
D: $A_3B_2$

---

**Question 3**

Consider the 1M aqueous solution of the following compounds and arrange them in the increasing order of elevation in the boiling points.

A. $C_6H_{12}O_6$
B. $NaCl$
C. $MgCl_2$
D. $AlCl_3$
E. $Al_2(SO_4)_3$

Choose the correct answer from the options given below:
### Question 4

**Section:** CHEMISTRY  
**Item No:** 4  
**Question ID:** 692644  
**Question Type:** MCQ  
**Question:** Calculate the molarity of a solution containing 5g of NaOH in 450 mL solution  
**Options:**  
A: $0.278 \times 10^{-3}$ M  
B: 0.278 M  
C: $2.78 \times 10^{-3}$ M  
D: 2.78 M

### Question 5

**Section:** CHEMISTRY  
**Item No:** 5  
**Question ID:** 692645  
**Question Type:** MCQ  
**Question:** Among the following statements related to ionic conductance, choose the correct statements.  
A. Ionic conductance depends on the nature of electrolyte  
B. Ionic conductance is due to the movements of electrons  
C. Ionic conductance is also called electronic conductance  
D. Ionic conductance depends on temperature  
E. Ionic conductance also depends on the nature of solvent  
**Options:**  
A: A, B and C only  
B: B, C and D only  
C: B, C and E only  
D: A, D and E only

### Question 6

**Section:** CHEMISTRY  
**Item No:** 6  
**Question ID:** 692646  
**Question Type:** MCQ  
**Question:** $\Lambda^0_m$ for NaCl, HCl and NaOAc are 126.4, 425.9 and 91.0 S cm$^2$ mol$^{-1}$ respectively. Calculate $\Lambda^0_m$ for HOAc  
**Options:**  
A: 390.5 S cm$^2$ mol$^{-1}$  
B: 643.3 S cm$^2$ mol$^{-1}$  
C: 461.3 S cm$^2$ mol$^{-1}$  
D: 208.5 S cm$^2$ mol$^{-1}$

### Question 7
**Question ID:** 692647  
**Question Type:** MCQ  
**Question:** How much charge is required for the reduction of 1 mol of MnO$_4^-$ to Mn$^{2+}$ ?  
| A: | 1 F |
| B: | 5 F |
| C: | 3 F |
| D: | 6 F |

---

**Section:** CHEMISTRY  
**Item No:** 8  
**Question ID:** 692648  
**Question Type:** MCQ  
**Question:** The products formed at cathode and anode by electrolysis of aqueous NaCl solution respectively are  
| A: | Na, Cl$_2$ |
| B: | Na, O$_2$ |
| C: | H$_2$, Cl$_2$ |
| D: | H$_2$, O$_2$ |

---

**Section:** CHEMISTRY  
**Item No:** 9  
**Question ID:** 692649  
**Question Type:** MCQ  
**Question:** The artificial sweetener used only for cold food is  
| A: | Alitame |
| B: | Sucralose |
| C: | Aspartame |
| D: | Saccharin |

---

**Section:** CHEMISTRY  
**Item No:** 10  
**Question ID:** 6926410  
**Question Type:** MCQ  
**Question:** Rate constant ‘k’ for a certain reaction is $k = 2 \cdot 3 \times 10^{-5}$ L mol$^{-1}$ s$^{-1}$. Order of the reaction is:  
| A: | 0 |
| B: | 1 |
| C: | 2 |
| D: | 3 |

---

**Section:** CHEMISTRY  
**Item No:** 11  
**Question ID:** 6926411
The decomposition of NH₃ on platinum surface is zero order reaction. If \( k = 2 \times 10^{-4} \text{ mol L}^{-1} \text{s}^{-1} \), the rate of production of H₂ is

A: \( 2 \times 10^{-4} \text{ mol L}^{-1} \text{s}^{-1} \)
B: \( 7 \times 10^{-4} \text{ mol L}^{-1} \text{s}^{-1} \)
C: \( 5 \times 10^{-4} \text{ mol L}^{-1} \text{s}^{-1} \)
D: \( 10 \times 10^{-4} \text{ mol L}^{-1} \text{s}^{-1} \)

The molecularity of the following elementary reaction is \( \text{NH}_3 + \text{NO}_2 \rightarrow \text{N}_2 + 2\text{H}_2\text{O} \)

A: Zero
B: One
C: Two
D: Three

Which of the following is not the characteristic of physisorption?

A: It arises because of van der Waals forces.
B: It is not specific in nature.
C: Enthalpy of adsorption is high.
D: It results into multi molecular layers on adsorbent surface under high pressure.

Which one of the following is an emulsion?

A: Smoke
B: Hair cream
C: Paint
D: Cheese
16. Caprolactam is the starting material for
   A: Nylon 6,6
   B: Nylon 6
   C: Nylon 2,6
   D: Dacron

17. Which of the following is a positively charged Sol?
   A: Starch
   B: Gum
   C: Gold Sol
   D: Blood

18. Match list I with list II
   List I   List II
   A. Siderite I. Aluminium
   B. Malachite II. Iron
   C. Calamine III. Copper
   D. Bauxite IV. Zinc

   Choose the correct answer from the options given below:
   A: A - I, B - II, C - III, D - IV
   B: A - II, B - III, C - IV, D - I
   C: A - IV, B - III, C - II, D - I
   D: A - III, B - II, C - IV, D - I

19. The metal refined by Van Arkel method is
   A: Ni
   B: Zr
   C: Cu
   D: Sn
Question:
Arrange the following hydrides in increasing order of thermal stability.
A. \( \text{H}_2\text{O} \)
B. \( \text{H}_2\text{Se} \)
C. \( \text{H}_2\text{Po} \)
D. \( \text{H}_2\text{Te} \)
E. \( \text{H}_2\text{S} \)
Choose the correct answer from the options given below:
A: \( \text{A} < \text{B} < \text{C} < \text{D} < \text{E} \)
B: \( \text{C} < \text{D} < \text{B} < \text{E} < \text{A} \)
C: \( \text{C} < \text{D} < \text{E} < \text{B} < \text{A} \)
D: \( \text{A} < \text{E} < \text{B} < \text{D} < \text{C} \)

Question:
Match list I with list II

<table>
<thead>
<tr>
<th>List I</th>
<th>List II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Ammonia</td>
<td>I. Ostwald’s process</td>
</tr>
<tr>
<td>B. Chlorine</td>
<td>II. Contact process</td>
</tr>
<tr>
<td>C. Sulphuric Acid</td>
<td>III. Deacon process</td>
</tr>
<tr>
<td>D. Nitric Acid</td>
<td>IV. Haber’s process</td>
</tr>
</tbody>
</table>

Choose the correct answer from the options given below:
A: \( \text{A} - \text{IV}, \text{B} - \text{III}, \text{C} - \text{II}, \text{D} - \text{I} \)
B: \( \text{A} - \text{IV}, \text{B} - \text{I}, \text{C} - \text{II}, \text{D} - \text{III} \)
C: \( \text{A} - \text{IV}, \text{B} - \text{III}, \text{C} - \text{I}, \text{D} - \text{II} \)
D: \( \text{A} - \text{IV}, \text{B} - \text{I}, \text{C} - \text{III}, \text{D} - \text{II} \)

Question:
The formula of a noble gas species which is isostructural with \( \text{BrO}_5^- \) is:
A: \( \text{XeOF}_4 \)
B: \( \text{XeF}_2 \)
C: \( \text{XeO}_3 \)
D: \( \text{XeF}_4 \)
Match list I with list II

<table>
<thead>
<tr>
<th>List I (Transition Metals)</th>
<th>List II (Maximum Oxidation State)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Ti</td>
<td>I. 7</td>
</tr>
<tr>
<td>B. V</td>
<td>II. 4</td>
</tr>
<tr>
<td>C. Mn</td>
<td>III. 5</td>
</tr>
<tr>
<td>D. Cu</td>
<td>IV. 2</td>
</tr>
</tbody>
</table>

Choose the correct answer from the options given below:


B: A - I, B - II, C - III, D - IV

C: A - III, B - I, C -II, D - IV

D: A - II , B - I, C - III, D - IV

The metal from first transition series having positive $E^0_{M^{2+}M}$ value:

A: Cr

B: V

C: Cu

D: Ni

Magnetic moment of a divalent ion in aqueous solution of an element with atomic number 25 is:

A: 2.84 BM

B: 3.87 BM

C: 4.90 BM

D: 5.92 BM
Section: CHEMISTRY
Item No: 26
Question ID: 6926426
Question Type: MCQ
Question: Which one of the following transition metal ion is colourless?
A: Se$^{3-}$
B: V$^{2-}$
C: Mn$^{2+}$
D: Co$^{3+}$

Question Type: MCQ
Question: Among the following statements, choose the correct statements.
A: SN$^2$ reaction proceeds with stereo chemical inversion.
B: The process of conversion of Racemic mixture into enantiomer is known as Racemisation.
C: A mixture containing 2 enantiomers in equal proportions is known as Racemic mixture.
D: The stereoisomers related to each other as superimposable mirror image are called enantiomers.
E: The objects which are non-superimposable on their mirror image are said to be chiral and this property is known as chirality.
Choose the correct answer from the options given below:
A: A, B and C only
B: A, C and E only
C: B, C and E only
D: C, D and E only

Section: CHEMISTRY
Item No: 27
Question ID: 6926427
Question Type: MCQ
Question: IUPAC name of neopentyl chloride is
A: 1- Chloro - 2, 2 - dimethylpropane
B: 2 - Chloro - 1, 2 - dimethylpropane
C: 2 - Chloro - 2 - Methylbutane
D: 2 - Chloro - 2 - Methylpentane

Section: CHEMISTRY
Item No: 28
Question ID: 6926428
Question Type: MCQ
Question: The structure of major monohalo product in the following reaction is

\[ \text{CH}_2\text{OH} + \text{HCl} \xrightarrow{\text{heat}} \]

\[ \text{HO} \]

\[ \text{CH}_2\text{Cl} \]
### Question 29

**Section:** CHEMISTRY  
**Item No:** 29  
**Question ID:** 6926429  
**Question Type:** MCQ

**Question:** Among the following statements, choose the correct statements.

A. Boiling point of alcohols increases with increase in the number of carbon atoms.
B. In alcohols, boiling points increases with increase of branching in carbon chain.
C. Boiling points of alcohols are lesser in comparison to haloalkanes of comparable molecular mass.
D. Boiling points of alcohols are higher in comparison to hydrocarbons of comparable molecular mass.
E. The high boiling points of alcohols are mainly due to the presence of intramolecular hydrogen bonding.

Choose the correct answer from the options given below:

A: A, D and E only  
B: A, B and C only  
C: B, C and D only  
D: C, D and E only

### Question 30

**Section:** CHEMISTRY  
**Item No:** 30  
**Question ID:** 6926430  
**Question Type:** MCQ

**Question:** Arrange the following compounds in increasing order of their acid strength:

A. Propan-1- ol  
B. 3- nitrophenol  
C. 3, 5- dinitrophenol  
D. Phenol  
E. 4 – Methylphenol

Choose the correct answer from the options given below:

A: A < B < C < D < E
The structure of the product of the following reaction is:

\[ \text{Product Structure} \]

A: 

B: 

C: 

D: 

Section: CHEMISTRY
Item No: 31
Question ID: 6926431
Question Type: MCQ

Section: CHEMISTRY
Item No: 32
Question ID: 6926432
A: \[ \text{Product: } + \text{C}_2\text{H}_3\text{Br} \]

B: \[ \text{Product: } + \text{C}_2\text{H}_5\text{OH} \]

C: \[ \text{Product: } + \text{C}_2\text{H}_3\text{Br} \]

D: \[ \text{Product: } + \text{C}_2\text{H}_5\text{Br} \]

Question Type: MCQ

Question: The product of the following reaction is:

A: Acid Behaviour
B: Basic Behaviour
C: Amphoteric Behaviour
D: Neutral Behaviour
Which simple chemical test is used to distinguish between ethanal & propanal?

A: Iodoform test  
B: Tollen's test  
C: Fehling's test  
D: Lucas test

Which of the following compound would undergo Aldol condensation?

A: Methanal  
B: Benzaldehyde  
C: 2,2-Dimethylbutanal
<table>
<thead>
<tr>
<th>Section: CHEMISTRY</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Item No:</td>
<td>37</td>
</tr>
<tr>
<td>Question ID:</td>
<td>6926437</td>
</tr>
<tr>
<td>Question Type:</td>
<td>MCQ</td>
</tr>
</tbody>
</table>
| Question:         | Among the following statements choose the correct statements  
|                   | A. Analgesics reduce or abolish pain without causing impairment of  
|                   |   consciousness, mental confusion.  
|                   | B. Tranquilizers are neurological inactive drugs.  
|                   | C. Morphine is the example of non-narcotic analgesics.  
|                   | D. Disinfectants are applied to inanimate objects whereas antiseptics are applied  
|                   |   to living tissues.  
|                   | E. Same substance can act as an antiseptic as well as disinfectant by varying the  
|                   |   concentration.  
|                   | Choose the correct answer from the options given below:  
| A:                | A, D and E only  
| B:                | B, C and D only  
| C:                | A, C and E only  
| D:                | B, C and E only |

<table>
<thead>
<tr>
<th>Section: CHEMISTRY</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Item No:</td>
<td>38</td>
</tr>
<tr>
<td>Question ID:</td>
<td>6926438</td>
</tr>
<tr>
<td>Question Type:</td>
<td>MCQ</td>
</tr>
</tbody>
</table>
| Question:         | Out of the following artificial sweetening agents, which one has highest sweetness  
|                   | value in comparison to cane sugar?  
| A:                | Saccharin  
| B:                | Alitame  
| C:                | Sucralose  
| D:                | Aspartame |

<table>
<thead>
<tr>
<th>Section: CHEMISTRY</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Item No:</td>
<td>39</td>
</tr>
<tr>
<td>Question ID:</td>
<td>6926439</td>
</tr>
<tr>
<td>Question Type:</td>
<td>MCQ</td>
</tr>
</tbody>
</table>
| Question:         | Among the following polymers, which one is the copolymer?  
| A:                | Polypropene  
| B:                | Polystyrene  
| C:                | Polyvinyl chloride  
| D:                | Glyptal |

<table>
<thead>
<tr>
<th>Section: CHEMISTRY</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Item No:</td>
<td>40</td>
</tr>
<tr>
<td>Question ID:</td>
<td>6926440</td>
</tr>
<tr>
<td>Question Type:</td>
<td>MCQ</td>
</tr>
</tbody>
</table>
| Question:         | Among the following, which one is a disaccharide?  
| A:                |  
| B:                |  
| C:                |  
| D:                |  

A: Glucose  
B: Glycogen  
C: Maltose  
D: Starch

Section: CHEMISTRY  
Item No: 41  
Question ID: 6926441  
Question Type: MCQ  
Passage: The reaction of amines with mineral acids to form ammonium salt shows that these are basic in nature. Amines have an unshared pair of electron on nitrogen atom due to which they behave as lewis base. Basicity of amines is related to their structure. Basic character of an amine depends upon the ease of formation of cation by accepting a proton from the acid. The more stable the cation is relative to the amine, more basic is the amine.  
Question: Structure of ammonium salt when ethylamine reacts with one mole of HCl?  
A: C₂H₅ – NH₃⁺ Cl⁻  
B: (C₂H₅)₂ – NH₂⁺ Cl⁻  
C: (C₂H₅)₃ – NH⁺ Cl⁻  
D: (C₂H₅)₄ – N⁺ Cl⁻

Section: CHEMISTRY  
Item No: 42  
Question ID: 6926442  
Question Type: MCQ  
Passage: The reaction of amines with mineral acids to form ammonium salt shows that these are basic in nature. Amines have an unshared pair of electron on nitrogen atom due to which they behave as lewis base. Basicity of amines is related to their structure. Basic character of an amine depends upon the ease of formation of cation by accepting a proton from the acid. The more stable the cation is relative to the amine, more basic is the amine.  
Question: Among the following amines, which one is most basic (in aqueous solution)?  
A: NH₃  
B: C₂H₅NH₂  
C: (C₂H₅)₂NH  
D: (C₂H₅)₃N

Section: CHEMISTRY  
Item No: 43  
Question ID: 6926443  
Question Type: MCQ  
Passage: The reaction of amines with mineral acids to form ammonium salt shows that these are basic in nature. Amines have an unshared pair of electron on nitrogen atom due to which they behave as lewis base. Basicity of amines is related to their structure. Basic character of an amine depends upon the ease of formation of cation by accepting a proton from the acid. The more stable the cation is relative to the amine, more basic is the amine.
### Question 44

**Question:** The correct order of basicity of amines in gas phase

<table>
<thead>
<tr>
<th>Option</th>
<th>Basicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:</td>
<td>$1^\circ &lt; 3^\circ &lt; 2^\circ$</td>
</tr>
<tr>
<td>B:</td>
<td>$3^\circ &lt; 1^\circ &lt; 2^\circ$</td>
</tr>
<tr>
<td>C:</td>
<td>$2^\circ &lt; 3^\circ &lt; 1^\circ$</td>
</tr>
<tr>
<td>D:</td>
<td>$1^\circ &lt; 2^\circ &lt; 3^\circ$</td>
</tr>
</tbody>
</table>

** Passage:** The reaction of amines with mineral acids to form ammonium salt shows that these are basic in nature. Amines have an unshared pair of electron on nitrogen atom due to which they behave as lewis base. Basicity of amines is related to their structure. Basic character of an amine depends upon the ease of formation of cation by accepting a proton from the acid. The more stable the cation is relative to the amine, more basic is the amine.

**Question:** Among the following, which one has the highest $pK_b$ value?

<table>
<thead>
<tr>
<th>Option</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:</td>
<td>$C_2H_5NH_2$</td>
</tr>
<tr>
<td>B:</td>
<td>$C_2H_5NHCH_3$</td>
</tr>
<tr>
<td>C:</td>
<td>$(C_2H_5)_2NH$</td>
</tr>
<tr>
<td>D:</td>
<td>$C_2H_2NH_2$</td>
</tr>
</tbody>
</table>

### Question 45

**Passage:** The reaction of amines with mineral acids to form ammonium salt shows that these are basic in nature. Amines have an unshared pair of electron on nitrogen atom due to which they behave as lewis base. Basicity of amines is related to their structure. Basic character of an amine depends upon the ease of formation of cation by accepting a proton from the acid. The more stable the cation is relative to the amine, more basic is the amine.

**Question:** Among the following, which one has the highest $K_b$ value?

<table>
<thead>
<tr>
<th>Option</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:</td>
<td>$C_2H_5NH_2$</td>
</tr>
<tr>
<td>B:</td>
<td>$C_2H_5N(CH_3)_2$</td>
</tr>
<tr>
<td>C:</td>
<td>$(C_2H_5)_2NH$</td>
</tr>
<tr>
<td>D:</td>
<td>$CH_3NH_2$</td>
</tr>
</tbody>
</table>

### Question 46

**Passage:** According to the valence bond theory, the metal atom or ion under the influence of ligands can use its $(n-1)d$, $ns$, $np$, $nd$ orbitals for hybridisation to yield a set of equivalent orbitals of definite geometry. These hybridised orbitals are allowed to overlap with ligand orbitals that can donate electron pairs for bonding. It is usually possible to predict the geometry of a complex from the knowledge of its magnetic behaviour on the basis of the valence bond theory. Consider the formation of $[Co(NH_3)_2Cl]Cl_2$ and answer the following question:

---

**Question:** Which of the following is not a characteristic of a complex?
Question:
The IUPAC name of the above coordination entity is
A: Chlorido[amminecobalt(II)] chloride
B: Chlorido[amminecobalt(II)] dichloride
C: Pentaamminechlorocobalt(III) chloride
D: Pentaamminechlorocobalt(III) dichloride

According to the valence bond theory, the metal atom or ion under the influence of ligands can use its (n-1)d, ns, np, nd orbitals for hybridisation to yield a set of equivalent orbitals of definite geometry. These hybridised orbitals are allowed to overlap with ligand orbitals that can donate electron pairs for bonding. It is usually possible to predict the geometry of a complex from the knowledge of its magnetic behaviour on the basis of the valence bond theory. Consider the formation of [Co(NH₃)₅Cl]Cl₂ and answer the following question:

Question:
The spin only magnetic moment of the complex [Co(NH₃)₅Cl]Cl₂ in BM is
A: 1.7
B: 0.0
C: 3.8
D: 4.9

According to the valence bond theory, the metal atom or ion under the influence of ligands can use its (n-1)d, ns, np, nd orbitals for hybridisation to yield a set of equivalent orbitals of definite geometry. These hybridised orbitals are allowed to overlap with ligand orbitals that can donate electron pairs for bonding. It is usually possible to predict the geometry of a complex from the knowledge of its magnetic behaviour on the basis of the valence bond theory. Consider the formation of [Co(NH₃)₅Cl]Cl₂ and answer the following question:

Question:
The hybridization of cobalt in the above coordination entity is
A: sp³d²
B: d²sp³
C: sp³d
D: dsp³
possible to predict the geometry of a complex from the knowledge of its magnetic behaviour on the basis of the valence bond theory. Consider the formation of [Co(NH₃)₅Cl]Cl₂ and answer the following question:

<table>
<thead>
<tr>
<th>Question</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>The coordination number of cobalt in the above coordination entity is</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to the valence bond theory, the metal atom or ion under the influence of ligands can use its (n-1)d, ns, np, nd orbitals for hybridisation to yield a set of equivalent orbitals of definite geometry. These hybridised orbitals are allowed to overlap with ligand orbitals that can donate electron pairs for bonding. It is usually possible to predict the geometry of a complex from the knowledge of its magnetic behaviour on the basis of the valence bond theory. Consider the formation of [Co(NH₃)₅Cl]Cl₂ and answer the following question:

<table>
<thead>
<tr>
<th>Question</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>The primary valence of Co in above coordination entity is</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
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<td>4</td>
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