1. IUPAC name of \( \text{H}_3\text{C}--\text{CH}--\text{CH}_2--\text{CH}--\text{CH}_3 \) is
\[
\begin{align*}
\text{OH} \\
\text{COOH}
\end{align*}
\]
(1) 4-hydroxy 1 methyl pentanoic acid  
(2) 4-hydroxy 2 methyl pentanoic acid
(3) 2-hydroxy 4 methyl pentanoic acid  
(4) 2-hydroxy 2 methyl pentanoic acid
Ans: (2)

2. Alkali metals have negative reduction potential and hence they behave as
(1) Oxidising agents  
(2) Lewis bases  
(3) Reducing agents  
(4) Electrolytes
Ans: (3)

3. Which of the following gases has the highest value of RMS – velocity at 298 K?
(1) \( \text{CH}_4 \)  
(2) \( \text{CO} \)  
(3) \( \text{Cl}_2 \)  
(4) \( \text{CO}_2 \)
Ans: (1)

4. Cycloalkane formed when 1, 4-dibromopentane is heated with Sodium is
(1) Methyl cyclobutane  
(2) Cyclopentane  
(3) Cyclobutane  
(4) Methyl cyclopentane
Ans: (2)

5. In the reaction, \( 2\text{FeSO}_4 + \text{H}_2\text{SO}_4 + \text{H}_2\text{O} \rightarrow \text{Fe}_2(\text{SO}_4)_3 + 2\text{H}_2\text{O} \), the oxidizing agent is
(1) \( \text{FeSO}_4 \)  
(2) \( \text{H}_2\text{SO}_4 \)  
(3) \( \text{H}_2\text{O} \)  
(4) Both \( \text{H}_2\text{SO}_4 \) and \( \text{H}_2\text{O} \)
Ans: (3)

6. Given Thermochemical equation, \( 2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\ell) \); \( \Delta \text{H} = -571.6 \text{ kJ} \). Heat of decomposition of water is
(1) -571.6 kJ  
(2) +571.6 kJ  
(3) -1143.2 kJ  
(4) +285.8 kJ
Ans: (4)

7. In Buna-S, the symbol “Bu” stands for
(1) 1-Butene  
(2) n-Butene  
(3) 2-Butene  
(4) Butadiene
Ans: (4)

8. The electronic configuration of \( \text{Cu}^{2+} \) ion is
(1) [Ar] 3d\(^8\) 4s\(^1\)  
(2) [Ar] 3d\(^9\) 4s\(^0\)  
(3) [Ar] 3d\(^7\) 4s\(^2\)  
(4) [Ar] 3d\(^8\) 4s\(^0\)
Ans: (2)

9. The yield of the products in the reaction, \( \text{A}_2(\text{g}) + 2\text{B}(\text{g}) = \text{C}(\text{g}) + Q \). kJ would be higher at
(1) High temperature and high pressure  
(2) High temperature and low pressure  
(3) Low temperature and high pressure  
(4) Low temperature and low pressure
Ans: (3)
10. Mesomeric effect involves  
(1) delocalisation of $\pi$ - electrons  
(2) delocalisation of $\sigma$ - electrons  
(3) partial displacement of electrons  
(4) delocalisation of $\pi$ and $\sigma$ electrons  
Ans: (1)

11. Which one of the following sets of ions represents the collection of isoelectronic species?  
(1) K$^+$, Cl$^-$, Mg$^{2+}$, Sc$^{3+}$  
(2) Na$^+$, Ca$^{2+}$, Sc$^{3+}$, F$^-$  
(3) K$^+$, Ca$^{2+}$, Sc$^{3+}$, Cl$^-$  
(4) Na$^+$, Mg$^{2+}$, Al$^{3+}$, Cl$^-$  
Ans: (3)

12. Adsorption theory is applicable for  
(1) Homogeneous catalysis  
(2) Heterogeneous catalysis  
(3) Autocatalysis  
(4) Induced catalysis  
Ans: (2)

13. Methane can be converted into Ethane by the reactions  
(1) Chlorination followed by the reaction with alcoholic KOH  
(2) Chlorination followed by the reaction with aqueous KOH  
(3) Chlorination followed by Wurtz reaction  
(4) Chlorination followed by decarboxylation  
Ans: (3)

14. Intramolecular Hydrogen bonding is formed in  
(1) H$_2$O  
(2) Salicyladehyde  
(3) NH$_3$  
(4) Benzophenone  
Ans: (2)

15. If 50% of the reactant is converted into a product in a first order reaction in 25 minutes, how much of it would react in 100 minutes?  
(1) 93.75%  
(2) 87.5%  
(3) 75%  
(4) 100%  
Ans: (1)

16. The number of optical isomers of the compound CH$_3$ – CHBr – CHBr – COOH is  
(1) 0  
(2) 1  
(3) 3  
(4) 4  
Ans: (4)

17. When limestone is heated, CO$_2$ is given off. The metallurgical operation is  
(1) Smelting  
(2) Reduction  
(3) Calcination  
(4) Roasting  
Ans: (3)

18. The rate of reaction increases with rise in temperature because of  
(1) increase in number of activated molecules  
(2) increase in energy of activation  
(3) decrease in energy of activation  
(4) increase in the number of effective collisions  
Ans: (1, 3 & 4)
19. Meso compounds do not show optical activity because
   (1) they do not contain chiral carbon atoms
   (2) they have non-super imposable mirror images
   (3) they contain plane of symmetry
   (4) they do not contain plane of symmetry
Ans: (3)

20. When formic acid is heated with concentrated H₂SO₄, the gas evolved is
   (1) only CO₂
   (2) only ‘CO’
   (3) a mixture of ‘CO’ and ‘CO₂’
   (4) a mixture of ‘SO₂’ and ‘CO₂’
Ans: (2)

21. Temperature coefficient of a reaction is ‘2’. When temperature is increased from 30°C to 90°C, the rate of reaction is increased by
   (1) 60 times
   (2) 64 times
   (3) 150 times
   (4) 400 times
Ans: (2)

22. Conversion of benzene to acetophenone can be brought by
   (1) Wurtz reaction
   (2) Wurtz-Fittig’s reaction
   (3) Friedel Crafts alkylation
   (4) Friedel Crafts acylation
Ans: (4)

23. Excess of PCl₅ reacts with concentrated H₂SO₄ giving
   (1) Chlorosulphuric acid
   (2) Sulphurous acid
   (3) Sulphury chloride
   (4) Thionyl chloride
Ans: (3)

24. An example for a neutral buffer is
   (1) Ammonium hydroxide and Ammonium chloride
   (2) Acetic acid and Sodium acetate
   (3) Acetic acid and Ammonium hydroxide
   (4) Citric acid and Sodium citrate
Ans: (3)

25. Least energetic conformation of cyclohexane is
   (1) Chain conformation
   (2) Boat conformation
   (3) Cis conformation
   (4) E-z form
Ans: (1)

26. Which of the following is employed in flash tubes in photograph?
   (1) Ar
   (2) Ne
   (3) Kr
   (4) Xe
Ans: (4)

27. Conjugate base of H₂PO₄⁻ is
   (1) HPO₄⁻
   (2) HPO₄²⁻
   (3) H₃PO₄
   (4) PO₄³⁻
Ans: (2)
28. An alkyl bromide (X) reacts with Sodium in ether to form 4, 5-diethyl octane, the compound ‘X’ is
(1) \( \text{CH}_3(\text{CH}_2)_3\text{Br} \)  (2) \( \text{CH}_3(\text{CH}_2)_5\text{Br} \)
(3) \( \text{CH}_3(\text{CH}_2)_3\text{CH(\text{Br})CH}_3 \)  (4) \( \text{CH}_3 - (\text{CH}_2)_2 - \text{CH(\text{Br}) - CH}_2 - \text{CH}_3 \)
\textbf{Ans: (4)}

29. Which one of the following shows highest magnetic moment?
(1) \( \text{Fe}^{2+} \)  (2) \( \text{CO}^{2+} \)  (3) \( \text{Cr}^{3+} \)  (4) \( \text{Ni}^{2+} \)
\textbf{Ans: (1)}

30. The emf of a galvanic cell constituted with the electrodes \( \text{Zn}^{2+} |\text{Zn (}-0.76 \text{ V)} \) and \( \text{Fe}^{2+} |\text{Fe (-0.41V)} \) is
(1) -0.35 V  (2) +1.17 V  (3) +0.35 V  (4) -1.17 V
\textbf{Ans: (3)}

31. Which of the following pairs are correctly matched?

<table>
<thead>
<tr>
<th>Reactants</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. ( \text{RX} + \text{AgOH}_{(aq)} )</td>
<td>( \text{RH} )</td>
</tr>
<tr>
<td>II. ( \text{RX} + \text{AgCN}_{(alco)} )</td>
<td>( \text{RNC} )</td>
</tr>
<tr>
<td>III. ( \text{RX} + \text{KCN}_{(alco)} )</td>
<td>( \text{RNC} )</td>
</tr>
<tr>
<td>IV. ( \text{RX} + \text{Na}_{(ether)} )</td>
<td>( \text{R-R} )</td>
</tr>
</tbody>
</table>

1) I alone  2) I and II  3) II and III  4) II and IV
\textbf{Ans: (4)}

32. In a transition series, with increase in atomic-number, the paramagnetism
1) increases gradually  
2) decreases gradually
3) first increases to a maximum and then decreases  
4) first decreases to a minimum and then increases
\textbf{Ans: (3)}

33. Identify a species which is ‘NOT’ a Bronsted acid but a Lewis acid.
1) \( \text{BF}_3 \)  2) \( \text{H}_3^{+}\text{O} \)  3) \( \text{NH}_3 \)  4) \( \text{HCl} \)
\textbf{Ans: (1)}

34. The compound formed when calcium acetate and calcium formate is dry distilled.
1) Acetone  2) Acetaldehyde  3) Benzaldehyde  4) Acetophenone
\textbf{Ans: (2)}

35. \( d^2sp^3 \) hybridisation of the atomic orbitals gives
1) Square planar structure  2) Triangular structure
3) Tetrahedral structure  4) Octahedral structure
\textbf{Ans: (4)}

36. The pH of \( 10^{-8} \text{ M HCl solution} \) is
1) 8  2) 6.9586  3) More than 8  4) Slightly more than 7
\textbf{Ans: (2)}

37. Which of the following is strongly acidic?
1) Phenol  2) o-cresol  3) p-nitrophenol  4) p-cresol
\textbf{Ans: (3)}
38. A group of atoms can function as a ligand only when
   1) it is a small molecule  2) it has an unshared electron pair
   3) it is a negatively charged ion  4) it is a positively charged ion
   Ans: (2)

39. Which of the following is ‘NOT’ a colligative property?
   1) Elevation in boiling point  2) Depression in freezing point
   3) Osmotic pressure  4) Lowering of vapour pressure
   Ans: (4)

40. Acetone and Propanal are
   1) Functional isomers  2) Position isomers
   3) Geometrical isomers  4) Optical isomers
   Ans: (1)

41. Which of the following is diamagnetic?
   1) H₂⁺  2) He²⁺  3) O₂  4) N₂
   Ans: (4)

42. 3 gms of urea is dissolved in 45 gms of H₂O. The relative lowering in vapour pressure is
   1) 0.05  2) 0.04  3) 0.02  4) 0.01
   Ans: (3)

43. The reagent used to distinguish between acetaldehyde and benzaldehyde is
   1) Tollen’s reagent  2) Fehling’s solution
   3) 2-4-dinitrophenyl hydrazine  4) Semicarbazide
   Ans: (2)

44. Metallic luster is due to
   1) high density of metals  2) high polish on the surface of metals
   3) reflection of light by mobile electrons  4) chemical inertness of metals
   Ans: (3)

45. Which of the following aqueous solutions will exhibit highest boiling point?
   1) 0.01 M urea  2) 0.01 M KNO₃  3) 0.01 M Na₂SO₄  4) 0.015M C₆H₁₂O₆
   Ans: (3)

46. Which one of the following gives amine on heating with amide?
   1) Br₂ in aqueous KOH  2) Br₂ on alcoholic KOH
   3) Cl₂ in Sodium  4) Sodium in Ether
   Ans: (1)

47. The number of antibonding electrons present in O₂⁻ molecular ion is
   1) 8  2) 6  3) 5  4) 4
   Ans: (3)

48. The process is spontaneous at the given temperature, if
   1) ΔH is +ve and ΔS is −ve  2) ΔH is −ve and ΔS is +ve
   3) ΔH is +ve and ΔS is +ve  4) ΔH is +ve and ΔS is equal to zero
   Ans: (2)

49. Glucose when reduced with HI and Red Phosphorus gives
   1) n-hexane  2) n-heptane  3) n-pentane  4) n-octane
   Ans: (1)
50. The stability of a Lyophobic colloid is due to
1) Adsorption of covalent molecules on the colloid
2) The size of the particles
3) The charge on the particles
4) Tyndall effect
Ans: (1)

51. Oils are liquids at room temperature since they contain higher percentage of
1) Oleates 2) Palmitates 3) Stearates 4) Myristates
Ans: (1)

52. Which of the following cations will have minium flocculation value for arsenic sulphide sol?
1) Na\(^+\) 2) Mg\(^{2+}\) 3) Ca\(^{2+}\) 4) Al\(^{3+}\)
Ans: (4)

53. The value of entropy of solar system is
1) increasing 2) decreasing 3) constant 4) zero
Ans: (1)

54. In face centred cubic lattice, a unit cell is shared equally by how many unit cells?
1) 6 2) 4 3) 2 4) 8
Ans: (4)

55. The number of disulphide linkages present in Insulin are
1) 4 2) 3 3) 2 4) 1
Ans: (2)

56. The process of zone refining is used in the purification of
1) Al 2) Ge 3) Cu 4) Ag
Ans: (2)

57. The number of water molecules present in a drop of water weighing 0.018 gm is
1) 6.022 x 10\(^{26}\) 2) 6.022 x 10\(^{23}\) 3) 6.022 x 10\(^{19}\) 4) 6.022 x 10\(^{20}\)
Ans: (4)

58. Empirical formula of a compound is CH\(_2\)O and its molecular mass is 90, the molecular formula of the compound is
1) C\(_3\)H\(_6\)O\(_3\) 2) C\(_2\)H\(_4\)O\(_2\) 3) C\(_6\)H\(_{12}\)O\(_6\) 4) CH\(_2\)O
Ans: (1)

59. Hybridised states of carbon in Graphite and Diamond are respectively
1) sp\(^3\), sp\(^3\) 2) sp\(^3\), sp\(^2\) 3) sp\(^2\), sp\(^2\) 4) sp\(^2\), sp\(^3\)
Ans: (4)

60. The mass of 112 cm\(^3\) of NH\(_3\) gas at STP is
1) 0.085 g 2) 0.850 g 3) 8.500 g 4) 80.500 g
Ans: (1)