PAPER-II

INSTRUCTIONS FOR CANDIDATES

1. Answer all questions.
2. All questions carry equal marks.
3. Only one answer is to be given for each question.
4. If more than one answers are marked, it would be treated as wrong answer.
5. Each question has four alternative responses marked serially as 1, 2, 3, 4. You have to darken only one circle or bubble indicating the correct answer on the Answer Sheet using BLUE BALL POINT PEN.
6. The OMR Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully with blue ball point pen only.
7. 1/3 part of the mark(s) of each question will be deducted for each wrong answer. A wrong answer means an incorrect answer or more than one answers for any question. Leaving all the relevant circles or bubbles of any question blank will not be considered as wrong answer.
8. Mobile Phone or any other electronic gadget in the examination hall is strictly prohibited. A candidate found with any such objectionable material with him/her will be strictly dealt as per rules.
9. Please correctly fill your Roll Number in O.M.R. Sheet. 5 Marks can be deducted for filling wrong or incomplete Roll Number.
10. If there is any sort of ambiguity, mistake either of printing or factual nature then our of Hindi and English Version of the question, the English Version will be treated as standard.

Warning: If a candidate is found copying or if any unauthorized material is found in his/her possession, F.I.R. would be lodged against him/her in the Police Station and he/she would liable to be prosecuted. Department may also debar him/her permanently from all future examinations.

Do not open this Test Booklet until you are asked to do so.
1. The enthalpies of formation of all elements in their standard states are
   (1) Unity
   (2) Zero
   (3) < 0
   (4) different for each element

2. The enthalpy of combustion of methane, graphite and dihydrogen at 298 K are \(-890.3\ \text{kJ mol}^{-1}\), \(-393.5\ \text{kJ mol}^{-1}\), and \(-285.8\ \text{kJ mol}^{-1}\) respectively. Enthalpy of formation of \(\text{CH}_4\) is
   (1) \(-74.8\ \text{kJ mol}^{-1}\)
   (2) \(+74.8\ \text{kJ mol}^{-1}\)
   (3) \(-52.27\ \text{kJ mol}^{-1}\)
   (4) \(+52.27\ \text{kJ mol}^{-1}\)

3. In a process 701 J of heat is absorbed by a system and 394 J of work is done by the system. What is the change in internal energy for the process?
   (1) \(-307\ J\)
   (2) \(+307\ J\)
   (3) \(+1095\ J\)
   (4) \(-1095\ J\)

4. For the reaction
   \(\text{C}_2\text{(g)} \rightarrow \text{Cl}_2\text{(g)}\) the signs of \(\Delta H\) and \(\Delta S\) are
   (1) Both negative
   (2) Both positive
   (3) \(\Delta H\) negative and \(\Delta S\) positive
   (4) \(\Delta H\) positive and \(\Delta S\) negative

5. Sodium salt of which acid will be needed for the preparation of propane by decarboxylation method?
   (1) \(\text{CH}_3\text{CH}_2\text{COONa}\)
   (2) \(\text{CH}_3\text{CH} = \text{CH} = \text{COONa}\)
   (3) \(\text{CH}_3\text{COONa}\)
   (4) \(\text{CH}_3\text{CH} \to \text{CH} = \text{CH} = \text{COONa}\)

   \(\text{CH}_3\)
6. The rate of reaction of alkanes is highest with which of the following halogens?
   (1) F₂  (2) Cl₂  (3) Br₂  (4) I₂

7. The reactivity of addition of which of the following hydrogen halide is highest with alkene?
   (1) HF  (2) HCl  (3) HBr  (4) HI

8. Ozonolysis of which of the following alkenes give propane – 2 – one and methanal?
   (1) But – 2 – ene  (2) Prop – 1 – ene  (3) 2 – Methyl propene  (4) But – 1 – ene

9. \[
   \text{CH}_3 - \text{C} \equiv \text{CH} + \text{H}_2\text{O} \xrightarrow{\text{Hg}^{2+} / \text{H}^+} \text{A} \]
   \[
   \frac{333 \text{ K}}{} \]
   A in above reaction is
   (1) \text{CH}_3\text{CH}_2\text{CH}_2\text{OH}
   (2) \text{CH}_3 - \text{CH} = \text{CHO}
   (3) \text{CH}_3 - \text{C} - \text{CH}_3
   (4) \text{CH}_3 - \text{CH} - \text{CH}_3

10. What is the product of the reaction given below:
   \[
   \text{Z} + \text{Br}_2 \xrightarrow{\text{heat or UV light}} \]
   (1) \hspace{1cm} (2) \hspace{1cm} (3) \hspace{1cm} (4)
11. Which of the following is Swart’s reaction?
(1) $R - X + \text{NaI} \rightarrow RI + \text{NaX}$
(2) $R - \text{Br} + \text{AgF} \rightarrow RF + \text{AgBr}$
(3) $\text{CH}_2=\text{CH}_2 + \text{Br}_2 + \text{CCl}_4 \rightarrow \text{CH}_2=\text{CH}_2 + \text{Br} + \text{Br}$
(4) $\text{ROH} + \text{SOCl}_2 \rightarrow \text{RCI} + \text{SO}_2 + \text{HCl}$

12. Which of the following alcohol vapours passed over heated heavy metal catalyst Cu does not give aldehydes or ketones?
(1) $(\text{CH}_3)_2\text{COH}$
(2) $(\text{CH}_3)_2\text{CHOH}$
(3) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
(4) $\text{CH}_3\text{CH}_2\text{OH}$

13. CH$_3$ – CH = CH – CH$_2$ – CH$_2$ – CN
(1) $\text{A/H(i-Bu)}_2$
(2) $\text{H}_2\text{O}$

The product of the above reaction is
(1) $\text{CH}_3$–CH$_2$–CH$_2$–CH$_2$–CH$_2$–CN
(2) $\text{CH}_3$–CH$_2$–CH$_2$–CH$_2$–CH$_2$–NH$_2$
(3) $\text{CH}_3$–CH=CH–CH$_2$–CH$_2$–CHO
(4) $\text{CH}_3$–CH=CH–CH$_2$–CH$_2$–COOH

14. \[
\begin{align*}
\text{CH}_3 & \xrightarrow{\text{Cl}_2, \text{hv}} \text{A} \xrightarrow{\text{H}_2\text{O}, 373 \text{K}} \text{B} \\
\end{align*}
\]

A and B are respectively
(1) Chlorobenzene, Phenol
(2) Benzal chloride, Benzaldehyde
(3) p-chloro toluene, p-cresol
(4) o-chloro toluene, o-chloro benzoic acid
15. Reaction with which of the following reagents followed by hydrolysis gives benzaldehyde from toluene?
   (1) CrO₂Cl₂
   (2) K₂Cr₂O₇
   (3) DIBAL-H
   (4) CH₃COCl//Anhydrous AlCl₃

16. Which of the following has highest boiling point?
   (1) CH₃CH₂CH₂CHO
   (2) CH₃CH₂CH₂CH₂OH
   (3) CH₃CH₂OCH₂CH₃
   (4) CH₃CH₂CH₂CH₂CH₃

17. With which of the following reducing agent > C = O group of aldehydes and ketones is reduced to > CH₂ group:
   (1) Zn - Hg and concentrated HCl
   (2) LiA/H₄
   (3) NaBH₄
   (4) Catalytic hydrogenation

18. Which among the following compounds has highest order of reactivity in nucleophilic addition reaction?
   (1) Benzaldehyde
   (2) p-Tolualdehyde
   (3) p-Nitrobenzaldehyde
   (4) Acetophenone

19. C₆H₅CH₂OH → HBr → A → KCN → B → Δ → H₂O → C

   Which of the following is the product 'C'?
   (1) Benzaldehyde
   (2) Phenyl ethanoic acid
   (3) Phenyl ethanol
   (4) Hexane

   ‘C’ in the above reaction sequence is
   (1) Benzoic acid
   (2) Phenyl ethanoic acid
   (3) Phenyl ethylamine
   (4) Hexane
20. The product of the following reaction is

\[ \text{CH}_3\text{CH}_2\text{CH}_2\text{COOH} \xrightarrow{(1) \text{Cl}_2/\text{red P}} \text{H}_2\text{O} \]

(1) 2-chloro butanoic acid
(2) 3-chloro butanoic acid
(3) 4-chloro butanoic acid
(4) Butanoyl chloride

21. Sodium salt of which of the following, when heated with soda lime (NaOH and CaO) evolves carbondioxide?

\[ \begin{align*}
\text{(1)} & \quad \text{OH} \\
\text{(2)} & \quad \text{CH}_3\text{CH}_2\text{OH} \\
\text{(3)} & \quad \text{CH}_3\text{COOH} \\
\text{(4)} & \quad \text{CH}_3\text{CHO}
\end{align*} \]

22. Which among the following is aromatic?

\[ \begin{align*}
\text{(1)} & \quad \text{ } \\
\text{(2)} & \quad \text{ } \\
\text{(3)} & \quad \text{ } \\
\text{(4)} & \quad \text{ } 
\end{align*} \]

23. In the process of generation of nitronium ion, nitric acid acts as a/an

(1) Acid
(2) Base
(3) Salt
(4) Electrophile

24. Deficiency of which of the following vitamins causes increased blood clotting time?

(1) Vitamin K
(2) Vitamin E
(3) Vitamin B\textsubscript{12}
(4) Vitamin B\textsubscript{6}

25. Glucose on prolonged heating with HI forms

(1) Hexa-iodo hexane
(2) Gluconic acid
(3) Penta-iodo hexane
(4) n-hexane
26. Reaction with which of the following reagents indicates the presence of carbonyl group in glucose?
   (1) HI
   (2) NH₂OH
   (3) Acetic anhydride
   (4) H₂O

27. Which of the following hybrid sp³ orbital obtained is incorrect after combining the wave functions of 2s, 2pₓ, 2pᵧ and 2pₗ atomic orbitals?
   (1) \( \psi_{sp³} = \frac{1}{\sqrt{2}}\psi_{2s} + \frac{1}{\sqrt{2}}\psi_{2pₓ} + \frac{1}{\sqrt{2}}\psi_{2pᵧ} + \frac{1}{\sqrt{2}}\psi_{2pₗ} \)
   (2) \( \psi_{sp³} = \frac{1}{\sqrt{2}}\psi_{2s} + \frac{1}{\sqrt{2}}\psi_{2pₓ} - \frac{1}{\sqrt{2}}\psi_{2pᵧ} - \frac{1}{\sqrt{2}}\psi_{2pₗ} \)
   (3) \( \psi_{sp³} = \frac{1}{\sqrt{2}}\psi_{2s} - \frac{1}{\sqrt{2}}\psi_{2pₓ} + \frac{1}{\sqrt{2}}\psi_{2pᵧ} - \frac{1}{\sqrt{2}}\psi_{2pₗ} \)
   (4) \( \psi_{sp³} = \frac{1}{\sqrt{2}}\psi_{2s} - \frac{1}{\sqrt{2}}\psi_{2pₓ} - \frac{1}{\sqrt{2}}\psi_{2pᵧ} + \frac{1}{\sqrt{2}}\psi_{2pₗ} \)

28. The relative strength of bond formed by which of the following orbitals is highest?
   (1) s
   (2) sp
   (3) p
   (4) sp³

29. Which among the following ion is linear?
   (1) \( N_3^- \)
   (2) \( CO_3^{2-} \)
   (3) \( NO_3^- \)
   (4) \( BF_4^- \)

30. In SF₄ to minimise the repulsive forces the lone pair occupies which of the following positions?
   (1) Apical top position
   (2) Equatorial position
   (3) At the centre
   (4) Apical bottom position
31. Schrödinger wave equation is

\[ \nabla \psi + \frac{\frac{8\pi^2 m}{h^2} (E - V)}{\psi} = 0 \]

(1) \[ \nabla \psi + \frac{\frac{8\pi^2 m}{h^2} (E - V)}{\psi} = 0 \]

(2) \[ \nabla^2 \psi + \frac{\frac{8\pi^2 m}{h^2} (E - V)}{\psi} = 0 \]

(3) \[ \nabla^2 \psi + \frac{\frac{8\pi^2 m}{h^2} (E + V)}{\psi} = 0 \]

(4) \[ \nabla^2 \psi + \frac{\frac{8\pi^2 m}{h^2} (E - V)}{\psi} = 0 \]

32. The bond angle in NF₃ as compared to NH₃ is

(1) smaller
(2) greater
(3) same as NH₃
(4) cannot be predicted.

33. Which of the following sp hybrid orbital is obtained by hybridising 2s and 2pₓ orbitals?

(1) \[ \psi_{sp} = \frac{1}{\sqrt{3}} \psi_{2s} + \frac{1}{\sqrt{2}} \psi_{2p_x} \]

(2) \[ \psi_{sp} = \frac{1}{\sqrt{3}} \psi_{2s} + \frac{1}{\sqrt{3}} \psi_{2p_x} \]

(3) \[ \psi_{sp} = \frac{1}{\sqrt{2}} \psi_{2s} - \frac{1}{\sqrt{2}} \psi_{2p_x} \]

(4) \[ \psi_{sp} = \frac{1}{\sqrt{2}} \psi_{2s} + \frac{1}{\sqrt{3}} \psi_{2p_x} \]

34. Which of the following statement is not true for valence bond theory for co-ordination compounds?

(1) It explains formation of complex.
(2) It explains the colour exhibited by co-ordination compounds.
(3) It does not distinguish between weak and strong ligands.
(4) It explains structures of co-ordination compounds.
35. The ‘spin only’ magnetic moment of $[\text{MnBr}_4]^2-$ is 5.9 BM. The geometry of the complex will be
(1) Tetrahedral
(2) Square planar
(3) Pyramidal
(4) See-saw shape

36. The correct increasing order of field strength of ligands is
(1) $\text{OH}^- < \text{C}_2\text{O}_4^{2-} < \text{H}_2\text{O} < \text{NCS}^- < \text{NH}_3$
(2) $\text{H}_2\text{O} < \text{C}_2\text{O}_4^{2-} < \text{OH}^- < \text{NCS}^- < \text{NH}_3$
(3) $\text{H}_2\text{O} < \text{NH}_3 < \text{C}_2\text{O}_4^{2-} < \text{NCS}^- < \text{OH}^-$
(4) $\text{H}_2\text{N}<\text{H}_2\text{O}<\text{OH}^-<\text{NCS}^-<\text{C}_2\text{O}_4^{2-}$

37. In octahedral complex 10 Dq is difference in energy between which of the following d-levels?
(1) $d_{xy}$ and $d_{yz}$
(2) $d_{x^2-y^2}$ and $d_{z^2}$
(3) $t_{2g}$ and $e_g$
(4) $d_{xy}$ and $d_{xz}$

38. Complexes of d$^3$ metal ions have a CFSE of
(1) $-1.2 \Delta_o$
(2) $-0.8 \Delta_o$
(3) $-0.6 \Delta_o$
(4) $-0.4 \Delta_o$

39. In the lanthanides the spin contribution $S$ and orbital contribution $L$ couple together to give new quantum number $J$. Which of the following relation is correct when shell is more than half full?
(1) $J = L + S$
(2) $J = L - S$
(3) $J = S - L$
(4) $J = \sqrt{L \cdot S}$
40. लैनेउरों के लिए बोर मैग्नेटोन में चुंबकीय आपूर्ति \( \mu \) का निम्नलिखित में से कौन सा सही है?
(1) \( \mu = J \sqrt{g(g+1)} \)
(2) \( \mu = J \sqrt{g(g-1)} \)
(3) \( \mu = g \sqrt{J(J-2)} \)
(4) \( \mu = g \sqrt{J(J+1)} \)

41. निम्नलिखित में से कौन सा लैनेउर आयन EDTA के साथ प्रबलतम संकुल बनाता है?
(1) \( \text{Lu}^{3+} \)  (2) \( \text{Ce}^{3+} \)
(3) \( \text{Pr}^{3+} \)  (4) \( \text{Nd}^{3+} \)

42. \([\text{Ce(NO}_3]_6^{2-}\) में प्रत्येक \( \text{NO}_3^- \) द्वारा धातु से उपस्थित क्रिया का काम में अर्द्ध ऑक्सीजन परमाणु की संख्या है?
(1) 0  (2) 1
(3) 2  (4) 3

43. लैनेउरों के आवश्यक स्थानांतरण स्पेक्ट्रम के लिए निम्नलिखित में से कौन सा कथन सही नहीं है?
(1) यह लिग्नड से धातु की ओर इलेक्ट्रॉन स्थानांतरण से होता है।
(2) यह तब अधिक संभावित है जब धातु की उच्च ऑक्सीजनकरण अवस्था हो。
(3) इसकी संभावना तब अधिक है जब लिग्नड में ऑक्सीजनकरण गुण हो।
(4) यह सामान्यतया गहरा रंग उत्पन्न करता है।

44. \([\text{Ce}^{IV} (\text{एसिटिल एसिटेट})_4]\) संकुल की आकृति है?
(1) चतुरफलकीय  (2) वर्ग प्रतिप्रिम
(3) अष्टफलकीय  (4) वर्ग समतली
45. The catalytic decomposition of phosphine on hot Tungsten at high pressure has the rate law

\( V = k \)

\( V = k[PH_3] \)

\( V = k[PH_3] [W] \)

\( V = k[PH_3]^2 \)

46. For the first order reaction, the time required for 99.9% completion of reaction is how many times that required for 50% completion?

(1) 50 times  (2) 10 times  
(3) 5 times    (4) 2.5 times

47. The \( t_{1/2} \) of a reaction is doubled as the initial concentration of reactant is doubled, then the order of the reaction is

(1) 0  (2) 1  
(3) 2    (4) 3

48. From the kinetic theory of gases the number of bimolecular collisions per second per unit volume among molecules of one species is given by

\( Z = 2n\sigma (8\pi kT/\mu)^{1/2} \)

\( Z = 2n^2\sigma^2 (8\pi kT/\mu) \)

\( Z = 2n^2\sigma^2 (8\pi kT/\mu)^{1/2} \)

\( Z = 2n\sigma (8\pi kT/\mu) \)

49. The rate constant for the second-order decomposition of \( N_2O \) follows the following equation:

\( k = (5.00 \times 10^{11} \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}) \exp(-10,000 \text{ k/T}) \), Activation energy of the reaction will be

(1) 10,000 J/mol  
(2) 8,314 J/mol  
(3) 83.14 kJ/mol  
(4) 5 \times 10^{11} \text{ J/mol}
50. The EMF of the cell
\[ \text{Cd} | \text{CdCl}_2 \cdot 5\text{H}_2\text{O} \ (\text{saturated}) || \text{AgCl}_s | \text{Ag} \]
the cell's EMF 25 °C is 0.7 volt. The free energy change for it is
(1) 135.1 kJ  (2) −135.1 kJ
(3) 67.55 kJ  (4) −67.55 kJ

51. The electrode potential for the half cell reaction
\[ \text{Ag}^{+}_{\text{aq}} + e^- \rightleftharpoons \text{Ag}_{\text{s}} \]
is
(1) \[ E = E^\circ_{\text{Ag}^{+}/\text{Ag}} + \frac{RT}{F} \ln \left[ \text{Ag}^{+} \right] \]
(2) \[ E = E^\circ_{\text{Ag}^{+}/\text{Ag}} - \frac{RT}{F} \ln \left[ \text{Ag}^{+} \right] \]
(3) \[ E = E^\circ_{\text{Ag}^{+}/\text{Ag}} - \frac{RT}{F} \ln \left[ \text{Ag}^{+} \right]^2 \]
(4) \[ E = E^\circ_{\text{Ag}^{+}/\text{Ag}} + \frac{RT}{F} \ln \frac{1}{\left[ \text{Ag}_{\text{s}} \right]} \]

52. Debye-Hückel-Onsagar equation for electrolyte like KCl is
(1) \[ \lambda_m = \lambda_m^\circ \frac{-8.2 \times 10^6}{(DT)^{1/2}} \left( \frac{82.4}{(DT)^{1/2}\eta} \right) \sqrt{C} \]
(2) \[ \lambda_m = \lambda_m^\circ \frac{-8.2 \times 10^6}{(DT)^{1/2}\eta} \left( \frac{82.4}{(DT)^{1/2}\lambda_m^\circ} \right) \sqrt{C} \]
(3) \[ \lambda_m = \lambda_m^\circ \frac{-8.2 \times 10^5}{(DT)^{1/2}\eta} \left( \frac{82.4}{(DT)^{1/2}\lambda_m^\circ} \right) \sqrt{C} \]
(4) \[ \lambda_m = \lambda_m^\circ \frac{-8.2 \times 10^5}{(DT)^{1/2}\eta} \left( \frac{82.4}{(DT)^{1/2}\lambda_m^\circ} \right) \sqrt{C} \]

53. For plotting \(-\log r_x\) against \(\sqrt{\mu}\), the slope of the line for uni-trivalent or tri-univalent electrolyte will be
(1) \[ \frac{1}{3} \times 0.509 \]  (2) 0.509
(3) 3 \times 0.509  (4) 4 \times 0.509
54. The ionic strength of 0.02 molal Na₂SO₄ solution is
   (1) 0.02  (2) 0.03  (3) 0.04  (4) 0.06

55. What is the pH of a solution obtained by mixing 50 ml of 0.2 M HCl and 50 ml of 0.1 M NaOH?
   (1) 0  (2) 1  (3) 1.3  (4) 12.7

56. \( \Delta G = \Delta H + T \left( \frac{\partial \Delta G}{\partial T} \right)_p \)
   (1) Gibbs-Helmholtz equation
   (2) Kirchhoff equation
   (3) Gibbs-Duhem equation
   (4) Clapeyron-Clausius equation

57. From the following thermochemical equations the enthalpy of formation of benzene will be
   (i) \( \text{C}_6\text{H}_6(g) + \frac{15}{2} \text{O}_2(g) \rightarrow 6\text{CO}_2(g) + 3\text{H}_2\text{O}(l); \Delta H = -3267.7 \text{ kJ} \)
   (ii) \( \text{C}_6\text{H}_6(s) + \frac{15}{2} \text{O}_2(g) \rightarrow 6\text{CO}_2(g) + 3\text{H}_2\text{O}(l); \Delta H = -393.5 \text{ kJ} \)
   (iii) \( \text{H}_2(g) + \frac{1}{2} \text{O}_2(g) \rightarrow \text{H}_2\text{O}(l); \Delta H = -286.2 \text{ kJ} \)
   (1) +48.1 kJ  (2) -48.1 kJ  (3) 2588 kJ  (4) -2588 kJ

58. The variation of \( \Delta H \) of a reaction with temperature at constant pressure is equal to which of the following?
   (1) \( C_p \)  (2) \( \Delta U \)  (3) \( \Delta G \)  (4) \( C_V \)
59. Which of the following is correct for a reversible process?
(1) $\Delta S_{\text{system}} + \Delta S_{\text{surrounding}} = 0$
(2) $\Delta S_{\text{system}} + \Delta S_{\text{surrounding}} < 0$
(3) $\Delta S_{\text{system}} + \Delta S_{\text{surrounding}} > 0$
(4) $\Delta S_{\text{system}} - \Delta S_{\text{surrounding}} > 0$

60. Which of the following gives entropy change of one mole of an ideal gas for isochoric process?
(1) $C_p \ln \left( \frac{T_2}{T_1} \right)$
(2) $C_v \ln \left( \frac{V_2}{V_1} \right)$
(3) $C_v \ln \left( \frac{T_2}{T_1} \right)$
(4) $C_v \ln \left( \frac{V_2}{V_1} \right)$

61. Which of the following conformer of cyclohexane has highest energy barrier with high angle and torsional strain?
(1) Chair
(2) Half chair
(3) Twist boat
(4) Boat

62. Which of the following pairs of conformers of n-butane are enantiomers?
(1) two anti-conformers
(2) two gauche conformers
(3) anti and syn conformer
(4) anti and gauche conformer

63. In the gauche conformation of n-butane the methyl groups are apart by
(1) $0^\circ$
(2) $60^\circ$
(3) $120^\circ$
(4) $180^\circ$

64. What is the difference of energy between anti and gauche conformation of n-butane?
(1) 0.8 k cal
(2) 2.8 k cal
(3) 3.4 k cal
65. Which of the following has Z-configuration?

(1) \[
\begin{array}{c}
\text{CH}_3 \\
\text{Br} \\
\text{Cl} \\
\text{H} \\
\end{array}
\]
(2) \[
\begin{array}{c}
\text{CH}_3 \\
\text{Cl} \\
\text{Br} \\
\text{H} \\
\end{array}
\]
(3) \[
\begin{array}{c}
\text{Cl} \\
\text{Br} \\
\text{H} \\
\text{Br} \\
\end{array}
\]
(4) \[
\begin{array}{c}
\text{Cl} \\
\text{Br} \\
\text{H} \\
\text{Cl} \\
\end{array}
\]

66. The above reaction is an application of
(1) Mannich reaction
(2) Wittig reaction
(3) Stobbe reaction
(4) Aldol reaction

67. Identify A.
(1) \[
\text{CH}_3(\text{CH}_2)_3\text{COOH}
\]
(2) \[
\begin{array}{c}
\text{CF}_3 \\
\end{array}
\]
(3) \[
\begin{array}{c}
\text{H}_3\text{C} \\
\text{O} \\
\end{array}
\]
(4) \[
\begin{array}{c}
\text{H}_3\text{C} \\
\text{COOH} \\
\end{array}
\]
68. \[ \text{PhCHO} + \text{CH}_3\text{CHO} \xrightarrow{\text{NaOH}} \Delta \xrightarrow{} \text{Y} \]

Y की पहचानिए:
1. PhCH = CHCOOH
2. Ph - CH₂ - CH₂ - CHO
3. Ph - CH = CH - CHO
4. Ph - CH = CH - Ph

69. \[ \text{Me} \xrightarrow{} \text{CHO} \xrightarrow{\text{KCN, DMF}} \xrightarrow{\text{RT}, 20\text{ hrs}} \text{Me} \xrightarrow{} \text{CHO} \]

उपरोक्त अभिक्रिया निम्नलिखित में से किसका अनुप्रयोग है?
1. एलडोल संपनन
2. बेंजोइन संपनन
3. कैनिंजारो अभिक्रिया
4. कोनिङ्जेल अभिक्रिया

70. निम्नलिखित अभिक्रिया का उत्तर है:

\[ \text{CHO} + (\text{CH}_3\text{CO})_2\text{O} \xrightarrow{\text{CH}_3\text{COONa}} \]

(1) \[ \text{O} \]
(2) \[ \text{O} \]
(3) \[ \text{O} \]
(4) \[ \text{O} \]

The above reaction is an application of which of the following?
1. Aldol condensation
2. Benzoin condensation
3. Cannizzaro reaction
4. Knovenegel reaction

70. Product of the following reaction is:

\[ \]

(1) \[ \text{O} \]
(2) \[ \text{O} \]
(3) \[ \text{O} \]
(4) \[ \text{O} \]
71. \[ \text{(1) BrCH}_2\text{COOC}_2\text{H}_5/\text{Zn} \]
\[ \text{(2) H}_2\text{O}^+ \]

\[ \text{OH} \]
\[ \text{CH}_2\text{COOC}_2\text{H}_5 \]

The above reaction is an application of which of the following?
(1) Reformatsky reaction
(2) Cannizzaro reaction
(3) Wittig reaction
(4) Mannich reaction

72. Which of the following is reacted with chlorobenzene and in presence of concentrated H\(_2\)SO\(_4\) to get DDT?
(1) CH\(_3\)CHO
(2) CH\(_2\)C/CHO
(3) CHC/\(_2\)CHO
(4) CC/\(_3\)CHO

73. \[ \text{BrNO}_2 \]
\[ \text{KCN} \]
\[ \text{C}_2\text{H}_5\text{OH} \]
\[ X \]

\[ \text{BrNO}_2 \]
\[ \text{KCN} \]
\[ \text{C}_2\text{H}_5\text{OH} \]

X in the above reaction is
(1) (2)
(3) (4)

74. \[ \text{K}_3\text{Fe(CN)}_6/\text{NaOH} \]
\[ \Delta \]

In the above reaction the main product 'A' is
(1) 2, 6-dinitrophenol
(2) 2, 4-dinitrophenol
(3) 2-nitrophenol
(4) 3-amino nitrobenzene
75. \( \text{CHO} \quad \text{SnCl}_2 / \text{HCl} \quad \text{NO}_2 \)

Product of above reaction is

(1) \( \text{CH}_2\text{OH} \)
(2) \( \text{CH}_2\text{OH} \)
(3) \( \text{CHO} \)
(4) \( \text{CH}_3\text{Cl} \)

---

76. \( \text{NaNO}_2 / \text{HBF}_4 \quad \text{NO}_2 \)

B in the reaction is

(1) \( \text{NH}_2 \)
(2) \( \text{NH}_2 \)
(3) \( \text{NO}_2 \)
(4) \( \text{NO}_2 \)

---

77. \( 2\text{C}_6\text{H}_5\text{NO}_2 \quad \text{Zn} / \text{NaOH} \quad X \)

X in the above reaction is

(1) \( \text{C}_6\text{H}_5\text{NH}_2 \)
(2) \( \text{C}_6\text{H}_5\text{NHOH} \)
(3) \( \text{C}_6\text{H}_5\text{NH} - \text{NH} - \text{C}_6\text{H}_5 \)
(4) \( \text{C}_6\text{H}_5\text{N} = \text{N} - \text{C}_6\text{H}_5 \)
78. Which of the following is a thermosetting polymer?
(1) Polythene
(2) Polyvinyl chloride
(3) Bakelite
(4) Polystyrene

79. Match the List – I with List – II:

<table>
<thead>
<tr>
<th>List – I</th>
<th>List – II</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Natural rubber</td>
<td>a. 2-chloro-1, 3-butadiene</td>
</tr>
<tr>
<td>II. Neoprene</td>
<td>b. 2-methyl-1, 3-butadiene</td>
</tr>
<tr>
<td>III. Glyptal</td>
<td>c. Terephthalic acid and ethylene glycol</td>
</tr>
<tr>
<td>IV. Terylene</td>
<td>d. Phthalic acid and ethylene glycol</td>
</tr>
</tbody>
</table>

Codes:
I II III IV
(1) a b c d
(2) d c b a
(3) b a c d
(4) b a d c

80. Bactericidal antibiotic is
(1) Erythromycin (2) Ofloxacin
(3) Tetracycline (4) Chloramphenicol

81. Non-narcotic analgesics is
(1) Morphine (2) Heroin
(3) Codeine (4) Paracetamol

82. The molecular orbital configuration of NH₃ in ground state is given by
(1) σ₁a₂ σ₂a₂ σ₃a₂ (2) σ₁c₂ σ₁c₂ σ₂a₂
(3) σ₁a₂ σ₂a₂ σ₃a₂ (4) σ₂a₂ σ₁a₂ σ₁c₂

83. The products obtained by reaction of RMgBr and S₈ are
(1) RBr and MgS
(2) MgBr and RBr
(3) RSH and R₂S
(4) R₂S₂ and MgS
84. Complete the following reaction:

\[ ^{209}_{83}\text{Bi} + {^{54}_{24}}\text{Cr} \rightarrow ? + ^{7}\text{n} \]

\[ \begin{align*}
(1) & \quad ^{206}_{107}\text{Unno} \\
(2) & \quad ^{206}_{107}\text{Unnp} \\
(3) & \quad ^{206}_{107}\text{Uns} \\
(4) & \quad ^{206}_{107}\text{Unn}
\end{align*} \]

85. For the mechanism given below, on applying steady state approximation for [SH⁺] the rate of formation of product is given by

\[ S + AH^+ \overset{k_1}{\underset{k_{-1}}{\rightleftharpoons}} SH^+ + A \]

\[ \text{SH}^+ + A \overset{k_2}{\rightarrow} P + AH^+ \]

- \[ k_{i1}k_2[S][AH^+] \]
- \[ \frac{k_1k_2}{k_{-1} + k_2} \]
- \[ \frac{k_1k_2}{k_{-1} + k_2} \]
- \[ \frac{k_1k_2}{k_{-1}k_2[AH^+]} \]

86. The specific conductance of 0.01 M solution of acetic acid was found to be 0.0163 Sm⁻¹ at 25 °C. What is the degree of dissociation of the acid if Molar conductance of acetic acid at infinite dilution is 390.7 \times 10⁻² Sm² mol⁻¹ at 25 °C?

- \[ 0.72 \]
- \[ 0.04171 \]
- \[ 0.472 \]
- \[ 0.00472 \]

87. For a perfectly crystalline substance, the absolute entropy \( S = 0 \) at \( T = 0 \), then \( S_T \) i.e. absolute entropy at temperature \( T \) will be

- \[ \int_0^T C_p \, d(\ln T) \]
- \[ \int_0^T \, d(\ln T) \]
- \[ \int_0^T C_p \, d(\ln T) \]
- \[ \int_0^T \, d(\ln T) \]

88. \[ T = 0 \] पर एक पूर्ण रूप से क्रिस्टलीय पदार्थ की परम एंट्रोपी \( S = 0 \) है तब \( T \) तापमान पर परम एंट्रोपी \( S_T \) होगी

\[ \begin{align*}
(1) & \quad 0 \\
(2) & \quad \int_0^T C_p \, d(\ln T) \\
(3) & \quad T \int_0^T C_p \, d(\ln T) \\
(4) & \quad \int_0^T \, d(\ln T)
\end{align*} \]
88. In the following reaction

\[ \text{CH}_3 + \text{C}_6\text{H}_5\text{SO}_2\text{Cl} \xrightarrow{\text{NaOH}} \text{A} \]
\[ \text{KMnO}_4 \xrightarrow{\text{B}} \xrightarrow{\text{H}^+} \text{C} \]

The product "C" is

(1) \[ \text{CH}_3 \]
(2) \[ \text{SO}_2\text{C}_6\text{H}_5 \]
(3) \[ \text{COOH} \]
(4) \[ \text{OH} \]

89. Mesityl oxide reacts with ammonia to give which of the following compounds?

(1) \[ (\text{CH}_3)_2\text{C} = \text{NH} \]
(2) \[ (\text{CH}_3)_2\text{C} = \text{CH} = \text{C} - \text{CH}_3 \]
(3) \[ (\text{CH}_3)_2\text{C} = \text{CH}_2 - \text{COCH}_3 \]
(4) \[ (\text{CH}_3)_2\text{C} - \text{CH}_2 - \text{COCH}_3 \]

90. The thermal cyclisation of trans, cis, trans-2, 4, 6-Octatriene gives

(1) only 5, 6-trans - Dimethyl - 1, 3-cyclohexadiene
(2) only 5, 6-cis - Dimethyl - 1, 3-cyclohexadiene
(3) both 5, 6 trans - Dimethyl - 1, 3-cyclohexadiene and 5, 6 cis - Dimethyl - 1, 3-cyclohexadiene
(4) Cyclo octane
91. The number of NMR signals produced by 1, 2-Dichloropropane are
   (1) 6   (2) 5
   (3) 4   (4) 3

92. Which of the following is not a law of learning proposed by Thorndike?
   (1) Law of Exercise
   (2) Law of Effect
   (3) Law of Response
   (4) Law of Readiness

93. Which of the following is not a dimension of intellect given by J.P. Guilford?
   (1) Operations   (2) System
   (3) Content   (4) Product

94. Which of the following psychologist has given the theory of multiple intelligence?
   (1) Cattell   (2) Burt
   (3) Pearson   (4) Gardner

95. The belief that intelligence is a general ability is the result of the work of which of the following psychologist?
   (1) Binet   (2) Spearman
   (3) Gardner   (4) Sternberg

96. According to the Vygotsky, which of the following tools helps in cognitive development of an individual?
   (1) Social and Cultural tools
   (2) Physical tools
   (3) Emotional tools
   (4) Individual tool

97. Which of the following is not a term used in application of computers in teaching-learning process?
   (1) Computer Working Learning
   (2) Computer Assisted Learning
   (3) Computer Managed Learning
   (4) Computer Managed Instruction
98. Which of the following is an example of audio-visual aid?
(1) Taperecorder  (2) Chart  (3) Television  (4) Radio

99. Which of the following step is not included in system approach?
(1) System module  (2) System analysis  (3) System design and development  (4) System operation and evaluation

100. Which of the following is an objective of using Computer Assisted Instruction (CAI) in teaching learning process?
(1) To achieve cognitive objectives  (2) To achieve emotional objectives  (3) To achieve psychomotor objectives  (4) To achieve affective objectives

101. What is the full name of CIET?
(1) Central Institute of Educational Technology  (2) Central Institute of Educational Telecast  (3) Composite Institute of Educational Technology  (4) Common Institute of Educational Technology

102. The three focal points in education are
(1) Students, Teachers and Parents  (2) Students, Teachers and Siblings  (3) Students, Teachers and Educational Technology  (4) Students, Teachers and Subject Matter

103. Linear programmed instruction is based on the ideas of which of the following?
(1) Edward  (2) Gilbert  (3) Pavlov  (4) Skinner
104. Which of the following is a type of constructivism approach?
(1) Social  (2) Critical  (3) Emotional  (4) Moral

105. Self-assessment is based on which of the following principles?
(1) Behaviourism  (2) Cognitivism  (3) Constructivism  (4) Pragmatism

106. The Report “Learning without Burdon” was proposed by which of the following committee?
(1) Ram Murti Committee  (2) Yaspal Committee  (3) Sachar Committee  (4) Hurtong Committee

107. Which of the following statement is correct about the learning, according to the behavioural principles of learning?
(1) Cannot be measured and observed.  (2) Measured through subjective psychological methods.
(3) Observed and measured in an objective way.  (4) Measured through the introspection method.

108. Team teaching refer to a situation where
(1) Two or more teachers teach one student.  (2) Two or more teachers teach a group of students.
(3) Two or more teachers discuss about a topic.  (4) Two or more teachers solve a difficult problem.

109. Which of the following is not a stage of moral development proposed by Kohlberg?
(1) Non-conventional  (2) Pre-conventional  (3) Post-conventional  (4) Conventional
110. निम्नलिखित में से कोन सा अध्यापकों के व्यक्तित्विक स्वास्थ्य में सुधार में सहायक है?
(1) उच्च नैतिक आकांस
(2) हिटलर के मुख्याध्यक्ष का प्राातिलाप
(3) व्यवसायिक अभिशप्तता की कमी
(4) एकतनजीव प्रशासन

111. MOOC का पूरा नाम निम्नलिखित में से क्या है?
(1) मॉडल्टन ऑपन ऑनलाइन कोर्सेज
(2) मैथिस ऑपन ऑनलाइन कोर्सेज
(3) मैथिस ऑनलाइन ऑपन कोर्सेज
(4) मैथिस ऑफलाइन ऑपन कोर्सेज

112. सूर्यास्तक्राम प्रकार का चित्रण का चित्रण है?
(1) अनुसारी
(2) अभिव्यक्त
(3) सही उत्तर पर चित्रण
(4) सामाय मध्यम पर चित्रण

113. निम्नलिखित में से कोन सा आधिकार स्थानान्तरण का एक सिद्धांत है?
(1) सम्बन्ध तथा सिद्धांत
(2) अनुवंशिक तथा सिद्धांत
(3) समूह कारक सिद्धांत
(4) बुधकारक सिद्धांत

114. निम्नलिखित में से कोन सा एक रक्षा युग्मित का प्रकार नहीं है?
(1) शोध/उद्देश्यकरण (2) पश्चागमन
(3) सामान्यण (4) शृंखलपूर्ति

115. समीक्षात्मक विकास का समाधान जिसके द्वारा प्रतिपादित किया गया?
(1) बंदूरा (2) चावलस्पर्शी
(3) हार (4) गोस्बाणी

116. सहकारी अधिकार व्यूहरचनाओं के विकास पर निम्नलिखित में से किस अधिकार सिद्धांत ने बल दिया?
(1) संस्थानवाद (2) व्यवहारवाद
(3) संरचनावाद (4) निर्मितिवाद

110. Which of the following is helpful to improve mental health of teachers?
(1) High moral expectations
(2) Flexibility of head of the school
(3) Lack of professional aptitude
(4) Autocratic administration

111. MOOC is stand for
(1) Modern Open Online Courses
(2) Massive Open Online Courses
(3) Massive Online Open Courses
(4) Mechanical Open Online Courses

112. Creativity is the ability of thinking
(1) Divergently
(2) Convergently
(3) Conc. on correct answer
(4) Conc. on common solution

113. Which of the following is a theory of transfer of learning?
(1) Identical element theory
(2) Theory of conditioning
(3) Group factor theory
(4) Multifactor theory

114. Which of the following is not a defense mechanism?
(1) Sublimation
(2) Regression
(3) Accommodation
(4) Compensation

115. Zone of proximal development was a concept introduced by whom?
(1) Bandura (2) Vygotsky
(3) Bruner (4) Piaget

116. Which of the following theory emphasize to the development of co-operative learning strategies?
(1) Cognitivism
(2) Behaviourism
(3) Structurism
(4) Constructivism
117. निम्नलिखित में से कौन सी अधिगम परिस्थिति
आभासी अधिगम वातावरण का रूप नहीं है?
(1) ई-अधिगम
(2) विचारात्मक / विवेचनात्मक अधिगम
(3) अनलाइन अधिगम
(4) मिश्रित अधिगम

118. निम्नलिखित में से क्या एक अधिगम प्रबन्ध
प्रक्रम/प्रणाली (LMS) का एक प्रकार नहीं है?
(1) एडमुडो
(2) ब्लैकबोर्ड
(3) डोसिबो
(4) मूडल

119. रिच्चर्ड सचेतन के द्वारा निम्नलिखित में से कौन
सा शिक्षण प्रतिमान प्रतिविद्यालय किया गया है?
(1) सामाजिक उपलब्धि प्रतिमान
(2) पुष्टिव्यवस्था प्रशिक्षण प्रतिमान
(3) अनुभव संगठन प्रतिमान
(4) सामाजिक अन्त-क्रिया प्रतिमान

120. निम्नलिखित में से क्या एक अवाकृतिक सम्प्रेषण
का प्रकार है?
(1) मौखिक सम्प्रेषण
(2) लिखित सम्प्रेषण
(3) संकेतात्मक यूट्यूब द्वारा सम्प्रेषण
(4) टेलीफोन द्वारा सम्प्रेषण

121. निम्नलिखित में से कौन सी सम्प्रेषण की एक
अमूर्तित सामग्री नहीं है?
(1) टेलीविजन
(2) कम्प्यूटर
(3) वीडियो
(4) समाचार-पत्र

117. Which of the following learning situation is not a form of virtual
learning environment?
(1) E-learning
(2) Reflective learning
(3) Online learning
(4) Blended learning

118. Which of the following is not an
element of Learning Management System (LMS)?
(1) Edmodo
(2) Blackboard
(3) Docebo
(4) Moodle

119. Which of the following teaching
model is proposed by Richard
Suchman?
(1) Concept attainment model
(2) Inquiry training model
(3) Advanced organizer model
(4) Social interaction model

120. Which of the following is a kind of
non-verbal communication?
(1) Oral communication
(2) Written communication
(3) Communication through symbolic
code language
(4) Communication through
telephone

121. Which of the following is not a non-
print media of communication?
(1) Television
(2) Computer
(3) Video
(4) Newspaper
122. What is the total number of orbitals associated with the principal quantum number \( n = 3 \) ?

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<thead>
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<tbody>
<tr>
<td>(1)</td>
<td>3</td>
</tr>
<tr>
<td>(2)</td>
<td>6</td>
</tr>
<tr>
<td>(3)</td>
<td>9</td>
</tr>
<tr>
<td>(4)</td>
<td>18</td>
</tr>
</tbody>
</table>

123. The correct order of energy of 2s orbitals of following is

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<tr>
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<tbody>
<tr>
<td>(1)</td>
<td>H &gt; Na &gt; K &gt; Li</td>
</tr>
<tr>
<td>(2)</td>
<td>H &gt; Li &gt; Na &gt; K</td>
</tr>
<tr>
<td>(3)</td>
<td>K &gt; Na &gt; Li &gt; H</td>
</tr>
<tr>
<td>(4)</td>
<td>Na &gt; K &gt; Li &gt; H</td>
</tr>
</tbody>
</table>

124. The correct order for first ionisation energy among following is

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<tbody>
<tr>
<td>(1)</td>
<td>C &gt; N &gt; O &gt; F</td>
</tr>
<tr>
<td>(2)</td>
<td>O &gt; N &gt; F &gt; C</td>
</tr>
<tr>
<td>(3)</td>
<td>O &gt; F &gt; N &gt; C</td>
</tr>
<tr>
<td>(4)</td>
<td>F &gt; N &gt; O &gt; C</td>
</tr>
</tbody>
</table>

125. Which of the following have the most negative electron gain enthalpy?

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<tbody>
<tr>
<td>(1)</td>
<td>P</td>
</tr>
<tr>
<td>(2)</td>
<td>S</td>
</tr>
<tr>
<td>(3)</td>
<td>Cl</td>
</tr>
<tr>
<td>(4)</td>
<td>F</td>
</tr>
</tbody>
</table>

126. "No two electrons in an atom can have the same set of four quantum numbers" is the statement of which of the following?

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>(1)</td>
<td>(n + l) rule</td>
</tr>
<tr>
<td>(2)</td>
<td>Aufbau Principle</td>
</tr>
<tr>
<td>(3)</td>
<td>Hund’s rule of maximum multiplicity</td>
</tr>
<tr>
<td>(4)</td>
<td>Pauli Exclusion principle</td>
</tr>
</tbody>
</table>

127. The number of angular nodes for ‘d’ orbitals are

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>(1)</td>
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<td>(3)</td>
<td>2</td>
</tr>
<tr>
<td>(4)</td>
<td>3</td>
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</table>

128. Which of the following element is not regarded as transition element?

<p>| | |</p>
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</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Tc</td>
</tr>
<tr>
<td>(2)</td>
<td>Zn</td>
</tr>
<tr>
<td>(3)</td>
<td>Pt</td>
</tr>
<tr>
<td>(4)</td>
<td>Au</td>
</tr>
</tbody>
</table>
129. Tris (ethane – 1, 2 – diamine) cobalt (III) sulphate is
(1) [Co(en)₃]SO₄
(2) [Co(en)₃]₂(SO₄)₂
(3) [Co(en)₃]₂(SO₄)₃
(4) [Co(en)₃]₂(SO₄)₂

130. Which of the following complex does not show geometric isomerism?
(1) [Pt(NH₃)₂(Br)(Cl)(py)]
(2) [Pt(NH₃)₂Cl₂]
(3) [Co(NH₃)₄Cl₂]⁺
(4) [NiCl₄]²⁻

131. Which of the following complex possesses sp³d² hybridisation?
(1) [CoF₆]³⁻
(2) [Co(NH₃)₆]³⁺
(3) [Co(C₂O₄)₃]²⁻
(4) [Mn(CN)₆]³⁻

132. Pd का पूरा अक्षय में बाल्क इलेक्ट्रॉनिक विनाश है?
(1) 4d⁸5s²
(2) 4d⁹5s¹
(3) 4d¹⁰5s⁰
(4) 4d¹⁰5s²

133. The number of moles of AgCl precipitated by 1 mole of [Co(NH₃)₄Cl₂]²⁺ with excess AgNO₃ is
(1) 0
(2) 1
(3) 2
(4) 3

134. Which of the following has the highest magnetic moment?
(1) [Mn(CN)₆]³⁻
(2) [Fe(CN)₆]³⁻
(3) [FeF₆]³⁻
(4) [CoF₆]³⁻
135. एउ का मूल अवस्था में बाह्य इलेक्ट्रॉनिक विवास है
   (1) 4f⁷6s² (2) 4f⁷5d⁴6s² (3) 4f⁷6s⁰ (4) 4f⁷6s²

136. La⁺³, Pr⁺³, Sm⁺³ तथा Tb⁺³ आपन की आयामिक विश्वा का बढ़ता हुआ सविंक क्रम है
   (1) La⁺³ < Pr⁺³ < Sm⁺³ < Tb⁺³
   (2) La⁺³ < Sm⁺³ < Pr⁺³ < Tb⁺³
   (3) Tb⁺³ < Sm⁺³ < Pr⁺³ < La⁺³
   (4) Tb⁺³ < Pr⁺³ < Sm⁺³ < La⁺³

137. निम्नलिखित में से कौन सी धातु लगभग 95% विश्व धातु में पाई जाती है?
   (1) स्त्रोतमधुधातु
   (2) क्षार धातु
   (3) लैंथनाइडधातु
   (4) ऐक्टिनोयडधातु

138. निम्नलिखित कौन सा अक्साइड, चालकता तथा दिखने में कॉपर धातु की तरह प्रतीत होता है?
   (1) TiO (2) CrO₂ (3) ReO₃ (4) VO₃

139. निम्नलिखित किन संयथाओं के लिए आकार लगभग समान नहीं है?
   (1) Nb, Os (2) Zr, Hf (3) Pd, Pt (4) Mo, W

140. 2N₂O₅(g) → 4NO₂(g) + O₂(g)
     इस अभिक्रिया के लिए भौतिक ध्वनि 6.79 × 10⁻⁴ mol L⁻¹ min⁻¹ है तब NO₂ के उत्पादन की दर है
     (1) 6.790 × 10⁻⁴ mol L⁻¹ min⁻¹ (2) 2.716 × 10⁻⁴ mol L⁻¹ min⁻¹ (3) 1.358 × 10⁻³ mol L⁻¹ min⁻¹ (4) 1.690 × 10⁻⁴ mol L⁻¹ min⁻¹

135. Outer electronic configuration of Eu in ground state is
   (1) 4f⁷6s² (2) 4f⁷5d⁴6s² (3) 4f⁷6s⁰ (4) 4f⁷6s²

136. The correct increasing order of ionic radii of La⁺³, Pr⁺³, Sm⁺³ and Tb⁺³ ions is
   (1) La⁺³ < Pr⁺³ < Sm⁺³ < Tb⁺³ (2) La⁺³ < Sm⁺³ < Pr⁺³ < Tb⁺³ (3) Tb⁺³ < Sm⁺³ < Pr⁺³ < La⁺³ (4) Tb⁺³ < Pr⁺³ < Sm⁺³ < La⁺³

137. Mischmetal consist of approximately 95% of which of the following metal?
   (1) Transition metal (2) Alkaline metal (3) Lanthanoid metal (4) Actinoid metal

138. Which of the following oxide is like metallic copper in its conductivity and appearance?
   (1) TiO (2) CrO₂ (3) ReO₃ (4) VO₃

139. Which of the following pair of elements does not have nearly same size?
   (1) Nb, Os (2) Zr, Hf (3) Pd, Pt (4) Mo, W

140. The average rate for the reaction 2N₂O₅(g) → 4NO₂(g) + O₂(g) is 6.79 × 10⁻⁴ mol L⁻¹ min⁻¹, then the rate of production of NO₂ is
   (1) 6.790 × 10⁻⁴ mol L⁻¹ min⁻¹ (2) 2.716 × 10⁻⁴ mol L⁻¹ min⁻¹ (3) 1.358 × 10⁻³ mol L⁻¹ min⁻¹ (4) 1.690 × 10⁻⁴ mol L⁻¹ min⁻¹
141. If the rate constant for some reaction is 
\[ k = 3 \times 10^{-4} \text{ L mol}^{-1} \text{ s}^{-1} \] 
tab then its order is 
(1) 0 
(2) 1 
(3) 2 
(4) 3

142. Which of the following is incorrect for zero order reaction ?
(1) \[ \frac{d[R]}{dt} = -k \]
(2) \[ [R] = [R]_0 e^{-kt} \]
(3) \[ t_{1/2} = \frac{2k}{k} \]
(4) Straight line plot is between [R] v/s t.

143. Which of the following gas has maximum physisorption on 1 g of activated charcoal ?
(1) \( \text{SO}_2 \) 
(2) \( \text{CO}_2 \) 
(3) \( \text{CH}_4 \) 
(4) \( \text{H}_2 \)

144. Which of the following statements is correct for emulsion ?
(1) They cannot be diluted by dispersion medium.
(2) They do not show Brownian movement.
(3) They can be broken into constituents by centrifuging.
(4) They do not show Tyndall effect.

145. A solution contains three components A, B and C. If each has a mole fraction of 0.2, then the sum of their mole fractions is 
(1) 0.2 
(2) 0.6 
(3) 1 
(4) 3
147. जब 6 g एथेनोइक अम्ल को 200 g बेंजीन में घोला जाए तब विलयन की मोलता स्तर क्या होगी?
(1) 0.003 m  (2) 0.06 m  (3) 0.5 m  (4) 1 m

148. किसी ताप पर शूद्र बेंजीन का वाष्प दबाओं 0.85 bar है | 0.5 g घनाक्षीण विस्तृत अनप्यध्यक्ष टौस को 39 g बेंजीन (मोलर द्रव्यमान 78 g mol⁻¹) में घोला गया | प्राप्त विलयन का वाष्प दबाव 0.845 bar है | टौस का मोलर द्रव्यमान है
(1) 100 g mol⁻¹  (2) 150 g mol⁻¹  (3) 170 g mol⁻¹  (4) 340 g mol⁻¹

149. सूची - I का सूची - II से मिलना कीजिए:

<table>
<thead>
<tr>
<th>सूची - I</th>
<th>सूची - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. आदर्श विलयन</td>
<td>a. ऐसीटोन और एथेनॉल</td>
</tr>
<tr>
<td>II. अनादर्श विलयन</td>
<td>b. ऐसीटोन और क्लोरोफोर्म विचलन</td>
</tr>
<tr>
<td>III. अनादर्श विलयन</td>
<td>c. बेंजीन और टॉलुइन विचलन</td>
</tr>
</tbody>
</table>

कोड:
(1) a b c  (2) c b a  (3) b c a  (4) c a b

150. \[ \text{N}_2(g) + 3\text{H}_2(g) \rightarrow 2\text{NH}_3(g) \]
\[ \Delta H_f = -92.4 \text{ kJ} \]
NH₃ गैस की मानक विलयन ऐंड्रेनली क्या है?
(1) 23.1 kJ/mol  (2) 46.2 kJ/mol  (3) -46.2 kJ/mol  (4) -92.4 kJ/mol

147. When 6 g of ethanoic acid is dissolved in 200 g benzene, then what is the molality of solution?
(1) 0.003 m  (2) 0.06 m  (3) 0.5 m  (4) 1 m

148. The vapour pressure of pure benzene at certain temperature is 0.85 bar. A non-volatile, non-electrolyte solid weighing 0.5 g when added to 39 g of benzene (molar mass 78 g mol⁻¹). Vapour pressure of solution then is 0.845 bar. The molar mass of solid substance is
(1) 100 g mol⁻¹  (2) 150 g mol⁻¹  (3) 170 g mol⁻¹  (4) 340 g mol⁻¹

149. Match the List - I with List - II:

<table>
<thead>
<tr>
<th>List - I</th>
<th>List - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Ideal solution</td>
<td>a. Acetone and ethanol</td>
</tr>
<tr>
<td>II. Non-ideal solution</td>
<td>b. Acetone and chloroform</td>
</tr>
<tr>
<td>(Positive deviation)</td>
<td>(Negative deviation)</td>
</tr>
<tr>
<td>III. Non-ideal solution</td>
<td>c. Benzene and Toluene</td>
</tr>
</tbody>
</table>

Codes:
(1) a b c  (2) c b a  (3) b c a  (4) c a b

150. \[ \text{N}_2(g) + 3\text{H}_2(g) \rightarrow 2\text{NH}_3(g) \]
\[ \Delta H_f = -92.4 \text{ kJ} \]
What is the standard enthalpy of formation of NH₃ gas?
(1) 23.1 kJ/mol  (2) 46.2 kJ/mol  (3) -46.2 kJ/mol  (4) -92.4 kJ/mol