

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

(MPH/PHD/URS-EE-2019)

CHEMISTRY

Sr. No. 10003

Code **C**

SET-"X"

Time : 1½ Hours

Total Questions : 100

Max. Marks : 100

Roll No. _____ (in figure) _____ (in words)

Name : _____ Father's Name : _____

Mother's Name : _____ Date of Examination : _____

(Signature of the candidate)

(Signature of the Invigilator)

**CANDIDATES MUST READ THE FOLLOWING INFORMATION/
INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.**

1. All questions are compulsory.
2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her in addition to lodging of an FIR with the police. Further the answer-sheet such a candidate will not be evaluated.
3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along with answer key of all the A,B,C and D code will be got uploaded on the university website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet/Answer Key, the same may be brought to the notice of the Controller of Examination in writing/through E. Mail within 24 hours of uploading the same on the University Website. Thereafter, no complaint in any case, will be considered.
5. The candidate **MUST NOT** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers **MUST NOT** be ticked in the Question book-let.
6. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
7. Use only Black or Blue **BALL POINT PEN** of good quality in the OMR Answer-Sheet.
8. **BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.**

Sample copy for website

[Handwritten signatures]



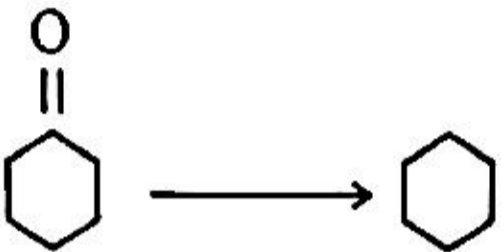
Question No.	Questions
1.	<p>For a potentiometric titration in the curve of emf (E) v/s volume (V) of the titrant added, the equivalence point is indicated by</p> <p>(1) $dE/dV = 0, d^2E/dV^2 = 0$ (2) $dE/dV = 0, d^2E/dV^2 > 0$ (3) $dE/dV > 0, d^2E/dV^2 = 0$ (4) $dE/dV > 0, d^2E/dV^2 > 0$</p>
2.	<p>If the concentration (c) is increased to 4 times its original value (c), the change in molar conductivity for strong electrolytes is (where b is Kohlrausch's constant) -</p> <p>(1) 0 (2) $b\sqrt{c}$ (3) $2b\sqrt{c}$ (4) $4b\sqrt{c}$</p>
3.	<p>The energy levels of the harmonic oscillator (neglecting zero point energy) are $\epsilon_n = nh\nu$ for $n = 0, 1, 2, \dots$. Assuming $h\nu = k_B T/3$; the partition function is</p> <p>(1) e (2) $e^{1/3} (e^{1/3} - 1)$ (3) $1/3e$ (4) $3e/(3e^3 - 1)$</p>
4.	<p>The ground state of hydrogen atom is -13.598 eV. The expectation values of kinetic energy $\langle T \rangle$ and potential energy, $\langle V \rangle$, in units of eV, are</p> <p>(1) $\langle T \rangle = 13.598, \langle V \rangle = -27.196$ (2) $\langle T \rangle = -27.196, \langle V \rangle = 13.598$ (3) $\langle T \rangle = -6.799, \langle V \rangle = -6.799$ (4) $\langle T \rangle = 6.799, \langle V \rangle = -20.397$</p>
5.	<p>The correct expression for the product $(\overline{M}_n) \cdot (\overline{M}_w)$ [where \overline{M}_n and \overline{M}_w are the number average and weight average molar masses, respectively, of a polymer] is</p> <p>(1) $N^{-1} \sum_i N_i M_i$ (2) $N^{-1} \sum_i N_i M_i^2$ (3) $N / \sum_i N_i M_i$ (4) $N / \sum_i N_i M_i^2$</p>

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6.	<p>Match the following columns :</p> <table border="1"> <thead> <tr> <th>Column-1</th> <th>Column-2</th> </tr> </thead> <tbody> <tr> <td>A. Energy of the ground state of He+</td> <td>1. -6.04 eV</td> </tr> <tr> <td>B. Potential energy of 1st orbit of H-atom</td> <td>2. -27.2 eV</td> </tr> <tr> <td>C. Kinetic energy of II excited state of He+</td> <td>3. $8.68 \times 10^{-18} \text{ J}$</td> </tr> <tr> <td>D. Ionisation potential of He+</td> <td>4. -54.4 eV</td> </tr> </tbody> </table> <p>Codes.</p> <table border="1"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>(2)</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> </tr> <tr> <td>(3)</td> <td>4</td> <td>2</td> <td>1</td> <td>3</td> </tr> <tr> <td>(4)</td> <td>2</td> <td>3</td> <td>1</td> <td>4</td> </tr> </tbody> </table>	Column-1	Column-2	A. Energy of the ground state of He+	1. -6.04 eV	B. Potential energy of 1st orbit of H-atom	2. -27.2 eV	C. Kinetic energy of II excited state of He+	3. $8.68 \times 10^{-18} \text{ J}$	D. Ionisation potential of He+	4. -54.4 eV		A	B	C	D	(1)	1	2	3	4	(2)	4	3	2	1	(3)	4	2	1	3	(4)	2	3	1	4
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7.	<p>The protecting power of lyophilic colloidal sol is expressed in terms of</p> <p>(1) Critical miscelle concentration (2) Oxidation number (3) Coagulation value (4) Gold number</p>																																			
8.	<p>Which one of the following is an example for homogenous catalysis ?</p> <p>(1) Hydrogenation of oil (2) Manufacture of ammonia by Haber's process (3) Manufacture of sulphuric acid by Contact process (4) Hydrolysis of sucrose in presence of dilute hydrochloric acid</p>																																			
9.	<p>The energy of a hydrogen atom in a state is $(-hcR_H/25)$, where R_H = Rydberg Constant). The degeneracy of the state will be</p> <p>(1) 25^1 (2) 25^2 (3) 25^3 (4) 25^4</p>																																			

Question No.	Questions
10.	<p>The value of the commutator $[x, p_x^2]$ is</p> <p>(1) $2i$ (2) $2i\hbar p_x$ (3) $2ixp_x$ (4) $\hbar i p_x/\pi$</p>
11.	<p>The room temperature magnetic moment (μ_{eff} in BM) for a monomeric Cu(II) complex is greater than 1.73. This may be explained using the expression</p> <p>(1) $\mu_{\text{eff}} = \mu_n (1 - \alpha\lambda/\Delta)$ (2) $\mu_{\text{eff}} = [n(n+2)]^{1/2}$ (3) $\mu_{\text{eff}} = [4s(s+1) + L(L+1)]^{1/2}$ (4) $\mu_{\text{eff}} = g[J(J+1)]^{1/2}$</p>
12.	<p>The numbers of P-S and P-P bonds in the compound P_4S_3 are, respectively,</p> <p>(1) 3 and 6 (2) 4 and 3 (3) 6 and 3 (4) 6 and 2</p>
13.	<p>In the absence of bound globin chain, heme group on exposure to O_2 gives the iron-oxygen species</p> <p>(1) $Fe(III) - O - Fe(III)$ (2) $Fe(III) - O - O^-$ (3) $Fe(III) - O - O - Fe(III)$ (4) $Fe(IV) - O -$</p>
14.	<p>The complex $[Cr(\text{bipyridyl})_3]^{2+}$, shows a red phosphorescence due to transition</p> <p>(1) ${}^4T_{1g} \leftarrow {}^4A_{2g}$ (2) ${}^2E_g \leftarrow {}^4A_{2g}$ (3) ${}^4T_{2g} \leftarrow {}^4A_{2g}$ (4) ${}^4A_{2g} \leftarrow {}^2E_g$</p>

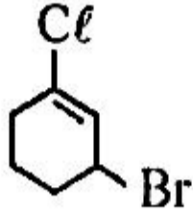
Question No.	Questions
20.	<p>Among the complexes (i) $K_4[Cr(CN)_6]$, (ii) $K_4[Fe(CN)_6]$, (iii) $K_3[Co(CN)_6]$, and (iv) $K_4[Mn(CN)_6]$, Jahn Teller distortion is expected in</p> <p>(1) i, ii and iii (2) ii, iii and iv (3) i and iv (4) ii and iii</p>
21.	<p>Which one of the following high spin complexes has the largest CSFE Crystal field stabilization energy</p> <p>(1) $[Cr(H_2O)_6]^{2+}$ (2) $[Mn(H_2O)_6]^{2+}$ (3) $[Fe(H_2O)_6]^{2+}$ (4) $[Co(H_2O)_6]^{2+}$</p>
22.	<p>The number of 3c, 2e BHB and B-B bonds present in B_4H_{10} respectively are</p> <p>(1) 2, 4 (2) 3, 2 (3) 4, 1 (4) 4, 0</p>
23.	<p>The most unstable species among the following is</p> <p>(1) $Ti(C_2H_5)_4$ (2) $Ti(CH_2Ph)_4$ (3) $Pb(CH_3)_4$ (4) $Pb(C_2H_5)_4$</p>
24.	<p>The acid catalyzed hydrolysis of $trans-[Co(en)_2AX]^{n+}$ can give <i>cis</i>-product also due to the formation of</p> <p>(1) Square pyramidal intermediate (2) Trigonal bipyramidal intermediate (3) Pentagonal bipyramidal intermediate (4) Face capped octahedral intermediate</p>

Question No.	Questions
25.	Total number of lines expected in ^{31}P NMR spectrum of HPF_2 is ($I = 1/2$ for both ^{19}F and ^{31}P) (1) Six (2) Four (3) Five (4) Three
26.	The number of faces, vertices and edges in IF_7 polyhedron are, respectively (1) 15, 7 and 15 (2) 10, 7 and 15 (3) 10, 8 and 12 (4) 12, 6 and 9
27.	The light pink colour of $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ and the deep blue colour of $[\text{CoCl}_4]^{-2}$ are due to (1) MLCT transition in the first and d-d transition in the second (2) LMCT transitions in both (3) d-d transitions in both (4) d-d transition in the first and MLCT transition in the second
28.	In $[\text{Mo}_2(\text{S}_2)_6]^{2-}$ cluster the number of bridging S atoms and coordination number of Mo respectively, are (1) 2 and 8 (2) 2 and 6 (3) 1 and 8 (4) 1 and 6
29.	The number of possible isomers of $[\text{Ru}(\text{PPh}_3)_2(\text{acac})_2]$ (acac = acetylacetonate) is (1) 2 (2) 5 (3) 4 (4) 3

Question No.	Questions
35.	Which of the following solvents is unacceptable on large scale ? (1) Dimethoxy ethane (2) Xylene (3) Diethyl ether (4) Heptane
36.	For the reaction given below, which reaction condition are not suitable ? <div style="text-align: center;">  </div> (1) $\text{LiAlH}_4 / \text{Et}_2\text{O}$ (2) $\text{H}_2\text{N NH}_2 / \text{NaOH}$ (3) Zn (Hg) / HCl (4) $\text{HSCH}_2\text{CH}_2\text{CH}_2\text{SH} / \text{H}^+, \text{H}_2 / \text{Ni}$
37.	Which of the following statements is <u>not</u> correct ? (1) The molecule to be synthesised is a target molecule (2) Synthetic equivalent is a real chemical compound resulting from disconnection (3) Regioselective reaction does not produce one of several possible structural isomers (4) Synthons are idealised fragments (usually cation or anion) resulting from a disconnection.
38.	How many oxygen atoms lined up in a row would fit in a one nanomaterial space ? (1) Seventy (2) One (3) Seven (4) None
39.	The role of catalyst in chemical reaction is (1) Lowers the activation energy (2) Alters the amount of products (3) Increases ΔH of Forward reaction (4) Decreases ΔH of Forward reaction
40.	Secondary pollutant is (1) SO_2 (2) CO (3) PAN (4) Aerosol



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46.	<p>At a certain temperature, the following observations were made for the reaction</p> $A \longrightarrow \text{Products}$ <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Time</td> <td style="width: 50%;">[A]</td> </tr> <tr> <td>(From the start)</td> <td></td> </tr> <tr> <td>2 minutes</td> <td>5×10^{-3}</td> </tr> <tr> <td>5 minutes</td> <td>4×10^{-3}</td> </tr> <tr> <td>8 minutes</td> <td>3×10^{-3}</td> </tr> <tr> <td>11 minutes</td> <td>2×10^{-3}</td> </tr> </table> <p>The order of the reaction is</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">(1) 1</td> <td style="width: 50%;">(2) 2</td> </tr> <tr> <td>(3) 3</td> <td>(4) Zero</td> </tr> </table>	Time	[A]	(From the start)		2 minutes	5×10^{-3}	5 minutes	4×10^{-3}	8 minutes	3×10^{-3}	11 minutes	2×10^{-3}	(1) 1	(2) 2	(3) 3	(4) Zero
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47.	<p>How many stereoisomers does have 2, 3-dichloropentane ?</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">(1) 2</td> <td style="width: 50%;">(2) 4</td> </tr> <tr> <td>(3) 3</td> <td>(4) 5</td> </tr> </table>	(1) 2	(2) 4	(3) 3	(4) 5												
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48.	<p>Which statement about benzene is incorrect ?</p> <ol style="list-style-type: none"> (1) The C_6 ring is planar (2) The C-Cπ-bonding is delocalised. (3) The reactivity of the benzene reflects the presence of carbon-carbon double bond. (4) Each C atom is sp^2 hybridized. 																

Question No.	Questions
49.	Which of the following is not a Huckel $(4n + 2)$ aromatic system ? (1) [18]-Annulene ($C_{18}H_{18}$) (2) Cyclooctatetraene (C_8H_8) (3) Benzene (C_6H_6) (4) Cyclopentadienyl anion ($C_5H_5^-$)
50.	The IUPAC name of  is : (1) 1-bromo-3-chlorocyclohexene (2) 2-bromo-6-chlorocyclohex-1-ene (3) 6-bromo-2-chlorocyclohexene (4) 3-bromo-1-chlorocyclohexene
51.	The complex $[Fe(Phen)_2(NCS)_2]$ (Phen – 1, 10-phenanthroline) shows spin crossover behaviour. CFSE and μ_{eff} at 250 and 150 K, respectively will be : (1) $0.4 \Delta_0$, 4.90 BM and $2.4 \Delta_0$, 0.00 BM (2) $2.4 \Delta_0$, 2.90 BM and $0.4 \Delta_0$, 1.77 BM (3) $2.4 \Delta_0$, 0.00 BM and $0.4 \Delta_0$, 4.90 BM (4) $1.2 \Delta_0$, 4.90 BM and $2.4 \Delta_0$, 0.00 BM
52.	$[Ni^{II} L_6]^{n+ \text{ or } n-}$ show absorption bands at 8500, 15400 and 26000 cm^{-1} whereas $[Ni^{II} L'_6]^{n+ \text{ or } n-}$ at 10750, 17500 and 28200 cm^{-1} , L and L' are respectively (1) OH^- and N_3^- (2) Cl^- and I^- (3) NCS^- and $RCOO^-$ (4) H_2O and NH_3

Question No.	Questions
53.	<p>The rate of exchange of OH_2 present in the coordination sphere by $^{18}\text{OH}_2$ of</p> <p>i. $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$; ii) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$; iii) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$; iv) $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$, follows the order</p> <p>(1) i) > iv) > iii) > ii) (2) i) > ii) > iii) > iv)</p> <p>(3) ii) > iii) > iv) > i) (4) iii) > i) > iv) > ii)</p>
54.	<p>On addition of an inert gas at constant volume to the reaction</p> $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$ <p>at equilibrium</p> <p>(1) The reaction remains unaffected</p> <p>(2) Forward reaction is favoured</p> <p>(3) The reaction halts</p> <p>(4) Backward reaction is favoured</p>
55.	<p>The transition zone for Raman spectra is</p> <p>(1) Between vibrational and rotational levels</p> <p>(2) Between electronic levels</p> <p>(3) Between magnetic levels of nuclei</p> <p>(4) Between magnetic levels of unpaired electrons</p>
56.	<p>Polarisation of the electron cloud by the cation forms</p> <p>(1) Ionic bond (2) Covalent bond</p> <p>(3) Coordinate bond (4) Metallic bond</p>

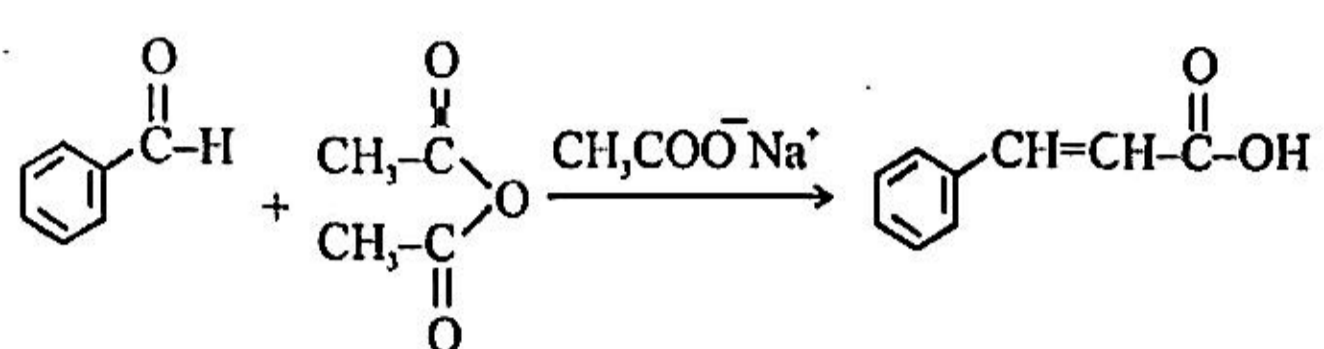
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57.	Activation energy of a chemical reaction can be determined by _____. (1) determining the rate constant at standard temperature (2) determining the rate constants at two temperatures (3) determining probability of collision (4) using catalyst
58.	Due to Frenkel defect, the density of the ionic solids (1) increases (2) decreases (3) does not change (4) none of the above
59.	What is the simplest formula of a solid whose cubic unit cell has the atom A at each corner, the atom B at each face centre and a C atom at the body centre (1) AB_2C (2) A_2BC (3) AB_3C (4) ABC_3
60.	Which of the following thermodynamic function is called as the arrow of "time" (1) Enthalpy (2) Gibbs free energy (3) Entropy (4) Helmholtz free energy

Question No.	Questions
61.	<p>Which of the following is a correct name for the following compound ?</p> $\begin{array}{c} \text{Cl} \quad \quad \text{CH}_2\text{CH}_3 \\ \quad \backslash \quad / \\ \quad \text{C} = \text{C} \\ \quad / \quad \backslash \\ \text{H}_3\text{C} \quad \quad \text{I} \end{array}$ <p>(1) cis-2-chloro-3-iodo-2-pentene (2) trans-2-chloro-3-ido-2-pentene (3) trans-3-iodo-4chloro-3-pentene (4) cis-3-iodo-4-chloro-3-pentene</p>
62.	<p>Keto-enol tautomerism is observed in :</p> <p>(1) $\text{C}_6\text{H}_5-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$ (2) $\text{C}_6\text{H}_5-\overset{\text{O}}{\parallel}{\text{C}}-\text{C}_6\text{H}_5$ (3) $\text{CH}_3\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$ (4) $\text{C}_6\text{H}_5-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$</p>
63.	<p>Which of the following gases is mainly responsible for acid rain ?</p> <p>(1) NO_2 and CO_2 (2) CO_2 and SO_2 (3) SO_2 and NO_2 (4) None of these</p>
64.	<p>Which of the following compound displays two singlets at $\delta_{2,3}$ and 7.1 ppm.</p> <p>(1) 1, 2-dimethylbenzene (2) 1, 3-dimethyl benzene (3) 1, 4-dimethyl benzene (4) methyl benzene</p>
65.	<p>A single strong and sharp absorption near 1650 cm^{-1} in IR spectra indicates the presence of</p> <p>(1) Acid chlorides (2) Amides (3) Anhydrides (4) Aldehydes</p>
66.	<p>The proteins in which prosthetic group is carbohydrate are known as</p> <p>(1) Lipo-protein (2) Mucoprotein (3) Chromoprotein (4) Nucleoprotein</p>



Question No.	Questions						
67.	<p>Match the List I and List II and select the correct answer using codes given below :</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>List I</p> <p>1 Nerol</p> <p>2 Citral</p> <p>3 Pinol</p> <p>4 Lupeol</p> </td> <td style="width: 50%; vertical-align: top;"> <p>List II</p> <p>A Lemon grass oil</p> <p>B Geraniol</p> <p>C Amyrin</p> <p>D α-pinene</p> </td> </tr> </table> <p>Correct answer is :</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">(1) 1-C, 2-B, 3-A, 4-D</td> <td style="width: 50%;">(2) 1-B, 2-A, 3-D, 4-C</td> </tr> <tr> <td>(3) 1-D, 2-C, 3-A, 4-D</td> <td>(4) 1-A, 2-D, 3-B, 4-D</td> </tr> </table>	<p>List I</p> <p>1 Nerol</p> <p>2 Citral</p> <p>3 Pinol</p> <p>4 Lupeol</p>	<p>List II</p> <p>A Lemon grass oil</p> <p>B Geraniol</p> <p>C Amyrin</p> <p>D α-pinene</p>	(1) 1-C, 2-B, 3-A, 4-D	(2) 1-B, 2-A, 3-D, 4-C	(3) 1-D, 2-C, 3-A, 4-D	(4) 1-A, 2-D, 3-B, 4-D
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68.	<p>Hydrolysis product of sucrose is :</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">(1) Fructose</td> <td style="width: 50%;">(2) Glucose + Galactose</td> </tr> <tr> <td>(3) Glucose</td> <td>(4) Glucose + Fructose</td> </tr> </table>	(1) Fructose	(2) Glucose + Galactose	(3) Glucose	(4) Glucose + Fructose		
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69.	<p>The mass spectrum of primary amides shows a moderate molecular ion and an Intense peak at $m/z = 44$ due to :</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">(1) Loss of an alkyl radical</td> <td style="width: 50%;">(2) Loss of HCN</td> </tr> <tr> <td>(3) Loss of CO</td> <td>(4) Loss of methyl radical</td> </tr> </table>	(1) Loss of an alkyl radical	(2) Loss of HCN	(3) Loss of CO	(4) Loss of methyl radical		
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(3) Loss of CO	(4) Loss of methyl radical						
70.	<p>Which one of the following is bacteriostatic drug ?</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">(1) Chloramphenicol</td> <td style="width: 50%;">(2) Penicillin</td> </tr> <tr> <td>(3) Streptomycin</td> <td>(4) Phenacetin</td> </tr> </table>	(1) Chloramphenicol	(2) Penicillin	(3) Streptomycin	(4) Phenacetin		
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71.	<p>Heating 1, 4-dicarbonyl compounds in the presence of phosphorus pentoxide (P_2O_5) gives :</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">(1) Pyrrole</td> <td style="width: 50%;">(2) Furan</td> </tr> <tr> <td>(3) Thiophene</td> <td>(4) Quinoline</td> </tr> </table>	(1) Pyrrole	(2) Furan	(3) Thiophene	(4) Quinoline		
(1) Pyrrole	(2) Furan						
(3) Thiophene	(4) Quinoline						
72.	<p>The Acetylation of thiophene occurs at :</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">(1) C_3-position</td> <td style="width: 50%;">(2) C_4-position</td> </tr> <tr> <td>(3) C_2-position</td> <td>(4) both at C_2 and C_4-positions</td> </tr> </table>	(1) C_3 -position	(2) C_4 -position	(3) C_2 -position	(4) both at C_2 and C_4 -positions		
(1) C_3 -position	(2) C_4 -position						
(3) C_2 -position	(4) both at C_2 and C_4 -positions						

Question No.	Questions
73.	Pyridine is basic in nature having (1) $pK_a = 5.21$ (2) $pK_a = -0.27$ (3) $pK_a = 5.81$ (4) $pK_a = -0.35$
74.	Least stable carbocation among the following is (1) $(CH_3)_3C^+$ (2) $(CH_3)_2CH^+$ (3) $CH_3CH_2^+$ (4) CH_3^+
75.	Due to the presence of an unpaired electron, free radicals are (1) Anions (2) Cations (3) Chemically reactive (4) Chemically inreactive
76.	Benzoyl peroxide undergoes homolytic cleavage to produce (1) Phenyl radical (2) Methyl radical (3) Phenyl chloride (4) Methyl chloride
77.	SN^1 mechanism for the hydrolysis of an alkyl halide involves the formation of intermediate (1) Free radical (2) Carbanion (3) Carbocation (4) None of these
78.	Which of the following is <u>NOT</u> polar protic solvent ? (1) H_2O (2) C_2H_5OH (3) Fumaric acid (4) Acetone
79.	A new carbon-carbon bond formation is possible in (1) Clemmensen reduction (2) Wurtz reduction (3) Friedel-Craft alkylation (4) Oppenauer oxidation

Question No.	Questions
80.	<p>Give the name of reaction given below :</p> <div style="text-align: center;">  </div> <p>(1) Perkin reaction (2) Pechmann condensation (3) Benzoin condensation (4) Claisen-Schmidt reaction</p>
81.	<p>The molecule $(OC)_3M = CPh(OCH_3)$ obeys 18 electron rule. The two 'M' satisfying the condition are</p> <p>(1) Cr, Re^+ (2) Mo, V (3) V, Re^+ (4) Cr, V</p>
82.	<p>The number of lines exhibited by a high resolution EPR spectrum of the species $[Cu(ethylenediamine)_2]^{2+}$ is [Nuclear spin (I) of copper is $3/2$ and of N = 1]</p> <p>(1) 12 (2) 15 (3) 20 (4) 36</p>
83.	<p>Complexes of general formula, $fac-[Mo(CO)_3(\text{phosphine})_3]$ have the C-O stretching bands as given below :</p> <p>Phosphine : PF_3 (i); PCl_3 (ii); $P(Cl)Ph_2$ (iii); PMe_3 (iv)</p> <p>$\nu(CO)$: in cm^{-1} : 2090 (a); 2040 (b); 1977 (c); 1945 (d)</p> <p>The correct combination of the phosphine and the stretching frequency is,</p> <p>(1) (i-a) (ii-b) (iii-c) (iv-d) (2) (i-b) (ii-a) (iii-d) (iv-c) (3) (i-d) (ii-c) (iii-b) (iv-a) (4) (i-c) (ii-d) (iii-a) (iv-b)</p>

Question No.	Questions
84.	Which one of the following will <i>NOT</i> undergo oxidative addition by methyl iodide ? (1) $[\text{Rh}(\text{CO})_2\text{I}_2]$ (2) $[\eta^5\text{-CpRh}(\text{CO})_2]$ (3) $[\text{Ir}(\text{PPh}_3)_2(\text{CO})\text{Cl}]$ (4) $[\eta^5\text{-Cp}_2\text{Ti}(\text{Me})\text{Cl}]$
85.	C_{60} has (1) 14 pentagon rings and 18 Hexagon rings (2) 12 pentagon rings and 20 Hexagon rings (3) 12 pentagon rings and 18 Hexagon rings (4) 14 pentagon rings and 20 Hexagon rings
86.	In 'carbon-dating' application of radioisotopes, ^{14}C emits (1) Positron (2) γ particle (3) β particle (4) α particle
87.	The product of the reaction of propene, CO and H_2 in the presence of $\text{Co}_2(\text{CO})_8$ as catalyst is (1) butanoic acid (2) butanal (3) 2-butanone (4) methylpropanoate
88.	Reductive elimination step in hydrogenation of alkenes by Wilkinson catalyst results in (neglecting solvent in coordination sphere of Rh) (1) T-shaped $[\text{Rh}(\text{PPh}_3)_2\text{Cl}]$ (2) Trigonal-planar $[\text{Rh}(\text{PPh}_3)_2\text{Cl}]$ (3) T-shaped $[\text{Rh}(\text{H})(\text{PPh}_3)_2]$ (4) Trigonal-planar $[\text{Rh}(\text{H})(\text{PPh}_3)_2]$
89.	The correct statement with respect to the bonding of the ligands, Me_3N and Me_3P with the metal ions Be^{2+} and Pd^{2+} is, (1) the ligands bind equally strong with both the metal ions as they are dicationic (2) the ligands bind equally strong with both the metal ions as both the ligands are pyramidal (3) the binding is stronger for Me_3N with Be^{2+} and Me_3P with Pd^{2+} (4) the binding is stronger for Me_3N with Pd^{2+} and Me_3P with Be^{2+}

Question No.	Questions
90.	In the iodometric titration of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3$) with acidic dichromate solution, 25 mL of 0.1 M dichromate requires 50 mL of 'x' M thiosulfate. The value of 'x' is (1) 0.6 (2) 0.3 (3) 0.1 (4) 0.4
91.	The number of the lines in the ESR spectrum of CD_3 is (the spin of D is 1) (1) 1 (2) 3 (3) 4 (4) 7
92.	Colligative properties are used for the determination of (1) molar mass (2) equivalent weight (3) arrangement of molecules (4) melting and boiling point
93.	Which of the following does not contain a C_3 axis ? (1) POCl_3 (2) NH_4^+ (3) H_3O^+ (4) ClF_3
94.	Franck Condon principle is related to (1) time required for electronic transition to occur (2) absorption of light (3) time of electronic transition and change in internuclear distance (4) symmetry of molecules
95.	Which pairing of molecule and point group is correct ? (1) BCl_3, C_{3v} (2) SiCl_4, D_{4h} (3) $\text{H}_2\text{S}, C_{2v}$ (4) SF_4, C_{4v}
96.	The symmetric stretching mode of the SiF_4 molecule : (1) IR active (2) IR inactive (3) generates a change in molecular dipole moment (4) gives rise to a strong absorption in IR spectrum

