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(MPH/PHD/URS-EE-2019) CHEMISTRY

Sr. No. 10002

Code B

SET-"X"

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- 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 of 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.
- 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.

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No.	
17	Which of the following is a correct name for the following compound? $Cl \subset CH_1CH_2$
	(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
5,	Keto-enol tautomerism is observed in:
	(1) C,H,-C,-CH, (2) C,H,-C,-C,H,
	0 0 1 (3) CH,CH,C-OH (4) C,H,-C-H
co	lowing gases is main
	(1) NO ₂ and CO ₂ (2) CO ₂ and SO ₂
8	
4.	Which of the following compound displays two singlets at $\delta_{2,3}$ and 7.1 ppm.
	(1) 1, 2-dimethylbenzene (2) 1, 3-dimethyl benzene
	(3) 1, 4-dimethyl benzene (4) methyl benzene
5.	A single strong and sharp absorption near 1650 cm ⁻¹ in IR spectra indicates the presence of
	(1) Acid chlorides (2) Amides
•	(3) Anhydrides (4) Aldehydes

Question No.	Questions
1.	Which of the following is a correct name for the fall.
	Which of the following is a correct name for the following compound? $\frac{C\ell}{HC}C = C \left(\frac{CH_2CH_3}{LC}\right)$
	(1) cis-2-chloro-3-iodo-2-pentene
	(2) trans-2-chloro-3-ido-2-pentene
	(3) trans-3-iodo-4chloro-3-pentene
3	(4) cis-3-iodo-4-chloro-3-pentene
2.	Keto-enol tautomerism is observed in :
	O O O O $ (1) C_6H_5-C-CH_2-C-CH_3$ (2) $C_6H_5-C-C_6H_5$
	O (3) CH ₃ CH ₂ C-OH (4) C ₆ H ₅ -C-H
3.	Which of the following gases is mainly responsible for acid rain?
	(1) NO ₂ and CO ₂ (2) CO ₂ and SO ₃
	3) SO ₂ and NO ₂ (4) None of these
i. V	Which of the following compound displays two singlets at $\delta_{2,3}$ and .1 ppm.
(1	1) 1, 2-dimethylbenzene (2) 1, 3-dimethyl benzene
(3	3) 1, 4-dimethyl benzene (4) methyl benzene
· A	single strong and sharp absorption near 1650 cm ⁻¹ in IR spectra indicates se presence of
(1) Acid chlorides (2) Amides
(3	

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6.	The proteins in which prosthetic group is carbohydrate are known as
	(1) Lipo-protein (2) Mucoprotein
	(3) Chromoprotein (4) Nucleoprotein
7.	Match the List I and List II and select the correct answer using codes given below:
	List I List II
	1 Nerol A Lemon grass oil
	2 Citral B Geraniol
*	3 Pinol C Amyrin
	4 Lupeol D α-pinene
11 at	Correct answer is:
	(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
8.	Hydrolysis product of sucrose is:
	(1) Fructose (2) Glucose + Galactose
20.00	(3) Glucose (4) Glucose + Fructose
9.	The mass spectrum of primary amides shows a moderate molecular ion and an Intense peak at $m/z = 44$ due to:
- 1	(1) Loss of an alkyl radical (2) Loss of HCN
. 1	(3) Loss of CO (4) Loss of methyl radical
0.	Which one of the following is bacteriostatic drug?
` . .	(1) Chloramphenicol (2) Penicillin
	(3) Streptomycin (4) Phenacetin
. '	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

(2)

Question	· O
No.	Questions
12.	Colligative properties are used for the determination of
1	(1) molar mass (2) equivalent weight
	(3) arrangement of molecules (4) melting and boiling point
13.	Which of the following does not contain a C ₃ axis?
	(1) $POC\ell_3$ (2) NH_4^+
	(3) H_3O^+ (4) $C\ell F_3$
14.	Franck Condon principle is related to
	(1) time required for electronic transition to occur
	(2) absorption of light
, s	(3) time of electronic transition and change in internuclear distance
	(4) symmetry of molecules
15.	Which pairing of molecule and point group is correct?
	(1) $\mathrm{BC}\ell_{3}$, C_{3v} (2) $\mathrm{SiC}\ell_{4}$, D_{4h}
	(3) H_2S , C_{2v} (4) SF_4 , C_{4v}
16.	The symmetric stretching mode of the SiF ₄ molecule:
	(1) IR active
1	(2) IR inactive
j	(3) generates a change in molecular dipole moment
	(4) gives rise to a strong absorption in IR spectrum
17.	Match the following columns:
F. 14	LIST-1 LIST-2
	1. Sol A. Liquid dispersed in solid
	2. Gel B. gas dispersed in liquid
	3. Emulsion C. Solid dispersed in liquid
x = -	4. Foam D. liquid dispersed in liquid
eta [Codes
61	(1) 1-A 2-B 3-C 4-D
9	(2) 1-B 2-C 3-D 4-A
	(3) 1-C 2-A 3-D 4-B
	(4) 1–B 2–D 3–A 4–C
	(*) 1-D 2-D 3-A 4-C

NO.	June 1997
18.	A heat engine operates between the boiling point of water and a 100m temperature of 25°C. The efficiency of the engine is largest, if water is
	allowed to boll at a pressure of – (1) 1 atm. (2) 10 atms
	(3) 25 atms (4) 1.01 * 10° Nm ⁻²
19.	Monomer of Orlon is
76.5	(1) $CH_2 = CH - OCH_3$ (2) $CF_2 = CF_2$
	(3) $CH_2 = CH - CN$ (4) $CH_2 = CH - C\ell$
20.	Chloroprene is obtained by the addition of HC& to
236	(I) ethylene (2) acetylene
	(3) vinylacetylene (4) phenylacetylene
21.	The complex [Fe(Phen) ₂ (NCS) ₂](Phen – 1, 10-phnanthroline) shows spin crossover behaviour. CFSE and μ _{eff} at 250 and 150 K, respectively will
	(1) $0.4 \Delta_0$, 4.90 BM and 2.4 Δ_0 , 0.00 BM
	(2) 2:4 $\Delta_{\rm o}$, 2.90 BM and 0.4 $\Delta_{\rm o}$, 1.77 BM
	(3) 2.4 $\Delta_{\rm o}$, 0.00 BM and 0.4 $\Delta_{\rm o}$, 4.90 BM
	(4) 1-2 Δ_{0} , 4.90 BM and 2.4 Δ_{0} , 0.00 BM
22.	[Ni ^{II} $L_e^{]^{n+orb-}}$ show absorption bands at 8500, 15400 and 26000 cm ⁻¹ whereas [Ni ^{II} $L_e^{]^{n+orb-}}$ 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) HO and NH.

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Question No.	Questions
23,	The rate of exchange of $\mathrm{OH_2}$ present in the coordination sphere by $^{18}\mathrm{OH}$ of
	i. $[Cu(H_2O)_6]^{2+}$; ii) $[Mn(H_2O)_6]^{2+}$; iii) $[Fe(H_2O)_6]^{2+}$; iv) $[Ni(H_2O)_6]^{2+}$, follows the order
	(1) $i > iv > iii > ii) > iii > iii) > iv)$
	(3) $ii) > iii) > iv) > i) (4) iii) > iv) > ii)$
24.	On addition of an inert gas at constant volume to the reaction
89	$N_2 + 3H_2 = 2NH_3$ at equilibrium
	(1) The reaction remains unaffected
	(2) Forward reaction is favoured
	(3) The reaction halts
	(4) Backward reaction is favoured
25.	The transition zone for Raman spectra is
ú	(1) Between vibrational and rotational levels
	(2) Between electronic levels
	(3) Between magnetic levels of nuclei
	(4) Between magnetic levels of unpaired electrons
26.	Polarisation of the electron cloud by the cation forms
	(1) Ionic bond (2) Covalent bond
10	(3) Coordinate bond (4) Metallic bond

No.			
27.			32.
	Activation energy of a chemical reaction over a standard temperature		
	determining		\$6 60
3-87		1 18	
		525	33.
28.	Due to Frenkel defect, the density of the ionic solids		
858	(1) increases (2) decreases		
	(3) does not change (4) none of the above		31
29.	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		8
0.0250	(1) AB,C (2) A,DC	9	
, ,			84.
30.	Which of the following thermodynamic function is called as the arrow of "time"	50	
ø	(1) Enthalpy (2) Gibbs free energy		
	(3) Entropy (4) Helmholtz free energy	8 1	.35.
31.	The molecule (OC) ₅ M = CPh(OCH ₃) obeys 18 electron rule. The two 'M' satisfying the condition are	10 1	
	(1) Cr. Re ⁺ (2) Mo, V		
13%	(3) V, Re ⁺ (4) Cr, V	ا ا	Out to Carre



Question No.	Questions
32.	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]
*	(1) 12 (2) 15
	(3) 20 (4) 36
88.	Complexes of general formula, fac- $[Mo(CO)_3$ (phosphine) ₃] have the C-O stretching bands as given below:
	Phosphine : PF_3 (i); $PC\ell_3$ (ii); $P(C\ell)Ph_2$ (iii); PMe_3 (iv)
	v(CO): in cm ⁻¹ : 2090 (a); 2040 (b); 1977 (c); 1945 (d)
	The correct combination of the phosphine and the stretching frequency is,
	(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)
34.	Which one of the following will NOT undergo oxidative addition by methyl iodide?
	(1) $[Rh(CO_2)I_2]$ (2) $[\eta^5 - CpRh(CO)_2]$
	(3) $[Ir(PPh_3)_2(CO)C\ell]$ (4) $[\eta^5 - Cp_2Ti(Me)C\ell]$
35.	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



Question No.	Questions
36.	In 'carbon-dating' application of radioisotopes, 14C emits
	(1) Positron (2) y particle
×	(3) β particle (4) α particle
37.	The product of the reaction of propene, CO and H ₂ in the presence of Co ₂ (CO) ₈ as catalyst is
36	(1) butanoic acid (2) butanal
le le	(3) 2-butanone (4) methylpropanoate
38.	Reductive elimination step in hydrogenation of alkenes by Wilkinson catalyst results in (neglecting solvent in coordination sphere of Rh)
	(1) T-shaped $[Rh(PPh_3)_2 CI]$ (2) Trigonal-planar $[Rh(PPh_3)_2 C\ell]$
*	(3) T-shaped [Rh(H)(PPh ₃) ₂] (4) Trigonal-planar [Rh(H)(PPh ₃) ₂]
39.	The correct statement with respect to the bonding of the ligands, Mc ₃ N and Mc ₃ P 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
a .	'(2) the ligands bind equally strong with both the metal ions as both the ligands are pyramidal
	(3) the binding is stronger for Me ₃ N with Be ²⁺ and Me ₃ P with Pd ²⁺
	(4) the binding is stronger for Me ₃ N with Pd ²⁺ and Me ₃ P with Be ²⁺
40.	In the iodometric titration of sodium thiosulfate $(Na_2S_2O_3)$ with acidic dichromate solution, 25 mL of 0.1 M dichromate requires 50 mL of 'x' M thiosulfate. The value of 'x' is
ra I	(1) 0.6 (2) 0.3

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Question	Questions
No.	Linnario excess?
	What is meant by a reaction going in 94% enantiomeric excess?
41.	Just confolis 24/0 of one
	L ==== = + + + + + + + + + + + + + +
	(2) The product contains an enantiomer which is of the products (3) The product contains 94% of one enantiomer and 6% of the products
	 (3) The product contains 94% of one enantiomer and 3% of other (4) The product contains 97% of one enantiomer and 3% of other
4	enantiomer and by sodium
	Which of the following functional group is not reduced by sodium
42.	borohydride (NaBH ₄)
	(2) -C-Cl
ł	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
80	(4) _C_OH
£2	(3) -C-H (4) -C-OH
10	0
45	The given reaction is the example of:
43.	/ \
	$\pi + = \rightarrow \langle \rangle$
•	(1) 2+4 cycloaddition
	(2) 2+2 cycloaddition
	(3) 2+2+2 cycloaddition
	(4) 2S + 2S cycloaddition
	A photo chemical reaction is:
44.	(2) Initiated by ingite
8	(1) catalysed by light (2) used to convert hear
	emission of light energy into light
45.	Which of the following solvents is unacceptable on large scale?
30.	(1) Dimethoxy ethane (2) Xylene
	(3) Diethyl ether (4) Heptane
85 PG	(0) 2220329

Question No.	Questions
46.	For the reaction given below, which reaction condition are not suitable?
	O
W.	$\bigcup \longrightarrow \bigcup$
	(1) $LiA\ell H_4/\epsilon t_2O$ (2) $H_2NNH_2/NaOH$
	(3) $\operatorname{Zn}(\operatorname{Hg})/\operatorname{HC}\ell$ (4) $\operatorname{HSCH_2CH_2CH_2CH_2SH}/\operatorname{H^+}, \operatorname{H_2}/\operatorname{Ni}$
47.	Which of the following statements is <u>not</u> correct?
¥1 (#	(1) The molecule to be synthesised is a target molecule
	(2) Synthetic equivalent is a real chemical compound resulting from disconnection
9	(3) Regioselective reaction does not produce one of several possible structural isomers
15	(4) Synthon is an idealised fragment (usually cation or anion) resulting from a disconnection.
48.	How many oxygen atoms lined up in a row would fit in a one nanomaterial space?
¥2 22	(1) Seventy (2) One
	(3) Seven (4) None
49.	The role of catalyst in chemical reaction is
15	(1) Lowers the activation energy
	(2) Alters the amount of products
	(3) Increases ΔH of Forward reaction
	(4) Decreases of ΔH of Forward reaction
50.	Secondary pollutant is
İ	(1) SO ₂ (2) CO
1923	(3) PAN (4) Aerosol
51.	The normality of 2.3 M H ₂ SO ₄ solution is
	(1) 2.3 N (2) 4.6 N
	(3) 6.9 N (4) 7.9 N



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Question No.	Questions
52.	Crystal cannot posses
# # # # # # # # # # # # # # # # # # #	(1) 1 fold axis of symmetry
	(2) 3 fold axis of symmetry
	(3) 5 fold axis of symmetry
	(4) 6 fold axis of symmetry
53.	Number of sigma bonds in P ₄ O ₁₀ is
	(1) 6 (2) 7
	(3) 17 (4) 16
54.	2 mol of an ideal gas at 27°C is expanded reversibly from 2 lit. To 20 lit. Find entropy change ($R = 2 \text{ cal / mol K}$)
	(1) 92.1
	(2) 0
-	(3) 4
	(4) 9.2
55.	An adiabatic process is
	(1) isoenthalpic
	(2) isoentropic
**	(3) isochoric
	(4) isobaric

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Question No.	-	Questions		28
56.	reaction	e following observations were	made for	the
	$A \longrightarrow Products$ Time	[A]	i n	68
	(From the start)		e e	¥
	2 minutes 5 minutes	5*10 ⁻³	* 1	50
	8 minutes	4*10 ⁻³ 3*10 ⁻³	Nail	
	11 minutes	2*10 ⁻³	394	
	The order of the reaction is (1) 1	(2) 2	, ב	
	(3) 3	(4) Zero	5	
57.	How many stereoisomers does	s have 2, 3-dichloropentane?		
	(3) 3	(4) 5	<u> </u>	
58.	Which statement about benze (1) The C_s ring is planar	ne is incorrect?		
	 (2) The C-Cπ-bonding is delegated (3) The reactivity of the benz double bond. 	ocalised. zene reflects the presence of car	bon-carb	on
	(4) Each C atom is sp ² hybrid	lized.		

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Question No.	Questions		
59.	Which of the following is not a Huckel (4n + 2) aromatic system?		
1960	(1) [18]—Annulene ($C_{18}H_{18}$) (2) Cyclooctatetraene (C_8H_8)		
	(3) Benzene (C ₆ H ₆) (4) Cyclopentadienyl anion (C ₅ H ₅ ⁻)		
	Çℓ		
60.	The IUPAC name of Br is:		
	(1) 1-bromo-3-chlorocyclohexene		
N	(2) 2-bromo-6-chlorocyclohex-1-ene		
	(3) 6-bromo-2-chlorocyclohexene		
	(4) 3-bromo-1-chlorocyclohexene		
61.	Heating 1, 4-dicarbonyl compounds in the presence of phosphorus pentoxide (P_2O_5) gives		
	(1) Pyrrole (2) Furan		
**************************************	(3) Thiophene (4) Quinoline		
62.	The Acetylation of thiophene occurs at:		
· I	(1) C_3 -position (2) C_4 -position		
	(3) C_2 -position (4) both at C_2 and C_4 -positions		
63.	Pyridine is basic in nature having		
•	(1) $pKa = 5.21$ (2) $pKa = -0.27$		
	(3) $pKa = 5.81$ (4) $pKa = -0.35$		
64.	Least stable carbocation among the following is		
94 (0%)	(1) $(CH_3)_3C^+$ (2) $(CH_3)_2CH^+$ (3) $CH_3CH_2^+$ (4) CH_3^+		
	(3) CH ₃ CH ₂ ⁺ (4) CH ₃ ⁺		

Question No.	Questions
65.	Due to the presence of an unpaired electron, free radicals are
	(1) Anions (2) Cations
	(3) Chemically reactive (4) Chemically inreactive
66.	Benzoyl peroxide undergoes hamolytic cleavage to produce
4	(1) Phenyl radical (2) Methyl radical
	(3) Phenyl chloride (4) Methyl chloride
67.	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
68.	Which of the following is NOT polar protic solvent?
	(1) H ₂ O (2) C ₂ H ₅ OH
	(3) Fumaric acid (4) Acetone
69.	A new carbon-carbon bond formation is possible in
	(1) Clemmensen reduction (2) Wurtz reduction
	(3) Friedel-Craft alkylation (4) Oppenauer oxidation
70.	Give the name of reaction given below: $CH_{+} CH_{-} CH$
	(1) Perkin reaction (2) Pechmann condensation (3) Benzoin condensation (4) Claisen-Schmidt reaction

Question No.	Questions	
71,	For a potentiometric titration in the curve of emf (E) v/s volume (V) of he titrant added, the equivalence point is indicated by	
	(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$	
72.	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).	
	(1) 0 (2) b√c	
	(3) $2b\sqrt{c}$ (4) $4b\sqrt{c}$	
73.	The energy levels of the harmonic oscillator (neglecting zero point energy) are $\varepsilon_v = nhv$ for $n = 0, 1, 2 \dots$ Assuming $hv = k_B T/3$; the partition function is	
1	(1) $e^{1/3} (e^{1/3} - 1)$	
	(3) $1/3e$ (4) $3e/(3e^3-1)$	
74.	The ground state of hydrogen atom is -13.598 eV. The exception values of kinetic energy <t> and potential energy, <v>, in units of eV, are</v></t>	
	(1) $=13.598$, $=-27.196$ (2) $=-27.196$, $=13.598$	
	(3) $=-6.799$, $=-6.799$ (4) $=6.799$, $=-20.397$	
75.	The correct expression for the product $((M_n).(M_w))$ [where M_n and M_w are the number average and weight average molar masses, respectively, of a polymer] is	
.	(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) $N/\sum_{i} N_{i} M_{i}^{2}$	
<u></u>		



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(8) 25³ (ħ) 524 (1) (2) 521 ΣP_{3} Constant). The degeneracy of the state will be -The energy of a hydrogen atom in a state is $(-hcR_H/25)$, where $R_H = Rydberg$.67 (4) Hydrolysis of sucrose in presence of dilute hydrochloric acid (3) Manufacture of sulphuric acid by Contact process (2) Manufacture of ammonia by Haber's process (I) Hydrogenation of oil Which one of the following is an example for homogenous catalysis? ,87 Coagulation value Gold number (b) Critical miscelle concentration (2) Oxidation number The protecting power of lyophilic colloidal sol is expressed in terms of LL Z. (4) (8) (2) (1) Z . . B C Codes. 19 Ionisation potential of He+ D. V9 4.48 -4 Kinetic energy of II excited state of He+ C. .8 L 81-01 * 88.8 Potential energy of Ist orbit of H-atom B. V9 2.72 -Energy of the ground state of He+ v9 \$0.8 -I-nmuloD Column-2 Match the following columns: .97 No. Guestion Questions

Question No.	Questions
80.	The value of the commutator [x, p ² _x] is
	(1) $2i$ (2) $2ihp_x$
lį.	(3) $2ixp_x$ (4) $h i p_x/\pi$
81.	The room temperature magnetic moment (μ_{eff} in BM) for a monomer Cu(II) complex is greater than 1.73. This may be explained using the expression
	(1) $\mu_{\text{eff}} = \mu_{\text{e}} (1 - \alpha \lambda / \Delta)$ (2) $\mu_{\text{eff}} = [\mathbf{n} (\mathbf{n} + 2)]^{1/2}$
	(3) $\mu_{\text{eff}} = [4s(s+1) + L(L+1)]^{16}$ (4) $\mu_{\text{eff}} = g[J(J+1)]^{16}$
82.	The numbers of P-S and P-P bonds in the compound P ₄ S ₃ are, respectively
	(1) 3 and 6 (2) 4 and 3
	(3) 6 and 3 (4) 6 and 2
83.	In the absence of bound globin chain, heme group on exposure to O_2 gives the iron-oxgen species
1	(1) Fe(III) -O- Fe(III) (2) Fe(III) -O-O-
	(3) Fe(III) -O-O- Fe(III) (4) Fe(IV) -O-
	The complex $[Cr(bipyridyl)_3]^{2+}$, shows a red phosphorescence due to transition
	(1) ${}^{4}\Gamma_{1g} \leftarrow {}^{4}A_{2g}$ (2) ${}^{2}E_{g} \leftarrow {}^{4}A_{2g}$
	(3) ${}^{4}\Gamma_{2g} \leftarrow {}^{4}A_{2g}$ (4) ${}^{4}A_{2g} \leftarrow {}^{2}E_{g}$
85.	Consider the following reactions in N ₂ O ₄
i	. $NOC\ell + Sn$ ii. $NOC\ell + AgNO_3$
i	ii. $NOC\ell + BrF_3$ iv. $NOC\ell + SbC\ell_5$
1	Reactions which will give [NO]+ as a major product are :
	1) i and ii (2) iii and iv
(3) i and iv (4) ii and iv

⊋uestian No.	Questions			
86.	The number of 3c–2e bonds present in $A\ell(BH_4)_3$ is			
	(1) four (2) three			
20	(3) six (4) zero			
87.	The role of copper salt as co-catalyst in Wacker process is			
	(1) Oxidation of Pd(0) by Cu(II) (2) Oxidation of Pd(0) by Cu(I)			
	(3) Oxidation of Pd(II) by Cu(I) (4) Oxidation of Pd(II) by Cu(II			
88.	For the oxidation state/s of sulphur atoms in S_2O , consider the following			
	i) -2 and +4 ii) 0 and +2			
	iii) $+4$ and 0 iv) $+2$ and $+2$			
***************************************	The correct answer is/are			
	(1) i and ii (2) i and iii			
	(3) ii and iv (4) iii and iv			
89.	The geometries of $[C\ell F_4]^+$ and $[IF_4]^-$ respectively are			
	(1) Tetrahedral and tetrahedral			
	(2) Tetrahedral and trigonal bipyramidal			
	(3) Tetrahedral and Square planar			
	(4) Tetrahedral and Octahedral			
90.	Among the complexes (i) $K_4[(Cr(CN)_6], (ii) K_4[(Fe(CN)_6], (iii) K_5[(Co(CN)_6], (iv) K_4[(Mn(CN)_6], Jahn Teller distortion is expected in$			
	(1) i, ii and iii (2) ii, iii and iv			
	(3) i and iv (4) ii and iii			

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Question No.	Questions
91	Which one of the following high spin complexes has the largest CSFE Crystal field stabilization energy
	(1) $[Cr(H_2O)_6]^{2+}$ (2) $[Mn(H_2O)_6]^{2+}$
	(3) $[Fe(H_2O)_6]^{2+}$ (4) $[Co(H_2O)_6]^{2+}$
92.	The number of 3c, 2e BHB and B-B bonds present in B_4H_{10} respectively are
to it	(1) 2, 4 (2) 3, 2
	(3) 4, 1 (4) 4, 0
93.	The most unstable species among the following is
	(1) $Ti(C_2H_5)_4$ (2) $Ti(CH_2Ph)_4$
# T)	(3) $Pb(CH_3)_4$ (4) $Pb(C_2H_5)_4$
94.	The acid catalyzed hydrolysis of trans-[Co(en) ₂ AX) ⁿ⁺ can give cis-product also due to the formation of
ði.	(1) Square pyramidal intermediate
<u>u</u>	(2) Trigonal bipyramidal intermediate
	(3) Pentagonal bipyramidal intermediate
	(4) Face capped octahedral intermediate
95.	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

Question	Questions
No.	
96.	The number of faces, vertices and edges in IF, polyhedron are, respectively
	(1) 15, 7 and 15 (2) 10, 7 and 15
	(3) 10, 8 and 12 (4) 12, 6 and 9
97.	The light pink colour of $[Co(H_2O)_6]^{2+}$ and the deep blue colour of $[CoC\ell_4]^{-2}$ are due to
1	(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
98.	In $[Mo_2(S_2)_6]^{2-}$ 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
99.	The number of possible isomers of [Ru(PPh ₃) ₂ (acac) ₂] (acac = acetylacetonate) is
n .	(1) 2 (2) 5
	(3) 4 (4) 3
100.	Which ones among CO ₃ ²⁻ , XeO ₃ , SO ₃ , PO ₃ ³⁻ and NO ₃ ⁻ have planar structure?
	(1) CO ₃ ²⁻ , PO ₃ ³⁻ and XeO ₃ (2) CO ₃ ²⁻ , XeO ₃ and NO ₃ ⁻
	(3) SO ₃ , PO ₃ ³ - and NO ₃ ⁻ (4) CO ₃ ² -, SO ₃ and NO ₃ ⁻

(20)