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

Code

Sr. No. _____10012.

SET-"X"

Time: 1¼ Hours Total Questions: 100 Max. Marks: 100

Roll No. _______ (in figure) ________ (in words)

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Question No.	Questions
1.	The molecule $(OC)_{\delta}M = CPh(OCH_{\delta})$ obeys 18 electron rule. The two 'M' satisfying the condition are
	(1) Cr, Re ⁺ (2) Mo, V
	(3) V, Re ⁺ (4) Cr, V
2.	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
F8	(3) 20 (4) 36
3.	Complexes of general formula, fac- $[Mo(CO)_3 \text{ (phosphine)}_3]$ 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)
200	Which one of the following will NOT undergo oxidative addition by methyl iodide ?
	(1) $[Rh(CO_2)I_2]$ (2) $[\eta^5-CpRh(CO)_2]$
1	[3) $[Ir(PPh_3)_2(CO)C\ell]$ (4) $[\eta^5 - Cp_2Ti(Me)C\ell]$

(1)

Question No.	Questions
5.	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
6. .	In 'carbon-dating' application of radioisotopes, 14C emits
	(1) Positron (2) y particle
	(3) β particle (4) α particle
7.	The product of the reaction of propene, CO and H ₂ in the presence of Co ₂ (CO) ₈ as catalyst is
	(1) butanoic acid (2) butanal
-	(3) 2-butanone (4) methylpropanoate
8.	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 Cℓ]
4	(3) T-shaped [Rh(H)(PPh ₃) ₂] (4) Trigonal-planar [Rh(H)(PPh ₃) ₂]
9.	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,
	 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 th ligands are pyramidal
Ø	(3) the binding is stronger for Me ₃ N with Be ²⁺ and Me ₃ P with Pd ²⁺
8	(4) the binding is stronger for Me ₃ N with Pd ²⁺ and Me ₃ P with Be ²⁺

(2)



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•	Question No.	Questions			
	10.	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			
- 23		(1) 0.6 (2) 0.3			
		(3) 0.1 (4) 0.4			
	11.	 What is meant by a reaction going in 94% enantiomeric excess? (1) The product contains 94% of one enantiomer and 6% of other enantiomer (2) The product contains an enantiomer which is 94% pure (3) The product contains 94% of one enantiomer and 6% of the products 			
		(4) The product contains 97% of one enantiomer and 3% of other enantiomer			
	12.	Which of the following functional group is not reduced by sodium borohydride (NaBH ₄) (1) C=0 (2) -C-Cl			
		(3) -C-H (4) -C-OH 0			
Ī	13.	The given reaction is the example of:			
	8	$/\!\!/ \mathbb{N} + = \rightarrow \bigcirc \bigcirc$ (1) $2 + 4$ cycloaddition (2) $2 + 2$ cycloaddition (3) $2 + 2 + 2$ cycloaddition (4) $2S + 2S$ cycloaddition			
	14.	A photo chemical reaction is:			
		(1) catalysed by light (2) Initiated by light (3) accompanied with the emission of light (4) used to convert heat energy into light			
_					

(8)

Question			VM. And Andrews
No.		Ques	tions
15.	. Which of the following column	1.1	
	Which of the following solven (1) Dimethoxy ethane		
	(3) Diethyl ether	(2)	Xylene
16.		(4)	Heptane
10,	For the reaction given below,	which	reaction condition are not suitable?
	II .	-	W .
	$\bigcap \longrightarrow \bigcap$		
	(1) LiAlH ₄ /et ₂ O	(9)	II NI NIII / NI OTT
5	(3) Zn (Hg) / HCl	(2) (4)	H ₂ N NH ₂ / NaOH
17.	Which of the following statem		HSCH ₂ CH ₂ CH ₂ SH 'H ⁺ , H ₂ /Ni
1000.000	(1) The molecule to be synth	cents is	not correct?
İ	C C C C C C C C C C C C C C C C C C C	esised	is a target molecule
20.	disconnection	a rear	chemical compound resulting from
	(3) Regioselective reaction	does n	ot produce one of several possible
**	structural isomers		
MES	(4) Synthon is an idealised fifteen a disconnection.	ragme	nt (usually cation or anion) resulting
18.			
	How many oxygen atoms lined	min in	1170
10.	space?	up III.	a row would fit in a one nanomaterial
10.	space :	****	
10.	(1) Seventy	(2)	One
	(1) Seventy (3) Seven	(2) (4)	One None
19.	(1) Seventy (3) Seven The role of catalyst in chemica	(2) (4) al reac	One None
	(1) Seventy (3) Seven The role of catalyst in chemical (1) Lowers the activation energy	(2) (4) al reactergy	One None
	(1) Seventy (3) Seven The role of catalyst in chemical (1) Lowers the activation end (2) Alters the amount of productions	(2) (4) al reactergy ducts	One None tion is
	 (1) Seventy (3) Seven The role of catalyst in chemical (1) Lowers the activation ene (2) Alters the amount of process (3) Increases ΔH of Forward 	(2) (4) al reaction ergy ducts reaction	One None tion is
19.	 (1) Seventy (3) Seven The role of catalyst in chemical (1) Lowers the activation energy (2) Alters the amount of process (3) Increases ΔH of Forward (4) Decreases of ΔH of Forward 	(2) (4) al reaction ergy ducts reaction	One None tion is
	 (1) Seventy (3) Seven The role of catalyst in chemical (1) Lowers the activation ene (2) Alters the amount of process (3) Increases ΔH of Forward (4) Decreases of ΔH of Forward Secondary pollutant is 	(2) (4) al reaction ergy ducts reaction	One None tion is
19.	 (1) Seventy (3) Seven The role of catalyst in chemical (1) Lowers the activation energy (2) Alters the amount of process (3) Increases ΔH of Forward (4) Decreases of ΔH of Forward 	(2) (4) al reaction ergy ducts reaction	One None tion is

(4)

Question No.	Questions
21.	Which of the following is a correct name for the following compound?
/	$\frac{C\ell}{H_3C}C = C < \frac{CH_2CH_3}{I}$
	(I) 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
22.	Keto-enol tautomerism is observed in :
o .	O O O O O (1) $C_6H_5-C-CH_2-C-CH_3$ (2) $C_6H_5-C-C_6H_5$
	O O O II (3) CH,CH,C-OH (4) C,H,-C-H
23.	Which of the following gases is mainly responsible for acid rain?
	(1) NO ₂ and CO ₂ (2) CO ₂ and SO ₂
	(3) SO ₂ and NO ₂ (4) None of these
24.	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
	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.			Ques	tions
26.	The as	proteins in which pros	thetic	group is carbohydrate are known
	(1)	Lipo-protein	(2)	Mucoprotein
	(3)	Chromoprotein	(4)	Nucleoprotein
27.	1000	tch the List I and List II en below:	and se	elect the correct answer using codes
		List I	Lis	t II
	1	Nerol	Α	Lemon grass oil
20	2	Citral	В	Geraniol
	3	Pinol	C	Amyrin
nd.	4	Lupeol	D	α-pinene
	Ċor	rect answer is :		20
	(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
28.	Hyd	rolysis product of sucrose	is:	
100		Fructose	(2)	Glucose + Galactose
15 ²⁶	(3)	Glucose	(4)	Glucose + Fructose
29.		mass spectrum of primar an Intense peak at $m/z = 0$		des shows a moderate molecular ion
20,00		Loss of an alkyl radical		Loss of HCN
	(3)	Loss of CO	(4)	Loss of methyl radical
30.	Whi	ch one of the following is b	acteri	ostatic drug?
/	(1)	Chloramphenicol		± 1.25
	(2)	Penicillin		
	(3)	Streptomycin	200/07	0
	(4)	Phenacetin	92	

Question No.	Questions
31.	The number of the lines in the ESR spectrum of CD_3 is (the spin of D is 1)
/	(1) 1 (2) 3
1	
	(3) 4 (4) 7
32.	Colligative properties are used for the determination of
	(1) molar mass
	(2) equivalent weight
100	(3) arrangement of molecules
	(4) melting and boiling point
33.	Which of the following does not contain a C, axis?
	(1) POCl ₃ (2) NH ₄ ⁺
	(3) H ₃ O ⁺ (4) ClF ₃
34.	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
35.	Which pairing of molecule and point group is correct?
	(1) $\mathrm{BC}\ell_3$, C_{3v} (2) $\mathrm{SiC}\ell_4$, D_{4h}
23	(3) H_2S , C_{2v} (4) SF_4 , C_{4v}
36.	The symmetric stretching mode of the SiF, molecule:
	(1) IR active
	(2) IR inactive
	(3) generates a change in molecular dipole moment
5	(4) gives rise to a strong absorption in IR spectrum

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Question No.	Questions							
37.	Ma	tch the fo	llowin	g colum	ns:	- 15 0 M/S		
	LIS	ST-1				LIST-2	6	
	1.	Sol			Α,	Liquid disp	ersed in solid	£ ²⁰
	2.	Gel		87	В.	gas disperse	ed in liquid	#
* •	3.	Emulsio	on	2	C.	•	sed in liquid	*.
*	4.	Foam			D.	8930	rsed in liquid	
3	Coc	les ·						
FIT 20	(1)	1-A	2-B	3-C	4-D ·	15	20	
	(2)	1-B	2-C	3-D	4-A		20	
	(3)	1-C	2-A	3-D	4–B	× 17	*	
	(4)	1-B	2-D	3-A	4-C		D 8	• 4
38.	Ab	eat engi	ne ope	rates b	etween t	ne boiling poi	nt of water a	nd a room
38.	tem	eat enginerature wed to be	of 25°	C. The	efficienc	y of the engir	nt of water as ne is largest, i	nd a room if water is
38.	tem allo	perature wed to be	of 25° oil at a	C. The	efficience re of (2)	y of the engir	ie is largest, i	nd a room if water is
38.	tem allo (1) (3)	perature wed to be 1 atm.	of 25°	°C. The pressu	efficience re of (2)	y of the engir	ie is largest, i	nd a room if water is
	tem allo (1) (3)	perature wed to be 1 atm. 25 atms	of 25° oil at a Orlon	C. The pressu	efficience re of (2)	y of the engir 10 atms 1.01 * 10 ⁶ N	ie is largest, i	nd a room if water is
	tem allo (1) (3) Mor	perature wed to be 1 atm. 25 atms iomer of	of 25° oil at a Orlon H–OC	C. The pressuis	efficience re of (2) (4)	y of the enging 10 atms $1.01 * 10^6 \text{ N}$ $\text{CF}_2 = \text{CF}_2$	ie is largest, i	nd a room if water is
	(1) (3) Mor (1) (3)	perature wed to be 1 atm. 25 atms iomer of $CH_2 = C$ $CH_2 = C$	of 25° oil at a Orlon H–OC	C. The pressu is H ₃	efficience re of (2) (4) (4)	y of the enging 10 atms $1.01 * 10^6 \text{ N}$ $\text{CF}_2 = \text{CF}_2$	ie is largest, i	nd a room if water is
39.	(1) (3) Mor (1) (3)	perature wed to be 1 atm. 25 atms iomer of $CH_2 = C$ $CH_2 = C$	of 25° oil at a Orlon H–OC is obta	C. The pressu is H ₃	efficience re of (2) (4) (4)	y of the enging $10 \mathrm{atms}$ $1.01 * 10^6 \mathrm{N}$ $\mathrm{CF_2} = \mathrm{CF_2}$ $\mathrm{CH_2} = \mathrm{CH}$ ition of $\mathrm{HC}\ell$ to	ie is largest, i	nd a room if water is
39.	tem allo (1) (3) Mor (1) (3)	perature wed to be 1 atm. 25 atms $CH_2 = C$ $CH_2 = C$ oroprene	of 25° oil at a Orlon H-OC is obta	is H ₃	efficience re of (2) (4) (2) y the add	y of the enging 10 atms $1.01*10^6$ N $CF_2 = CF_2$ $CH_2 = CH$ ition of $HC\ell$ to acetylene	ie is largest, i	nd a room if water is

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PHY SHAP



Question No.	Questions
41.	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 be:
	(1) $0.4 \Delta_0$, 4.90 BM and $2.4 \Delta_0$, 0.00 BM
	(2) $2.4 \Delta_0$, 2.90BM and $0.4 \Delta_0$, 1.77BM
¥ e	(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
42.	[Ni ^{II} L_6] ^{n+or n-} show absorption bands at 8500, 15400 and 26000 cm ⁻¹ whereas [Ni ^{II} L_6] ^{n+or n-} at 10750, 17500 and 28200 cm ⁻¹ , L and L' are respectively
	(1) OH^- and N_3^- (2) $C\ell^-$ and I^-
	(3) NCS- and RCOO- (4) H ₂ O and NH ₃
43.	The rate of exchange of $\mathrm{OH_2}$ present in the coordination sphere by $^{18}\mathrm{OH_2}$ of
ħ	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) $i(x) > i(x) > i(i) > i(i$
	(3) $ii) > iii) > iv) > i) (4) iii) > iv) > ii)$
44.	On addition of an inert gas at constant volume to the reaction
	$N_2 + 3H_2 \rightleftharpoons 2NH_3$ at equilibrium
	(1) The reaction remains unaffected
	(2) Forward reaction is favoured
ľ	(3) The reaction halts
	(4) Backward reaction is favoured

(9)

Question No.	Questions			
45.	The transition zone for Raman spectra is			
3.	(1) Between vibrational and rotational levels			
	(2) Between electronic levels			
	(3) Between magnetic levels of nuclei			
421	(4) Between magnetic levels of unpaired electrons			
46.	Polarisation of the electron cloud by the cation forms			
	(1) Ionic bond (2) Covalent bond			
8 . .0	(3) Coordinate bond (4) Metallic bond			
47.	Activation energy of a chemical reaction can be determined by			
	(1) determining the rate constant at standard temperature			
(31.5)	(2) determining the rate constants at two temperatures			
	(3) determining probability of collision			
,	(4) using catalyst			
48.	Due to Frenkel defect, the density of the ionic solids			
	(1) increases (2) decreases			
	(3) does not change (4) none of the above			
49.	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	(1) AB ₂ C (2) A ₂ BC			
	(3) AB ₃ C (4) ABC ₃			

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Question No.	Questions
50.	Which of the following thermodynamic function is called as the arrow of "time"
٠	(1) Enthalpy (2) Gibbs free energy
	(3) Entropy (4) Helmholtz free energy
51.	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
*	(1) $\mu_{\text{eff}} = \mu_s (1 - \alpha \lambda / \Delta)$ (2) $\mu_{\text{eff}} = [n (n+2)]^{\nu_s}$
•	(3) $\mu_{\text{eff}} = [4s (s+1) + L (L+1)]^{1/2}$ (4) $\mu_{\text{eff}} = g [J (J+1)]^{1/2}$
52.	The numbers of P-S and P-P bonds in the compound P_4S_3 are, respectively,
	(1) 3 and 6 (2) 4 and 3
100	(3) 6 and 3 (4) 6 and 2
53.	In the absence of bound globin chain, heme group on exposure to O_2 gives the iron-oxgen species
	(1) Fe(III) -O-Fe(III) (2) Fe(III) -O-O-
	(3) Fe(III) –O–O–Fe(III) (4) Fe(IV) –O–
54.	The complex [Cr(bipyridyl) ₃] ²⁺ , shows a red phosphorescence due to transition
200	(1) ${}^{4}\mathbf{T}_{1g} \leftarrow {}^{4}\mathbf{A}_{2g}$ (2) ${}^{2}\mathbf{E}_{g} \leftarrow {}^{4}\mathbf{A}_{2g}$ (3) ${}^{4}\mathbf{T}_{2g} \leftarrow {}^{4}\mathbf{A}_{2g}$ (4) ${}^{4}\mathbf{A}_{2g} \leftarrow {}^{2}\mathbf{E}_{g}$
	(1) ${}^{4}T_{1g} \leftarrow {}^{4}A_{2g}$ (2) ${}^{2}E_{g} \leftarrow {}^{4}A_{2g}$ (3) ${}^{4}T_{2g} \leftarrow {}^{4}A_{2g}$ (4) ${}^{4}A_{2g} \leftarrow {}^{2}E_{g}$

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Question No.	Que	stions
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55.	Consider the following reactions in	N_2O_4
	i. NOC ℓ +Sn ii.	NOCl+AgNO ₃
	iii. NOCℓ + BrF ₃ iv.	NOCℓ+SbCℓ 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
56.	The number of 3c=2e bonds present	in $A\ell(BH_4)_3$ is
•	(1) four (2)	three
	(3) six (4)	zero
57.	The role of copper salt as co-catalys	st 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
58.	For the oxidation state/s of sulphur	atoms in S ₂ O, consider the following
.	i) -2 and $+4$ ii)	0 and $+2$
9 8	iii) + 4 and 0 iv)	+ 2 and + 2
	The correct answer is/are	12 Table 12
	(1) i and ii (2)	i and iii
	(3) ii and iv (4)	iii and iv
9.	The geometries of [ClF ₄]* and [IF ₄]-	respectively are
	(1) Tetrahedral and tetrahedral	
	(2) Tetrahedral and trigonal bipyra	midal
	(3) Tetrahedral and Square planar	
		* = =
	(4) Tetrahedral and Octahedral	

(12)



Question No.	Questions				
60.	Among the complexes (i) $K_4[(Cr(CN)_6], (ii) K_4[(Fe(CN)_6], (iii) K_5[(Co(CN)_6], and (iv) K_4[(Mn(CN)_6], Jahn Teller distortion is expected in$				
	(1) i, ii and iii (2) ii, iii and iv				
3723	(3) i and iii				
61.	For a potentiometric titration in the curve of emf (E) v/s volume (V) of the 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$				
62.	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)				
603	(1) 0 (2) b√c				
	$(3) 2b\sqrt{c} \qquad \qquad (4) 4b\sqrt{c}$				
33	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) e (2) $e^{1/3} (e^{1/3} - 1)$				
	(3) $1/3e$ (4) $3e/(3e^3-1)$				
64.	The ground state of hydrogen atom is -13.598 eV. The exception values of kinetic energy $\langle T \rangle$ and potential energy, $\langle V \rangle$, in units of eV, are				
	(1) $<$ T>= 13.598, $<$ V>= -27.196 (2) $<$ T>= -27.196, $<$ V>= 13.598				
	(3) $=-6.799, =-6.799$				

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Question No.	· Questions		
65.	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) $N/\sum_{i} N_{i} M_{i}^{2}$		
66.	Match the following columns:		
	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. $8.68 * 10^{-18} J$		
	D. Ionisation potential of He+ 4. -54.4 ev		
	Codes.		
	A B C D		
	(1) 1 2 3 4		
	(2) 4 3 2 1		
	(3) 4 2 1 3		
, S	(4) 2 8 1 4		
67.	The protecting power of lyophilic colloidal sol is expressed in terms of		
	(1) Critical miscelle concentration (2) Oxidation number		
	(3) Coagulation value (4) Gold number		
68.	Which one of the following is an example for homogenous catalysis?		
TE .	(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		

(14)

Question No.	Questions			
69.	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 -			
	(1) 25^1 (2) 25^2			
	(3) 25^3 (4) 25^4			
70.	The value of the commutator $[x, p_x^2]$ is			
	(1) 2i (2) 2 i h p _x			
	(3) $2ixp_x$ (4) hip_x/π			
71.	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			
72.	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			
73.	Number of sigma bonds in P ₄ O ₁₀ is			
1.	(1) 6 (2) 7			
	(3) 17 (4) 16			
4. 2	2 mol of an ideal gas at 27° C is expanded reversibly from 2 lit. To 20 lit Find entropy change (R = 2 cal / mol K)			
(1) 92.1 (2) 0			
	3) 4 (4) 9.2			

Question	e 1	Questions	
No.		driesmona	
75.	An adiabatic process is		
	(1) isoenthalpic	(2) isoentropic	*
	(3) isochoric	(4) isobaric	
76.	At a certain temperature, the	following observatio	ns were made for the
9 3	reaction	*	E 19 19 1912 - 19
	A> Products	2	
	Time	ra1	e ne
	Time	[A]	
	(From the start)	1	
	2 minutes	5*10-3	H 12
53	5 minutes	4*10-3	
	8 minutes	3*10-3	
	11 minutes	2*10-3	### # 12
	The order of the reaction is		
	(1) 1	(2) 2	
	(3) 3	(4) Zero	
77.	How many stereoisomers does	have 2, 3-dichlorop	entane?
	(1) 2	(2) 4	
	(3) 3	(4) 5	

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Ci				
Question No.	Questions			
7 0	Which statement about benzene is incorrect?			
78.				
12	(1) The C ₆ ring is planar			
12.0	(2) The C-Cπ-bonding is delocalised.			
to the	(3) The reactivity of the benzene reflects the presence of carbon-carbon double bond.			
1 88	(4) Each C atom is sp ² hybridized.			
· 79.	Which of the following is not a Huckel (4n + 2) aromatic system?			
	(1) [18]-Annulene (C ₁₈ H ₁₈) (2) Cyclooctatetraene (C ₈ H ₈)			
39	(3) Benzene (C_5H_6) (4) Cyclopentadienyl anion (C_5H_5)			
	Çl			
80.	The IUPAC name of Br is:			
	(1) 1-bromo-3-chlorocyclohexene			
	(2) 2-bromo-6-chlorocyclohex-1-ene			
1000	(3) 6-bromo-2-chlorocyclohexene			
	(4) 3-bromo-1-chlorocyclohexene			
81.	Which one of the following high spin complexes has the largest CSF Crystal field stabilization energy			
	(1) $[Cr(H_2O)_6]^{2+}$ (2) $[Mn(H_2O)_6]^{2+}$			
11)	(3) $[Fe(H_2O)_6]^{2+}$ (4) $[Co(H_2O)_6]^{2+}$			
82.	The number of 3c, 2e BHB and B-B bonds present in B ₄ H ₁₀ respectively			
<i>92.</i> ,	are			
e) 2	(1) 2, 4 (2) 3, 2			
	(3) 4, 1 (4) 4, 0			

Question No.	Questions				
83,	The most unstable species among the following is				
	(1) $\operatorname{Ti}(C_2H_5)_4$ (2) $\operatorname{Ti}(\operatorname{CH}_2\operatorname{Ph})_4$				
ii ii	(3) Pb(CH ₃) ₄ (4) Pb(C ₂ H ₅) ₄				
84.	The acid catalyzed hydrolysis of trans-[Co(en) ₂ AX) ⁿ⁺ can give cis-product also due to the formation of				
	(1) Square pyramidal intermediate				
- - -	(2) Trigonal bipyramidal intermediate				
28	(3) Pentagonal bipyramidal intermediate				
	(4) Face capped octahedral intermediate				
85.	Total number of lines expected in ^{31}P NMR spectrum of HPF ₂ is (I = $1/2$ for both ^{19}F and ^{31}P)				
293	(1) Six (2) Four				
	(3) Five (4) Three				
86.	The number of faces, vertices and edges in IF, polyhedron are, respectively				
9 X	(1) 15, 7 and 15 (2) 10, 7 and 15				
e e	(3) 10, 8 and 12 (4) 12, 6 and 9				
87.	The light pink colour of $[Co(H_2O)_6]^{2+}$ and the deep blue colour of $[CoC\ell_4]^{-2}$ are due to				
w #	(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				

(18)



Question No.		Questions			
88.	In $[Mo_2(S_2)_6]^{2-}$ cluster the nur number of Mo respectively, as	aber of bridging S atoms and coording	ation		
	(1) 2 and 8	(2) 2 and 6	337		
	(3) 1 and 8	(4) 1 and 6			
89.	The number of possil (acac = acetylacetonate) is	ole isomers of [Ru(PPh ₃) ₂ (ac	eac) ₂]		
	(1) 2	(2) 5			
	(3) 4	(4) 3			
90.	Which ones among CO ₃ ² -, X structure?	eO ₃ , SO ₃ , PO ₃ and NO ₃ have p	lanar		
	(1) CO_3^{2-} , PO_3^{3-} and XeO_3	(2) CO_3^{2-} , XeO_3 and NO_3^{-}			
į	(3) SO ₃ , PO ₃ and NO ₃	(4) CO ₃ ²⁻ , SO ₃ and NO ₃ ⁻			
91.	Heating 1, 4-dicarbonyl conpentoxide (P ₂ O ₅) gives:	pounds in the presence of phospl	norus		
¥3	(1) Pyrrole	(2) Furan	24 8		
	(3) Thiophene	(4) Quinoline	55 10 (1)		
92.	The Acetylation of thiophene occurs at:				
	(1) C ₃ -position	(2) C ₄ -position			
	(3) C ₂ -position	(4) both at C2 and C4-positions	181		
93.	Pyridine is basic in nature hav	ing			
52	(1) $pKa = 5.21$	(2) $pKa = -0.27$			
80	(3) $pKa = 5.81$	(4) $pKa = -0.35$	34		
94.	Least stable carbocation among the following is				
8	(1) (CH ₃) ₃ C ⁺	(2) (CH ₃) ₂ CH ⁺	r .		
	(3) CH ₃ CH ₂ +	(4) CH ₃ ⁺			

(19)

Question No.	Questions			
95.	Due to the presence of an unpaired electron, free radicals are			
	(1) Anions (2) Cations			
* :	(3) Chemically reactive (4) Chemically inreactive	×		
96.	Benzoyl peroxide undergoes hamolytic cleavage to produce			
á:	(1) Phenyl radical (2) Methyl radical	x :		
	(3) Phenyl chloride (4) Methyl chloride	e.		
97.	SN ¹ mechanism for the hydrolysis of an alkyl halide involves the form of intermediate	mation		
36	(1) Free radical (2) Carbanion			
*	(3) Carbocation (4) None of these	es.		
98.	Which of the following is NOT polar protic solvent?			
	(1) H ₂ O (2) C ₂ H ₂ OH			
	(3) Fumaric acid (4) Acetone			
99.	A new carbon-carbon bond formation is possible in			
	(1) Clemmensen reduction (2) Wurtz reduction			
	(3) Friedel-Craft alkylation (4) Oppenauer oxidation	.		
100.	Give the name of reaction given below:			
	o o			
11 (8) (8)				
	(1) Perkin reaction (2) Pechman-	(54) (34)		
12 12	(1) Perkin reaction (2) Pechmann condensation (3) Benzoin condensation (4) Claisen-Schmidt reaction			
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