UNIT-16 d & f BLOCK ELEMENTS

Important Points

Position in	Block
periodic table	
Groups 1 to 2	s-Block
Groups 13 to 18	p-Block
Groups 3 to 12	d-Block
Two horizontal rows at the	f-Block
bottom of the periodic table	

- [^] d-block elements are in periods 4 to 7.
- f-block elements are in periods 6 and 7.

Elements of d-block (Transition metal elements)

- [^] The elements which in their ground state or any one of their oxidation states, d-orbital is incompletely filled are called transition elements.
- ^ Amongst the d-block elements Zn, Cd and Hg do not act as transition elements.
- ^ All the transition elements are metallic elements.
- [^] In the first transition series, atomic radii decrease from Sc to V, while atomic radius remains same in elements Cr to Cu and the atomic radius of Zn is found increasing instead of decreasing.
- [^] Not much difference is observed in first and second ionization enthalpies of two neighbouring transition elements but the value of second ionization enthalpy of Cr and Cu are more than those of their neighbouring elements.
- ^ Most of the ionic and covalent compounds of transition elements are coloured.
- [^] Compounds of transition elements act as catalysts in certain chemical reactions.
- ^ The magnetic moment of transition element compounds,

 $\mu = \sqrt{n (n+2)}$ where μ = magnetic moment. n = number of unpaired element

The unit of magnetic moment is BM (Bohr Magneton)

- [^] The capacity to form complex compounds is much more than other elements because of definite characteristics of transition elements.
- [^] In the formation of crystals of transition metals, the voids are there in which non-metal elements (H, C, N, B) arrange and form interstitial compounds.
- [^] Scientists Hume and Rothery suggested the rules for the alloys and accordingly alloys having useful properties are obtained from transition metal elements.



[^] The compounds of transition element- $KMnO_4$ and $K_2Cr_2O_7$ are very useful in laboratory and in synthesis of organic compounds.

f-Block elements (Innertransition elements)

[^] f-Block elements are divided in to (1) Lanthanide series and (2) Actinide series.

Lanthanide series

- ^ Lanthanide series : In period-6 Ce (Z = 58) to Lu (Z = 71)
- [^] Elements of lanthanide series are called lanthanoids which are shown by symbol Ln.
- ^ All the lanthanoids possess stable oxidation state (+3).
- ^ The general electronic configuration of lanthanoids : $[Xe]4f^{1-14}5d^{0-1}6s^2$
- ^ Amongst lanthanoids, promethium (Pm) is radioactive.

Actinide series

- ^ Actinide series : In perod-7 Th (Z = 90) to Lr (Z = 103).
- ^ Elements of actinide series are called actinoids.
- $\hat{}$ The stable oxidation state in actioids is found to be from (+2) to (+6).
- $\hat{}$ The general electronic configuration of actinoids is : [Rn]5f⁰⁻¹⁴6d⁰⁻²7s²
- ^ All the actinoids are radioactive.

MCQ

1.	Whie	eh groups of eleme	nts are	called d-block ele	ements i	in modern periodic	table	2
	(A)	1 to 2	(B)	3 to 10	(C)	3 to 12	(D)	13 to 18
2.	Whie	ch block elements a	re mo	re electropositive	in mode	ern periodic table ?		
	(A)	S	(B)	р	(C)	d	(D)	f
3.	Whie	ch block elements a	re less	electropositive in	nmoder	n periodic table ?		
	(A)	S	(B)	р	(C)	d	(D)	f
4.	Whie	ch elements transist	betwe	een more electrop	ositive a	ind less electroposi	tive ele	ments?
_	(A)	S	(B)	p	(C)	d	(D)	f
5.	In m	odern periodic tabl	e, by v	which name d-blo	ck elem	ents are known?	4-	
	(A) (D)	More electroposit	ive ele	ments	(C) (D)	Iransition element	ts ma an ta	
6	(D) Whie	ch of the following i	is an el	ectronic configur	(D) ation at '	Th 9	ements	
0.))	ce u onne connigun		111	n	
	(A)	$[\text{Rn}] 5f^{\circ} 6d^2 7s^2$	2		(C)	$[Rn] 5f^2 6d^2 7s^2$	0	
	(B)	$[Rn] 5f^2 6d^2 7s^2$	2		(D)	$[Rn] 5f' 6d^2 7s^6$	C	
7.	By w	hich reason, eleme	ent -Th	is introduce in f-l	block?			
	(A)	According to elect	tronic	configuration	(B)	According to phy	sical p	roperties
	(C)	According to cher	mical p	properties	(D)	According to pract	ctical p	roperties
8.	Whe	n d-block elements	s are co	onsider as d-bloc	k elemei	nts?		
	(A)	d-orbital is fully fi	lled in	ground state.				
	(B)	d-orbital is half fil	led in g	ground state.				
	(\mathbf{C})	d-orbital is fully fi	lled in	alloxidation state	s.	to		
0	(D) Whi	a-of the following	lleu III elemer	only anyone oxid	alion sta	ent?		
).	(A)	Ac Rt	(B)	Ac Re	(C)	Rf La	(D)	Y Rf
10.	Whic	ch of the following i	s gene	ral electron config	guration	of transition element	nts?	1, 11
	(A)	$(n-1) d^{1-9} ns^{1-2}$	C		(B)	(n-1)d 1-10 ns	S ¹⁻²	
	(C)	$(n-1)d^{1-10} ns^1$			(D)	$(n-1)d^{1-9} ns^2$		
11.	Whic	ch of the following i	is an el	ectron configurat	ion of C	r?		
	(A)	$[Ar] 3d^4 4s^2$			(B)	$\left[\mathrm{Ar}\right] 3\mathrm{d}^5 \ 4\mathrm{s}^2$		
	(C)	$[Ar] 3d^5 4s^1$			(D)	$[Ar] 3d^5 3s^1$		
12.	Whic	ch of the following i	s an el	ectron configurati	ion of C	u?		
	(A)	$\left[\mathrm{Ar}\right] \mathrm{3d}^9 \ \mathrm{4s}^2$			(C)	$[Ar] 3d^{10} 3s^{1}$		
	(B)	$\left[\operatorname{Ar}\right] 3d^9 3s^2$			(D)	$[Ar] 3d^{10} 4s^{1}$		
				50	<u>`</u>			
					/			

13.	Whic	ch of the following	does n	ot considered as tra	insitior	element?		
	(A)	Cd	(B)	Pd	(C)	Ag	(D)	Ru
14.	Whic	ch of the following	does n	ot considered as tra	insitior	n element?		
	(A)	Au	(B)	Hg	(C)	La	(D)	Pt
15.	Whic	ch of the following	does n	ot relevant with tran	nsition	elements ?		
	(A)	Melting points of	transit	ion elements are hig	gh.			
	(B)	Some ions of tran	nsition	elements possesses	sparan	nagetic properties.		
	(C)	All transition elen	nents c	lissolves in acid.				
	(D)	Transition element	nts pro	cesses various oxid	ation s	tate.		
16.	Ment	tion correct order of	ofaton	nic radii.				
	(A)	$T_i > M_n > C_0 >$	C _u >	Z _n	(C)	Ti > Mn > Co =	Cu <	Zn
	(B)	Ti < Mn < Co <	<ca<< td=""><td>Zn</td><td>(D)</td><td>Ti > Mn = Ca ></td><td>Co <</td><td>Zn</td></ca<<>	Zn	(D)	Ti > Mn = Ca >	Co <	Zn
17.	Whic	ch of the following	elemen	nts have some atom	ic radii	i?		
	(A)	Mn, Fe, Co, Cu			(B)	Cr, Mn, Fe, Cu		
	(C)	Cr, Mn, Fe, Co			(D)	Mn, Fe, Cu, Ni		
18.	Aton	nic radii of Zn incre	eases i	n 3d transition serie	s beca	use		
	(A)	Positive charge of	fnucle	us increases	(B)	3d orbital is fully f	illed	
	(C)	Shielding effect						
	(D)	Due to repulsion	betwe	een $\bar{e} - \bar{e}$ of 3ϕ -oth	oital an	nd attraeti on betwe	$e^{en} e^{-}$	e deueases
19.	In 3d	series of transition	n eleme	ent atomic radii rem	nains sa	ame from Cr to Cu	becau	se
	(A)	Positive charge o	fnucle	us increases.				
	(B)	Sheilding effect in	ncreas	e for electron of 4s	orbital			
	(C)	3d orbital is fully	filled					
• •	(D)	Expansion of orb	out does	s not occur.				
20.	Whitelemo	ch elements have lo ent ?	w 101115	sation enthalpy as co	ompare	to their neighbour	elemer	nt in first transition
	(A)	Cr, Cu	(B)	Cr, Zn	(C)	Cr, Mn	(D)	Cu, Zu
21.	Ther	mal stability of tran	sition	metal elements dep	ends up	pon which of the fo	llowin	g?
	(A)	Atomic radii			(B)	Magnitude of ioni	sation	enthalpy
	(C)	On electrode pote	ential		(D)	Shielding effect		
22.	Wha	t is colour of aqueo	ous sol	ution of $\left[Ni(H_2 o \right]$	$_{6}$			
	(A)	yellow	(B)	violet	(C)	pink	(D)	green
23.	Wha	t is colour of aque	ous so	lution of – [Co(NH	[₃) ₆] ³⁺			
	(A)	violet	(B)	yellowish orange	(C)	red	(D)	green

(A) Cr^{3+} , Mn^{2+} (B) Co^{2+} , Mn^{3+} (C) Co^{2+} , Mn^{2+} (D) Co^{3+} , Mn^{2+} 25. Which of the following metalion is purple? (A) V^{4+} (B) Ti^{3+} (C) Fe^{3+} (D) Cu^{+} 26. Which of the following metalions is colourless? (A) $Ti^{4+} Cu^{2-+}$ (B) $Ti^{4+} Cu^{4+}$ (C) Cr^{2+} , Cu^{+} (D) T_{1}^{+4} , M_{n}^{+3} 27. Match column-A and B $\overline{1}$ V^{4+} 2. Ti^{3+} 3. Ti^{4+} 4. Mn^{2+} 4. Mn^{2+} (D) T_{1}^{+4} , M_{n}^{+3} 27. Match column-A and B (A) $1 \rightarrow d$ $2 \rightarrow c$ 3. $\rightarrow a$ $4 \rightarrow c$ (B) $1 \rightarrow d$ $2 \rightarrow c$ 3. $\rightarrow a$ $4 \rightarrow c$ (B) $1 \rightarrow d$ $2 \rightarrow c$ 3. $\rightarrow a$ $4 \rightarrow b$ (D) $1 \rightarrow c$ 2. $2 \rightarrow c$ 3. $\rightarrow b$ $4 \rightarrow a$ 28. Match column-A and B. $\overline{1}$ $\overline{NiCl_{2}}$, $6H_{2}O$ 2. Co $(NO_{3})_{2}$, $6H_{2}O$ 3. $FeCl_{3}$ 4. $CuSO_{4}$, $5H_{2}O$ 4. $green$ (B) $1 \rightarrow d$ 2. $2 \rightarrow c$ 3. $\rightarrow b$ $4 \rightarrow a$ (B) $1 \rightarrow d$ 2. $2 \rightarrow c$ 3. $\rightarrow b$ $4 \rightarrow a$	24.	Whi	ch of the followir	ng metal io	ons ha	ve pink colou	ur?				
(C) $\operatorname{Co}^{2^{+}}, \operatorname{Mn}^{2^{+}}$ (D) $\operatorname{Co}^{3^{+}}, \operatorname{Mn}^{2^{+}}$ 25. Which of the following metalion is purple? (A) $\operatorname{V}^{4^{+}}$ (B) $\operatorname{Ti}^{3^{+}}$ (C) $\operatorname{Fe}^{3^{+}}$ (D) Cu^{+} 26. Which of the following metalions is colourless? (A) $\operatorname{Ti}^{4^{+}} \operatorname{Cu}^{2^{-+}}$ (B) $\operatorname{Ti}^{4^{+}} \operatorname{Cu}^{4^{+}}$ (C) $\operatorname{Cr}^{2^{+}}, \operatorname{Cu}^{+}$ (D) $\operatorname{Ti}^{4^{+}}, \operatorname{M_{n}}^{+3}$ 27. Match column-A and B $\begin{array}{c} \hline Column-A & Column-B \\ \hline 1, & V^{4^{+}} & a. & colourless \\ 2, & \operatorname{Ti}^{3^{+}} & b. & pink \\ 3, & \operatorname{Ti}^{4^{+}} & c. & purple \\ 4, & \operatorname{Mn}^{2^{+}} & d. & blue \\ c. & vilot \end{array}$ (A) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow e$ (B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow b$ (C) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow b$ (D) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$ 28. Match column-A and B $\begin{array}{c} \hline Column-A & Column-B \\ \hline 1, & \operatorname{NiCl}_{2}, \operatorname{GH}_{2}O & a. & pink \\ 2, & \operatorname{Co}(\operatorname{NO}_{3})_{2}, \operatorname{GH}_{2}O & b. & colourless \\ 3, & \operatorname{FeCl}_{3} & c. & blue \\ 4, & \operatorname{CuSO}_{4}, \operatorname{SH}_{2}O & d. & green \\ 4, & \operatorname{CuSO}_{4}, \operatorname{SH}_{2}O & d. & green \\ 4, & \operatorname{CuSO}_{4}, \operatorname{SH}_{2}O & d. & green \\ 4, & \operatorname{CuSO}_{4}, \operatorname{SH}_{2}O & d. & green \\ 6, & yellow \\ \hline (A) & 1 \rightarrow e & 2 \rightarrow c & 3 \rightarrow b & 4 \rightarrow a \\ \end{array}$		(A)	Cr ³⁺ , Mn ²⁺				(B)	Co ²⁺ ,	, Mn ³⁺		
25. Which of the following metalion is purple? (A) V^{4+} (B) Ti^{3+} (C) Fe^{3+} (D) Cu^{+} 26. Which of the following metalions is colourless? (A) $Ti^{4+} Cu^{2-+}$ (B) $Ti^{4+} Cu^{+1}$ (C) Cr^{2+}, Cu^{+} (D) T_i^{+4}, M_n^{+3} 27. Match column-A and B $\frac{\hline Column-A}{1. V^{4+}} & a. colourless \\ 2. Ti^{3+} & b. pink \\ 3. Ti^{4+} & c. purple \\ 4. Mn^{2+} & d. blue \\ e. vilot$ (A) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow e$ (B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow b$ (C) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow b$ (D) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$ 28. Match column-A and B. $\frac{\hline Column-A}{1. NiCl_2. \ 6H_2O} & a. pink \\ 2. Co (NO_3)_2. \ 6H_2O & b. colourless \\ 3. FeCl_3 & c. blue \\ 4. CuSO_4. \ 5H_2O & d. green \\ e. yellow \\ \hline (A) 1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$ (B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$		(C)	Co^{2+}, Mn^{2+}				(D)	Co ³⁺ ,	, Mn ²⁺		
(A) V^{4+} (B) Ti^{3+} (C) Fe^{3+} (D) Cu^{+} 26. Which of the following metalions is colourless ? (A) $Ti^{4+} Cu^{2-+}$ (B) $Ti^{4+} Cu^{+1}$ (C) Cr^{2+}, Cu^{+} (D) T_i^{+4}, M_n^{+3} 27. Match column-A and B $\boxed{\begin{array}{ccccccccccccccccccccccccccccccccccc$	25.	Whi	ch of the followin	ig metalic	on is p	urple?					
26. Which of the following metal ions is colourless ? (A) $Ti^{4+} Cu^{2-+}$ (B) $Ti^{4+} Cu^{+1}$ (C) cr^{2+}, Cu^{+} (D) T_i^{+4}, M_n^{+3} 27. Match column-A and B $\boxed{\begin{array}{c cccccccccccccccccccccccccccccccccc$		(A)	V^{4+}	(B)	Ti ³⁺	-	(C)	Fe ³⁺		(D)	Cu^+
(A) $Ti^{4+} Cu^{2-+}$ (B) $Ti^{4+} Cu^{+1}$ (C) cr^{2+}, cu^{+} (D) T_{i}^{+4}, M_{n}^{+3} 27. Match column-A and B $\boxed{\begin{array}{c cccccccccccccccccccccccccccccccccc$	26.	Whi	ch of the followin	ig metal ic	ons is c	colourless?		-			
(C) Cr^{2+}, Cu^+ (D) T_1^{+4}, M_n^{+3} 27. Match column-A and B $\begin{array}{c ccccccccccccccccccccccccccccccccccc$		(A)	$Ti^{4+} Cu^{2-+}$				(B)	Ti ⁴⁺ C	u^{+1}		
27. Match column-A and B $\begin{array}{c c c c c c c c c c c c c c c c c c c $		(C)	Cr^{2+} , Cu^+				(D)	T _i ⁺⁴ , N	A_{n}^{+3}		
Column-AColumn-B1. V^{4+} a.colourless2. Ti^{3+} b.pink3. Ti^{4+} c.purple4. Mn^{2+} d.bluee.vilot(A) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ (B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow e$ (B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow b$ (C) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow b$ (D) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow b$ 28.Match column-A and B.Column-B1.NiCl_2.6H_2Oa.pink2.Co (NO_3)_2.6H_2Ob.colourless3.FeCl_3c.blue4.CuSO_4.5H_2Od.greenc.yellowc.blue(A) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$	27.	Mate	ch column-A and	В							
1. V^{4+} a.colourless2. Ti^{3+} b.pink3. Ti^{4+} c.purple4. Mn^{2+} d.bluee.vilot (A) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow e$ (B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow b$ (C) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow b$ (D) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$ 28. Match column-A and B. Column-A Column-A Column-B 1. NiCl ₂ . $6H_2O$ $a.$ pink $c.$ blue $d.$ pink $c.$ blue $d.$ green $e.$ yellow (A) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$ (B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$			Column	-A		Colu	mn-B				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		1.	V^{4+}		a.	colourless			Ī		
3. Π^{4+} Mn^{2+} c.purple blue e.(A) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow e$ (B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow e$ (B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow b$ (C) $1 \rightarrow d$ $2 \rightarrow e$ $3 \rightarrow a$ $4 \rightarrow b$ (D) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$ 28.Match column-A and B. $\boxed{\begin{array}{c} \hline Column-A \\ 1. \\ NiCl_2 \cdot 6H_2O \\ 2. \\ Co (NO_3)_2 \cdot 6H_2O \\ 3. \\ FeCl_3 \\ 4. \\ CuSO_4 \cdot 5H_2O \\ 6. \\ 9ellow \\ \hline e. \\ yellow \\ \hline e. \\ yello$		2.	Ti ³⁺		b.	pink					
4. Mn^{2+} d.blue vilot(A) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow e$ (B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow b$ (C) $1 \rightarrow d$ $2 \rightarrow e$ $3 \rightarrow a$ $4 \rightarrow b$ (D) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$ 28.Match column-A and B. $1.$ NiCl ₂ . 6H ₂ Oa.pink2.Co (NO ₃) ₂ . 6H ₂ Ob.colourless3.FeCl ₃ c.blue4.CuSO ₄ . 5H ₂ Od.green(A) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$ (B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow e$		3.	Ti ⁴⁺		c.	purple					
(A) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow e$ (B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow b$ (C) $1 \rightarrow d$ $2 \rightarrow e$ $3 \rightarrow a$ $4 \rightarrow b$ (D) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$ 28.Match column-A and B.Column-A1.NiCl ₂ . 6H ₂ O2.Co (NO ₃) ₂ . 6H ₂ O3.FeCl ₃ c.4.CuSO ₄ . 5H ₂ Od.greene.yellow		4.	Mn ²⁺		d.	blue					
(A) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow e$ (B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow b$ (C) $1 \rightarrow d$ $2 \rightarrow e$ $3 \rightarrow a$ $4 \rightarrow b$ (D) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$ 28. Match column-A and B. 28. Match column-A and B. $\frac{Column-A}{1. \text{ NiCl}_2.6\text{H}_2\text{O}} \qquad a. \text{ pink} \\ 2. \text{ Co (NO}_{3)2}.6\text{H}_2\text{O}} \qquad b. \text{ colourless} \\ 3. \text{ FeCl}_3 \qquad c. \text{ blue} \\ 4. \text{ CuSO}_4.5\text{H}_2\text{O} \qquad d. \text{ green} \\ e. \text{ yellow} \\ (A) 1 \rightarrow e \qquad 2 \rightarrow c \qquad 3 \rightarrow b \qquad 4 \rightarrow a \\ (B) 1 \rightarrow d \qquad 2 \rightarrow c \qquad 3 \rightarrow b \qquad 4 \rightarrow e \end{cases}$					e.	vilot					
(B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow a$ $4 \rightarrow b$ (C) $1 \rightarrow d$ $2 \rightarrow e$ $3 \rightarrow a$ $4 \rightarrow b$ (D) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$ 28. Match column-A and B. Column-A Column-B 1. NiCl ₂ . 6H ₂ O a. pink 2. Co (NO ₃) ₂ . 6H ₂ O b. colourless 3. FeCl ₃ c. blue 4. CuSO ₄ . 5H ₂ O d. green e. yellow (A) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$ (B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow e$		(A)	$1 \rightarrow d$	$2 \rightarrow c$		$3 \rightarrow a$	2	$4 \rightarrow e$			
(C) $1 \rightarrow d$ $2 \rightarrow e$ $3 \rightarrow a$ $4 \rightarrow b$ (D) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$ 28. Match column-A and B. $\boxed{\begin{array}{c cccccccccccccccccccccccccccccccccc$		(B)	$1 \rightarrow d$	$2 \rightarrow c$		$3 \rightarrow a$	2	$4 \rightarrow b$			
(D) $1 \rightarrow e$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow a$ 28. Match column-A and B. $\begin{array}{c c c c c c c c c c c c c c c c c c c $		(C)	$1 \rightarrow d$	$2 \rightarrow e$		$3 \rightarrow a$	2	$4 \rightarrow b$			
28. Match column-A and B. $\begin{array}{c c c c c c c c c c c c c c c c c c c $		(D)	$1 \rightarrow e$	$2 \rightarrow c$		$3 \rightarrow b$	2	$4 \rightarrow a$			
Column-AColumn-B1.NiCl_2. $6H_2O$ a.2.Co $(NO_3)_2 . 6H_2O$ b.3.FeCl_3c.4.CuSO_4. $5H_2O$ d.e.yellow	28.	Mate	ch column-A and	B.					_		
1.NiCl ₂ . $6H_2O$ a.pink2.Co (NO ₃) ₂ . $6H_2O$ b.colourless3.FeCl ₃ c.blue4.CuSO ₄ . $5H_2O$ d.greene.yellowyellow			Column	-A		Colu	mn-B				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		1.	$\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$		a.	pink					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		2.	$Co(NO_3)_2$. 61	H ₂ O	b.	colourless					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		3.	FeCl ₃		C.	blue					
$(A) 1 \rightarrow e \qquad 2 \rightarrow c \qquad 3 \rightarrow b \qquad 4 \rightarrow a$ $(B) 1 \rightarrow d \qquad 2 \rightarrow c \qquad 3 \rightarrow b \qquad 4 \rightarrow e$		4.	$CuSO_4 \cdot 5H_2O$		d. e	green					
(B) $1 \rightarrow d$ $2 \rightarrow c$ $3 \rightarrow b$ $4 \rightarrow e$		(A)	$1 \rightarrow e$	$2 \rightarrow c$	0.	$3 \rightarrow h$		$4 \rightarrow a$	J		
		(B)	$1 \rightarrow d$	$2 \rightarrow c$		$3 \rightarrow b$	2	$4 \rightarrow e$			
(C) $1 \rightarrow d$ $2 \rightarrow a$ $3 \rightarrow c$ $4 \rightarrow b$		(C)	$1 \rightarrow d$	$2 \rightarrow a$		$3 \rightarrow c$	2	$4 \rightarrow b$			
(D) $1 \rightarrow d$ $2 \rightarrow a$ $3 \rightarrow e$ $4 \rightarrow c$		(D)	$1 \rightarrow d$	$2 \rightarrow a$		$3 \rightarrow e$	4	$4 \rightarrow c$			
29. Which catalyst is used to prepare SO, from SO, in contact process of production of H-SC	29.	Whi	ch catalyst is use	ed to prep	are S(D, from SO,	in con	tact pro	ocess of pro	oductio	on of H.SO.?
(A) NO (B) V_2O_2 (C) Fe (D) Ni	_, ,	(A)	NO	(B)	V _o O	(C)	Fe	P	(D)	Ni	2.2.2.4
30. Which of the following trantion metal ion has magnetic moment 3.87 BM?	30.	Whi	ch of the followir	ig trantior	$\frac{1}{2}$ meta	l ion has mas	gnetic	momen	nt 3.87 BM 1	?	
(A) Co^{2+} (B) Co^{3+} (C) Fe^{2+} (D) Fe^{3+}		(A)	Co ²⁺	(B)	Co ³⁺	(C)	Fe ²⁺		(D)	Fe ³⁺	
		. /		× /					. /		
						52	<u> </u>				

31.	In wł	hich of the following compo	ound	oftrantion metal ion has 4.90 BM magnetic momentum?							
	(A)	KM_nO_4 (B)	NiCl	l_2 (C) CoCl ₂ (D) FeSO ₄							
32.	Whic comp	ch of the following sentence pounds?	e is no	ot suitable for the capacity of transition metal to form complex							
	(A)	Transition metal ions are s	mall	l in size.							
	(B)	Nuclear charge of trantion	n met	tal ion in comparatively more.							
	(C)	Co-ordination covalent b	ond i	is not directional.							
	(D)	Transition metal ions poss	sesses	es different oxidation states.							
33.	Whie	ch of the following rules to	prepa	are alloys should be obey ?							
	(A)	Difference in atomic radii	shou	uld be less than 15%.							
	(B)	Valence electron configur	ation	n should not be equal.							
	(C)	Atomic volume should no	t sam	ne.							
	(D)	Crystal lattice structure ar	e diff	ferent.							
34.	Wha	t is the difference in atomic	radii	ii of two metallic elements to prepare alloys?							
	(A)	15%		(B) more than 15%							
	(C)	less than 15%		(D) 24.5 %							
35.	Wha	t is the difference of atomi	c radi	ii of Au and Cu in 22 carate gold?							
	(A)	15%		(B) more than 15%							
	(C)	less than 15%		(D) 24.5%							
36.	Mn,	Co, Cu metals are generally	y use	eful to prepare alloys because							
	(A)	(A) the difference in their atomic volume is more than 15%.									
	(B)	the difference in their ator	nic v	volume is less than 2%.							
	(C)	the difference in their ator	nic v	volume is 15%.							
	(D)	the difference in their ator	nic v	volume is 2%.							
37.	Whie	ch alloy is used in preparation	on of	f coins ?							
	(A)	Brass		(B) Bronze							
	(C)	German-Silver		(D) Nichrome							
38.	Whie	ch alloy is used in preparati	on o	of antic - piece ?							
	(A)	Nitinol		(B) Bronze							
	(C)	Cupronickle		(D) German-Silver							
39.	Whic	ch alloy possesses facinatin	gpro	operty of memory ?							
	(A)	Brass		(B) Nitinol							
	(C)	Nichrom		(D) Cupronicle							
40.	Matc	ch column-A and column-E	Bprop	perly.							
		Column-A		Column-B							
	1.	Brass	a.	Ni (60%) Cr (40%)							
	2.	Bronze	b.	Cu (80%) Sn (20%)							
	3.	Cupronicle	c.	Cu (90%) Sn (10%)							
	4.	Nicnrom	d.	Cu (70%) Zn (30%)							



	(A)	$1 \rightarrow d$	$2 \rightarrow c$	$3 \rightarrow e$		$4 \rightarrow a$
	(B)	$1 \rightarrow d$	$2 \rightarrow c$	$3 \rightarrow e$		$4 \rightarrow b$
	(C)	$1 \rightarrow d$	$2 \rightarrow e$	$3 \rightarrow a$		$4 \rightarrow b$
	(D)	$1 \rightarrow e$	$2 \rightarrow c$	$3 \rightarrow a$		$4 \rightarrow d$
41.	Whe	re amalgum alloy	is used?			
	(A)	In electric heate	er		(B)	In space reaserch
	(C)	To make surgic	al appliaces		(D)	In filling tooth cavity
42.	Mate	ch Column-A and	l Column-B pro	operly.		
		Column-	-A			Column-B
	1.	Stainless steel			a.	In reveting
	2.	Bronze			b.	In antic piece
	3.	Nitinol			c.	To make coins
	4.	German silver			d.	To make surgical appliances
					e.	Cu (75-85%) NI (25-15%)
	(A)	$1 \rightarrow e$	$2 \rightarrow d$	$3 \rightarrow b$		$4 \rightarrow c$
	(B)	$1 \rightarrow e$	$2 \rightarrow c$	$3 \rightarrow b$		$4 \rightarrow d$
	(C)	$1 \rightarrow e$	$2 \rightarrow c$	$3 \rightarrow a$		$4 \rightarrow b$
	(D)	$1 \rightarrow e$	$2 \rightarrow c$	$3 \rightarrow a$		$4 \rightarrow d$
43.	Whi	ch of the followin	g proportion of	fconstituent	t is pres	sent in amalgam alloys ?
	(A)	Hg (50%) Ag (35%) Sn (12%	6) Cu (3%)		
	(B)	Hg (50%) Ag (35%) Sn (12%	5) Cu (3%)	Zn (0.2	2%)
	(C)	Hg(50%)Ag(12%) Sn (35%	6) Cu (3%)	Zn (0.2	2%)
	(D)	Hg (50%) Ag (35%) Sn (3%)	Cu (12%)		
44.	FeC	$\operatorname{Cr}_2 \operatorname{O}_4 + \operatorname{Na}_2 \operatorname{CO}_4$	$O_3 + O_2 \rightarrow m$	ention whic	h proc	duct is obtained ts?
	(A)	$Na_2CrO_4 + F$	$e_3O_4 + CO_2$		(B)	$Na_2CrO_4 + Fe_2O_3 + CO_2$
	(C)	$Na_2Cr_2 O_7 +$	$Fe_2O_3 + CO_2$		(D)	$Na_2Cr_2 O_7 + Fe_2O_3 + CO$
45.	Wha	t will be the mole	eratio of reactar	nts in the gr	ven rea	ation ?
	Fe C	$Cr_2 O_4 + Na_2 Co$	$O_3 + O_2 \rightarrow N$	$a_2 CrO_4 +$	$\operatorname{Fe}_2 O$	$0_3 + CO_2$
	(A)	2:4:7	(B) 4:6:6		(C)	4:8:7 (D) 4:8:4
46.	Wha	t will be mole rati	io of product in	the followi	ngequ	ation?
	Fe C	$Cr_2 O_4 + Na_2 Co$	$O_3 + O_2 \rightarrow N$	$[a_2 CrO_4 +$	Fe, O	$0_{3} + CO_{2}$
	(A)	8:2:8	(B) 8:4:8	2 7	(C)	4:4:8 (D) 8:2:6
					、 /	× /

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47. $X + H^+ \rightarrow Y + Na^+ + H_2O$

 $Y + KCl \rightarrow K_2 Cr_2 O_7 + NaCl$

Mention X and Y

- (A) $X = Na_2 Cr_2 O_7$ $Y = Na_2 Cr O_4$
- (B) $X = Na_2 Cr_2 O_7$ $Y = Na_2 Cr_2 O_7$
- (C) $X = Na_2 Cr_2 O_4$ $Y = Na_2 Cr_2 O_7$
- (D) $X = Na_2 Cr_2 O_4$ $Y = Na_2 Cr O_4$
- 48. Fe Cr₂ O₄ + Na₂ CO₃ + O₂ \rightarrow X + Y + CO₂ Mention X and Y
 - (A) $X = Na_2 Cr_2 O_7$ $Y = Fe_3 O_4$
 - (B) $X = Na_2 Cr O_4$ $Y = Fe_3 O_4$
 - (C) $X = Na_2 Cr O_4$ $Y = Fe_2 O_3$
 - (D) $X = Na_2 Cr_2 O_7$ $Y = Fe_2 O_3$
- 49. Where potasium dicromate is used?
 - (A) In leather industry (B) In textile industry
 - (C) As germiside (D) As bleaching agent in cotton cloths.
- 50. What is atomic volume of Au and Cu in 22 carrate gold ornaments?
 - (A) 134 pm 118 pm (B) 133 pm 118 pm
 - (C) 134 pm 117 pm (D) 135 pm 117 pm

51.
$$X + KOH + O_2 \rightarrow Y + H_2O$$

 $Y + H_2SO_4 + Z + K_2SO_4 + MnO_2 + H_2O$ What are X, Y and Z in above reactions ?

- (A) $X = K_2 MnO_4$, $Y = MnO_2$, $Z = KMnO_4$
- (B) $X = K_2 MnO_4$, $Y = MnO_4$, $Z = KMnO_4$
- (C) $X = MnO_2$, $Y = K_2 MnO_4$, $Z = KMnO_4$
- (D) $X = MnO_2$, $Y = KMnO_4$, MnO_4 , $Z = K_2$, MnO_4
- 52. $K_2 \operatorname{MnO}_4 + H_2 \operatorname{SO}_4 \rightarrow \operatorname{KMnO}_4 + K_2 \operatorname{SO}_4 + \operatorname{MnO}_2 + H_2 O$ What will be mole ratio of products in above reaction ? (A) 1:1 (B) 2:1 (C) 1:2 (D) 2:2 53. $K_2 \operatorname{MnO}_4 + H_2 \operatorname{SO}_4 \rightarrow \operatorname{KMnO}_4 + K_2 \operatorname{SO}_4 + \operatorname{MnO}_2 + H_2 O$

51	Data			adaa						
54.	(Λ)	As reducing ager	te is us	ed as	(\mathbf{B})	Ascorrosio	n inhil	vitors		
	(\mathbf{A})	As decolouring agen	n oentin	textile indus	trv	(D)	In preparati	ion of a		mnound
55.	Whie	ch of following is u	sed in	dry cell?	uy	(D)	in propulat	011 01 0		mpound
	(Δ)	KMnO	(B)	MnO	(\mathbf{C})	ĸ	r O	(D)	ĸΝ	<i>I</i> n∩
56	Whi	\mathbf{K}	(D)	v_2	(C) .2	\mathbf{R}_2 C	$1_{2}0_{7}$	(D)	\mathbf{K}_2 is	
50.	(\mathbf{A})	Sodium amalgam	o mi u	entarcavities	• 1	(B)	Zine chloric	le		
	(\mathbf{C})	Mercury				(D)	Mercury A	nalgan	n	
57.	Whi	ch of following is u	sed as	gernlicide			5	U		
	(A)	$K_2 Cr_2 O_7$	(B)	KMnO ₄		(C)	FeSO ₄	(D)	K ₂ N	InO ₄
58.	Whi	ch of following eler	nents a	are include in	Lanth	anoide	series?			
	(A)	Lato Lu	(B)	Ce to Lu		(C)	La to yb	(D)	Ceto	o yb
59.	Whie	ch of general symb	ol is us	sed to represe	ent Lar	thanoi	ides?			
	(A)	Ln	(B)	La		(C)	Le		(D)	Li
60.	Whi	ch of following eler	nents a	are include in	actinic	le?				
	(A)	Th to Lr				(B)	Ac to Lr			
	(C)	Ac to No		~ .	2	(D)	Th to No			
61.	Wha	t is general electroi	nic con	figuration of	fouter	shello	ff-block elen	nents ')	
	(A)	$(n-2)f^{0-14}(n-1)$	d^{0-1} r	$1s^2$		(B)	$(n-2)f^{0-2}$	$^{14}(n -$	$1)d^{1-2}$	ns ²
	(C)	$(n-1)f^{0-14}(n$	-1) d ¹	$^{-2}$ ns ²		(D)	$(n-1)f^{1-1}$	¹⁴ (n -	$-1)d^{0}$	$^{-1}$ ns ¹
62.	Whi	ch of following eler	nent ha	as very close	similar	ity witl	h Lanthanoic	les?		
	(A)	Lr	(B)	Ce		(C)	Lu		(D)	La
63.	Wha	t is electronic conf	iguratio	on of Ce (Z)	= 58)					
	(A)	[Xe] 4f2 5do 6s	2			(B)	[Xe] $4f^1$	$5d^1$	6s ²	
	(C)	$\begin{bmatrix} Xe \end{bmatrix} 5d^2 6s^2$				(D)	[Xe] $4f^2$	$5d^1$	6s ¹	
64.	Whi	ch of following is g	eneral	electronic con	nfigura	tion of	Lanthanoid	es?		
	(A)	$[Xe] 4f^{0-14} 5d^{0-14}$	$1 6s^2$			(B)	$[Xe] 4f^{1-14}$	5d ¹⁻²	$6s^2$	
	(C)	$[Xe] 4f^{1-14} 5d^{0-1}$	$6s^2$			(D)	[Xe] 4f ¹⁻¹⁴	5d ⁰⁻¹ 6	s ¹⁻²	
65.	Whi	ch of following is g	eneral	electronic co	nfigura	tion of	factinides?			
	(A)	$[Ra] 5f^{0-14} 6d^{0-14}$	1 7s ²			(B)	$[Rn] 5f^{1-14}$	$6d^{0-2}$	$7s^2$	
	(C)	$[Rn] 5f^{0-14} 6d^{1-1}$	2 7s ²			(D)	$[Rn] 5f^{0-14}$	$6d^{0-2}$	2 7s ²	

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66.	Basic properties of hydroxides of lanthanoides is											
	(A) greater than $Al(OH)_3$ but less than $Ca(OH)_3$) ₂ .										
	(B) greater than $Ca(OH)_2$ but less than Al (OH)	[) ₃ .										
	(C) greater than $Ca(OH)_2$ and $Al(OH)_3$											
	(D) less than $Ca(OH)_2$ and $Al(OH)_3$											
67.	Lanthanoides elements are separated on the basis	s of the	eir									
	(A) chemical properties	(B)	difference in basicity									
	(C) physical properties	(D)	difference in acidity									
68.	$Ln \xrightarrow{Combusting in 0} X What is x$											
	(A) $\operatorname{Ln}O_3$ (B) Ln_2O	(C)	Ln_2O_3 (D) Ln_2O_3									
69.	Which of following radioactive elements in Lantha	anodie	25.									
	(A) Promethium (Pm)	(B)	Lutetium (Lu)									
	(C) Yetterbium (Yb	(D)	Samarium (Sm)									
70.	Which of following is used in gas lighters?											
	(A) CeO ₂	(B)	Pyrophoric Misch metal									
	(C) Gadolinium sulphate	(D)	Ceric compounds									
71.	Which of following is used as oxidizing agent in volumetric analysis?											
	(A) Ceric compounds (B) CeO ₂											
	(C) Oxides of lanthanoids	(D)	Gadolinium sulphate									
72.	Which of following is used in preparation of optic	/hich of following is used in preparation of optical glass of camera having high refractive index ?										
	(A) ceric compounds	(B)	CeO ₂									
	(C) Oxides of lanthanoids	(D)	Gadolinium sulphate									
73.	Which of following is used to produce very low to	emper	ature by magnetic field ?									
	(A) Pyrophoric misch metal	(B)	Uranium									
74	(C) Ihorium	(D)	Gadolinium sulphate									
/4.	What is the constitution of metals in pyrophoric m (A) $z = 50\%$ $z = 40\%$ $z = 10\%$	nisch n	netal ?									
	(A) $Ce-50\%$, $Ca-40\%$, $Fe-10\%$	(B)	Ce 40%, La 50%, Fe 1%, other 5%									
75	What would be amore order of d arbitrals offertr	(D) hodr	Ce-40%, La-30%, Fe-10%									
13.	what would be emergy order or d-orbitals of tetra $(A) d \sim d \sim d \sim d \sim d$		$d \sim d < d \sim d$									
	(A) $u_{xy} = u_{y_2} = u_{xz} < u_{x^2 - y^2} = u_{z^2}$	(В)	$\mathbf{u}_{\mathbf{x}^2-\mathbf{y}^2} \equiv \mathbf{u}_{\mathbf{z}^2} < \mathbf{u}_{\mathbf{xy}} \equiv \mathbf{u}_{\mathbf{yz}} \equiv \mathbf{u}_{\mathbf{xy}}$									
	(C) $d_{xy} \cong d_{z^2} < d_{yz} \cong d_{xz} \cong d_{x^2-y^2}$	(D)	$\mathbf{d}_{\mathbf{x}^2 - \mathbf{y}^2} \cong \mathbf{d}_{\mathbf{x}\mathbf{z}} < \mathbf{d}_{\mathbf{x}\mathbf{y}} \cong \mathbf{d}_{\mathbf{y}\mathbf{z}} \cong \mathbf{d}_{\mathbf{z}^2}$									
76.	Which of following statement is wrong?											
	(A) Atoms of all transition elements are parama	agneti	c.									
	(B) All transition elements are metals.											
	(C) All elements of d-block are transition elem	ents.										
	(D) d-block elements are present in between s	&pb	lock elements in periodic table.									
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77.	Why	do theoritical value	ofmag	gnetic mo	mentdif	fer from	m their	practical va	alue?		
	(A)	Due to decrease in	n volum	ne of meta	al ion.						
	(B)	Due to unsymmet	rical ar	rangemen	t of dipo	les in c	orbital.				
	(C)	Due to rotation-or	bital co	mbinatio	n.						
	(D)	Both are different	metho	ds to calcu	ılatemag	netic r	nomer	nt.			
78.	What	t is the value of mag	gnetic n	noment o	fcentral	metal	ion in l	$K_2 MnO_4$?			
	(A)	0.0 BM				(B)	1.73	BM			
	(C)	2.83 BB					(D)	3.87 BM			
79.	Whic	ch of group of ions	hascol	loured ior	ns?[PM	Т-2001	1]				
	(1)	Cu^{2+} (2)	${\rm Ti}^{4+}$	(3)	Co ²⁺	-	(4)	Fe ²⁺			
	(A)	1, 2, 3, 4				(B)	3, 4				
	(C)	2, 3				(D)	1, 2				
80.	Whic	ch of following pair	ofeler	nents has	$(n-1)d^{10}$	ns ² ele	ectroni	c configura	tion?[]	Pb CET-1996]
	(A)	Fe, Co, Ni				(B)	Cu,A	Ag, Au			
	(C)	Zn, Cd, Hg				(D)	Sc, Y	, La			
81.	Whic	ch is correct increas	sing or	derofion	ic radii o	fCe ³⁺	, La ³⁺ ,	Pm ³⁺ , Yb ³⁺	?[AIE	EE-2002]	
	(A)	$La^{3+} < Ce^{3+} < P$	² m ³⁺ <	Yb^{3+}		(B)	Yb ³⁺	$< PM^{3+}$	< Ce ³⁺	< La ³⁺	
	(C)	$La^{3+} = Ce^{3+} < P$	³⁺ <	Yb^{3+}		(D)	Yb ³⁺	$< PM^{3+} +$	< La ³⁺	< Ce ³⁺	
82.	The a	atomic no. of V, C est value of their sec	r, Mn a ond ior	and Fe ar nization e	e 23, 24, nthalpy 2	25 & 25 [AIE]	26 res EE-20	pectively.	Which	of following	has
	(A)	V	(B)	Cr	T T T	(C)	Mn]	(D)	Fe	
			0								
83.	Ifthe	radius of La^{3+} is 1.	06 A , 1	than what	twillbet	he app	proxim	ate value c	ofradius	s of Lu ³⁺ from	the
	follov	wing?[AIEEE-200)3]								
	(A) ₁	.40Å	(B)	1.40 Å		(C)	0.85	${\mathop{\rm A}\limits^{ m o}}$	(D)	1.60 Å	
84.	How	many d-electrons	are the	eir in Fe ²⁺	(Z=26)	[AIEE	E-200	3]			
	(A)	4	(B)	5		(C)	6		(D)	3	
85.	What like k	t willbe obtained w KNO ₃ ? What will b	hen ma	naganese olour of	dioxide product '	is fuse ? (AIE	d with EEE-20	KOH in pr 003)	esence	ofoxidizing ag	gent
	(A)	$K_2 MnO_4 Dark gr$	reen			(B)	KMn	O ₄ , Violet			
	(C)	Mn_2O_3 , Grey				(D)	Mn_2	D ₄ , Black			
86.	Whic	ch of following grou	up of tra	ansition m	netal is us	ed to p	prepare	e currency of	coins?		
	(A)	Cu, Ag, Au				(B)	Ru, F	Sh, Pd			
	(C)	Fe, Co, Ni				(D)	Os, I	r, Pt			

- 87. Ce is an important member of Lanthenoid series which of following is wrong statement for Ce ? [AIEEE-2004]
 - (A) The general oxidation state of Ce is +3 and +4.
 - (B) +3 oxidation state of Ce is more stable than +4.
 - (C) +4 oxidation state of Ce is not available in its aqueous solution.
 - (D) Ce (IV) behave as oxidizing agent.
- 88. Correct order of theoritical value of magnetic moment [AIEEE-2004]
 - (A) $[MnCl_4]^{2-} > [CoCl_4]^{2-} > [Fe(CN)_6]^{4-}$
 - (B) $[MnCl_4]^{2^-} > [Fe(CN)_6]^{4^-} > [CoCl_4]^{2^-}$
 - (C) $[Fe(CN)_6]^{4-} > [Mn Cl_4]^{2-} > [Co Cl_4]^{2-}$
 - (D) $[Fe(CN)_6]^{4-} > [CoCl_4]^{2-} > [Mn Cl_4]^{2-}$
- - (A) Zn and Zr have the same oxidation state.
 - (B) Zr and Hf have same covalent and ionic radius.
 - (C) Zr and Nb have same oxidation state.
 - (D) Zr and Yb have same covalent and ionic radius.
- 90. In which of following group, all ions have $3d^2$ configuration ? [PMT-2004] [Atomic No. Ti = 22, V = 23, Cr = 24, Mn = 25]
 - (A) Ti^{3+} , V^{2+} , Cr^{3+} Mn^{4+} (B) Ti^{+} , V^{4+} , Cr^{6+} Mn^{7+}
 - (C) Ti^{4+} , V^{3+} , Cr^{2+} Mn^{3+} (D) Ti^{2+} , V^{3+} , Cr^{4+} Mn^{5+}
- 91. Lanthanide contraction is caused due to........... [AIEEE-2006]
 - (A) The appreciable shilding on outer electrons by 4f electrons from the nuclear charge.
 - (B) The appreciable shilding on outer electrons by 5d electrons from the nuclear charge.
 - (C) The same effective nuclear charge from Ce to Lu.
 - (D) The poor shilding on outer electrons by 4f electrons from the nucluear charge.
- 92. The actinides exhibit more number of oxidation states in general than the lanthanide, because......... [AIEEE-2007, 2008, PMT-2005, 2006]
 - (A) The 5f-orbitals are more spread in place than the 4f orbitals.
 - (B) Energy differnce between 5f and 6d orbitals is less than that of 4f and 5d orbitals.
 - (C) Energy difference between 5f and 6d orbital is more than that of 4f and 5d orbitals.
 - (D) Actinides are more reactive than that of lanthanides.

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 (A) Ln (III) hydroxides are mainly basic in character. (B) Because of the large size of the Ln (III) ions, the bonding in its compounds is ionic in character. (C) Ln (III) Compounds are generally colourless. (D) The ionic sizes of Ln (III) decreases with increase in atomic number. 94. Which of following statement is wrong for transition element? [AIEEE-2009] (A) Once the d² configuration nis exceeded the tendency to involve all the 3d electrons in bonding decreases. (B) In addition to the normal oxidation states, the zero oxidation state is also shown by these elements in complexes. (C) In the highest oxidation states of the first five (transition elements (Sc to Mn) all the 4s & 3d electrons are used for bonding? 95. Which of following is wrong statement? (A) La (OH)₃ is less basic than Lu(OH)₃. (B) In lanthanide series, ionic radius decreases while moving Ce³⁺ to Lu³⁺ ion. (C) La is actually transition element. (D) Due to Lanthanide contraction atomic radius of Zn and Hf are same. 96. In which of the following pairs are both the ions coloured in aqueous solution? [PMT-2006] [Atomic No. SC=21, Ti=22, Co=27, Ni=28, Cu=29] (A) Ni³⁺, Cu⁻¹ (B) SC³⁺, Ti³⁺ (C) SC³⁺, Ti³⁺ (D) SC³⁺, CO²⁺ 97. Which of the following ion is most stable in aqueous solution? [PMT-2007] (A) 21 V³⁺ (B) 3d³⁺ 4s² (C) 3d³⁺ 4s² (D) 3d⁵ 4s¹ (D) 3d⁵ 4s² (D) 3d⁵ 4s¹ (D) 3d⁵ 4s² (D) German silver is alloy of [AIIMS-2000] (A) Fc, Cr	93.	The g for th	general oxidation state of Lanthanide elementeen nem? [AIEEE-2009]	ts is +3	3. Which of following is incorrect statement
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(D) Due to Lanthanide contraction atomic radius of Zn and Hf are same. 96. In which of the following pairs are both the ions coloured in aqueous solution ? [PMT-2006] [Atomic No. SC=21, Ti=22, Co=27, Ni=28, Cu=29] (A) Ni ²⁺ , Cu ⁺ (B) Ni ²⁺ , Ti ³⁺ (C) SC ³⁺ , Ti ³⁺ (D) SC ³⁺ , CO ²⁺ 97. Which of the following ion is most stable in aqueous solution ? [PMT-2007] (A) $_{22}V^{3+}$ (B) $_{22}Ti^{3+}$ (C) $_{25}Mn^{3+}$ (D) $_{24}Cr^{3+}$ 98. In which of the following outer most orbit will show maximum number of oxidation states ? [PMT-2009] (A) $_{3}d^5 4s^2$ (B) $_{3}d^2 4s^2$ (C) $_{3}d^3 4s^2$ (D) $_{3}d^5 4s^1$ 99. Mention the colourless pair from [Ti F ₆] ²⁻ , [Co F ₆] ²⁺ , Cu ₂ Cb & [NiC4] ²] [PMT-2009] (A) [Ti F ₆] ²⁻ , and Ca ₂ Cb (B) [Co F ₆] ³⁻ , and [Ni C4] ²] (C) [Ti F _e] ²⁻ , and [Co F ₈] ³] (D) Ca ₂ Cl ₂ and [Ni C4] ²⁻ 100. German silver is alloy of [AIIMS-2000] (A) Fe, Cr, Ni (B) Aq, Cu, Au (C) Cu, Zn, Ni (D) Cu, Zn, Sn		(C)	La is actually tranusition element.		
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$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	96.	In wl	hich of the following pairs are both the ions c	olour	ed in aqueous solution? [PMT-2006]
(A) $Ni^{2^{+}}, Cu^{+}$ (B) $Ni^{2^{+}}, Ti^{3^{+}}$ (C) $SC^{3^{+}}, Ti^{3^{+}}$ (D) $SC^{3^{+}}, CO^{2^{+}}$ 97. Which of the following ion is most stable in aqueous solution ? [PMT-2007] (A) $_{22}V^{3^{+}}$ (B) $_{22}Ti^{3^{+}}$ (C) $_{25}Mn^{3^{+}}$ (D) $_{24}Cr^{3^{+}}$ 98. In which of the following outer most orbit will show maximum number of oxidation states ? [PMT-2009] (A) $3d^{5} 4s^{2}$ (B) $3d^{2} 4s^{2}$ (C) $3d^{3} 4s^{2}$ (D) $3d^{5} 4s^{1}$ 99. Mention the colourless pair from $[Ti F_{6}]^{2^{-}}$, $[Co F_{6}]^{3^{-}}$, $Cu_{2} Cb \& [NiC4]^{2}$] [PMT-2009] (A) $[Ti F_{6}]^{2^{-}}$, and $Ca_{2} Cb$ (B) $[Co F_{6}]^{3^{-}}$, and $[Ni C4]^{2^{-}}$ 100. German silver is alloy of [AIIMS-2000] (A) Fe, Cr, Ni (B) Aq, Cu, Au (C) Cu, Zn, Ni (D) Cu, Zn, Sn		[Ato	mic No. SC=21, Ti=22, Co=27, Ni=28, Cu	=29]	
(C) SC^{3+} , Ti^{3+} (D) SC^{3+} , CO^{2+} 97. Which of the following ion is most stable in aqueous solution ? [PMT-2007] (A) $_{22}V^{3+}$ (B) $_{22}Ti^{3+}$ (C) $_{25}Mn^{3+}$ (D) $_{24}Cr^{3+}$ 98. In which of the following outer most orbit will show maximum number of oxidation states ? [PMT-2009] (A) $3d^5 4s^2$ (B) $3d^2 4s^2$ (C) $3d^3 4s^2$ (D) $3d^5 4s^1$ 99. Mention the colourless pair from [Ti F ₆] ²⁻ , [Co F ₆] ³⁻ , Cu ₂ Cl ₂ & [NiCl ₄ ²] [PMT-2009] (A) [Ti F ₆] ²⁻ , and Ca ₂ Cl ₂ (B) [Co F ₆] ³⁻ , and [Ni Cl ₄ ²] (C) [Ti F _e] ²⁻ , and [Co F ₈ ³] (D) Ca ₂ Cl ₂ and [Ni Cl ₄ ²] 100. German silver is alloy of [AIIMS-2000] (A) Fe, Cr, Ni (B) Aq, Cu, Au (C) Cu, Zn, Ni (D) Cu, Zn, Sn		(A)	Ni^{2+}, Cu^+	(B)	Ni ²⁺ , Ti ³⁺
97. Which of the following ion is most stable in aqueous solution ? [PMT-2007] (A) $_{22}V^{3+}$ (B) $_{22}Ti^{3+}$ (C) $_{25}Mn^{3+}$ (D) $_{24}Cr^{3+}$ 98. In which of the following outer most orbit will show maximum number of oxidation states ? [PMT-2009] (A) $3d^5 4s^2$ (B) $3d^2 4s^2$ (C) $3d^3 4s^2$ (D) $3d^5 4s^1$ 99. Mention the colourless pair from [Ti F ₆] ²⁻ , [Co F ₆] ³⁻ , Cu ₂ Cl ₂ & [NiCl ₄ ²] [PMT-2009] (A) [Ti F ₆] ²⁻ , and Ca ₂ Cl ₂ (B) [Co F ₆] ³⁻ , and [Ni Cl ₄ ²] (C) [Ti F ₆] ²⁻ , and [Co F ₆ ³] (D) Ca ₂ Cl ₂ and [Ni Cl ₄ ²] 100. German silver is alloy of [AIIMS-2000] (A) Fe, Cr, Ni (B) Aq, Cu, Au (C) Cu, Zn, Ni (D) Cu, Zn, Sn		(C)	SC ³⁺ , Ti ³⁺	(D)	SC ³⁺ , CO ²⁺
(A) $_{22}V^{3+}$ (B) $_{22}Ti^{3+}$ (C) $_{25}Mn^{3+}$ (D) $_{24}Cr^{3+}$ 98. In which of the following outer most orbit will show maximum number of oxidation states ? [PMT-2009] (A) $3d^5 4s^2$ (B) $3d^2 4s^2$ (C) $3d^3 4s^2$ (D) $3d^5 4s^1$ 99. Mention the colourless pair from [Ti F ₆] ²⁻ , [Co F ₆] ²⁺ , Cu ₂ Cb & [NiC4 ²] [PMT-2009] (A) [Ti F ₆] ²⁻ , and Ca ₂ Cb (B) [Co F ₆] ³⁻ , and [Ni C4 ²] (C) [Ti F _e] ²⁻ , and [Co F ₆ ³] (D) Ca ₂ Cl ₂ and [Ni C4 ²] (C) [Ti F _e] ²⁻ , and [Co F ₆ ³] (D) Ca ₂ Cl ₂ and [Ni C4 ²] 100. German silver is alloy of [AIIMS-2000] (A) Fe, Cr, Ni (B) Aq, Cu, Au (C) Cu, Zn, Ni (D) Cu, Zn, Sn	97.	Whic	ch of the following ion is most stable in aqueo	us sol	ution? [PMT-2007]
98. In which of the following outer most orbit will show maximum number of oxidation states ? [PMT-2009] (A) $3d^5 4s^2$ (B) $3d^2 4s^2$ (C) $3d^3 4s^2$ (D) $3d^5 4s^1$ (D) $3d^5 4s^1$ (PMT-2009] (A) $[Ti F_6]^{2^-}$, and $Ca_2 Cb_2$ (B) $[Co F_6]^{3^-}$, and $[Ni Cl_2^2]$ (C) $[Ti F_6]^{2^-}$, and $[Co F_6]^3$ (D) Ca_2Cl_2 and $[Ni Cl_2^2]^2$ (C) $[Ti F_6]^{2^-}$, and $[Co F_6]^3$ (D) Ca_2Cl_2 and $[Ni Cl_2^2]^2$ (A) Fe, Cr, Ni (B) Aq, Cu, Au (C) Cu, Zn, Ni (D) Cu, Zn, Sn		(A)	$_{22}V^{3+}$ (B) $_{22}Ti^{3+}$	(C)	$_{25}$ Mn ³⁺ (D) $_{24}$ Cr ³⁺
(A) $3d^{5} 4s^{2}$ (B) $3d^{2} 4s^{2}$ (C) $3d^{3} 4s^{2}$ (D) $3d^{5} 4s^{1}$ 99. Mention the colourless pair from [Ti F ₆] ²⁻ , [Co F ₆] ³⁻ , Cu ₂ C ₂ & [NiC ₄ ²] [PMT-2009] (A) [Ti F ₆] ²⁻ , and Ca ₂ C ₂ (B) [Co F ₆] ³⁻ , and [Ni C ₄ ²] (C) [Ti F _e] ²⁻ , and [Co F ₆ ³] (D) Ca ₂ Cl ₂ and [Ni C ₄ ²] (C) German silver is alloy of [AIIMS-2000] (A) Fe, Cr, Ni (B) Aq, Cu, Au (C) Cu, Zn, Ni (D) Cu, Zn, Sn (60)	98.	In wł	hich of the following outer most orbit will sho	w max	kimum number of oxidation states ? [PMT-2009]
(C) $3d^{3} 4s^{2}$ (D) $3d^{5} 4s^{1}$ 99. Mention the colourless pair from $[Ti F_{6}]^{2-}$, $[Co F_{6}]^{3-}$, $Cu_{2} C_{2} \& [NiC_{4}]^{2}$ [PMT-2009] (A) $[Ti F_{6}]^{2-}$, and $Ca_{2} C_{2}$ (B) $[Co F_{6}]^{3-}$, and $[Ni C_{4}]^{2}$] (C) $[Ti F_{e}]^{2-}$, and $[Co F_{6}]^{3-}$ (D) $Ca_{2}Cl_{2}$ and $[Ni C_{4}]^{2-}$ 100. German silver is alloy of [AIIMS-2000] (A) Fe, Cr, Ni (B) Aq, Cu, Au (C) Cu, Zn, Ni (D) Cu, Zn, Sn (60)		(A)	$3d^5 4s^2$	(B)	3d ² 4s ²
99. Mention the colourless pair from $[Ti F_6]^{2-}$, $[Co F_6]^{3-}$, $Cu_2 C_2 \& [NiC_4]^2$] [PMT-2009] (A) $[Ti F_6]^{2-}$, and $Ca_2 C_2$ (B) $[Co F_6]^{3-}$, and $[Ni C_4]^2$] (C) $[Ti F_e]^{2-}$, and $[Co F_6]^3$] (D) Ca_2Cl_2 and $[Ni C_4]^{2-}$ 100. German silver is alloy of [AIIMS-2000] (A) Fe, Cr, Ni (B) Aq, Cu, Au (C) Cu, Zn, Ni (D) Cu, Zn, Sn 60		(C)	$3d^3 4s^2$	(D)	$3d^5 4s^1$
(A) $[\text{Ti } F_6]^{2^-}$, and $\text{Ca}_2 \text{ Cb}_2$ (B) $[\text{Co } F_6]^{3^-}$, and $[\text{Ni } \text{Cl}^2]$ (C) $[\text{Ti } F_e]^{2^-}$, and $[\text{Co } F_6]^3$] (D) Ca_2Cl_2 and $[\text{Ni } \text{Cl}^2]^{2^-}$ 100. German silver is alloy of [AIIMS-2000] (A) Fe, Cr, Ni (B) Aq, Cu, Au (C) Cu, Zn, Ni (D) Cu, Zn, Sn 60	99.	Men	tion the colourless pair from $[Ti F_6]^{2-}$, $[Co F_6]^{2-}$	5 ^{Ĵ−} , C	$Cu_2 Cb_2 \& [NiC_4^2] [PMT-2009]$
(C) $[Ti F_e]^{2^-}$, and $[Co \xi^{-3}]$ (D) Ca_2Cl_2 and $[Ni C_4^{-1}]^{2^-}$ 100. German silver is alloy of [AIIMS-2000] (A) Fe, Cr, Ni (B) Aq, Cu, Au (C) Cu, Zn, Ni (D) Cu, Zn, Sn 60		(A)	$\left[\operatorname{Ti} F_{6}\right]^{2}$, and $\operatorname{Ca}_{2} \operatorname{Cb}_{2}$	(B)	$[Co F_6]^{3-}$, and $[Ni C_4^{2-}]$
100. German silver is alloy of [AIIMS-2000] (A) Fe, Cr, Ni (B) Aq, Cu, Au (C) Cu, Zn, Ni (D) Cu, Zn, Sn 60		(C)	$[\text{Ti } \text{F}_{e}]^{2}$, and $[\text{Co } \text{F}_{e}]^{3}$	(D)	Ca_2Cl_2 and $[Ni C_4]^2$
(A) Fe, Cr, Ni (B) Aq, Cu, Au (C) Cu, Zn, Ni (D) Cu, Zn, Sn 60	100.	Gern	nan silver is alloy of [AIIMS-2000]		
(C) Cu, Zn, Ni (D) Cu, Zn, Sn		(A)	Fe, Cr, Ni	(B)	Aq, Cu, Au
60		(C)	Cu, Zn, Ni	(D)	Cu, Zn, Sn
			60	>	

101.	Wha	t is oxidation no. o	ofCri	$K_2 Cr_2 O_7 [$	AIIMS-200	1]		
	(A)	+2	(B)	+4	(C)	+6	(D)	+7
102.	Whic	ch of following Lan	ithanid	e element ha	s+2 and $+3$	general oxidatio	n state.	[AIIMS-2003]
	(A)	La	(B)	Nd	(C)	Ce	(D)	Eu
103.	Whic	ch of following com	pound	l is coloured	?[AIIMS-20	[800		
	(A)	TiCl ₃	(B)	FeCl ₃	(C)	CoCl ₂	(D)	Allabove
104.	Whic	ch of following stat	ement	is correct for	r transition e	lements?[AFN	1C - 2002]
	(A)	They are very act	ive.					
	(B)	They show variab	le vale	ncies.				
	(C)	They show lower	meltin	g point.				
	(D)	They are stong ele	ectropo	ositive eleme	nts.			
105.	A ele	ment having atom	ic no. 5	56 is included	l in [AFMC-	-2003]		
	(A)	Lanthanides			(B)	Actindies		
	(C)	Alkaline earth me	tals		(D)	None of above	e	
106.	Wha	t is percentage pro	portio	n of silver in	german silve	er? [AFMC	2-2004]	
	(A)	0%			(B)	1%		
	(C)	5%			(D)	None of above	e	
107.	Whic	ch of similarity is se	en in L	anthanoids &	& actinides?			
	(A)	Electronic configu	iration		(B)	Oxidation stat	es	
	(C)	Ionisation energy			(D)	Formation of c	complexes	5
108.	Whic	ch of following is c	orrect	order of mag	gnetic mome	ent (In BM) for N	Mn^{2+}, Cr^{2+}	$^{-}\&V^{2+}$
	(A)	$Mn^{2+} > V^{2+} > 0$	Cr^{2+}		(B)	$V^{2+} > Cr^{2+} >$	> Mn ²⁺	
	(C)	$Mn^{2+} > Cr^{2+} >$	V^{2+}		(D)	$Cr^{2+} > V^{2+} >$	> Mn ²⁺	
109.	Whic	ch of following is p	roperr	eason for sta	bility of Gd ³	+ion. (Tamiln	adu-CET	-2002)
	(A)	4f orbital is compl	letely f	illed				
	(B)	4forbital is half fil	led					
	(C)	show electronic c	onfigu	ration similar	to inert gas.			
	(D)	4f orbital is comp	letely v	vacant				
110.	Whic	ch of ion can not sh	nowd-	d transition ?	Gujarat-20	007)		
	(A)	Ti ⁴⁺	(B)	Cr ³⁺	(C)	Mn ²⁺	(D)	Cu ²⁺
111.	Whic	ch of following elec	tronic	configuration	n can show h	nighest oxidation	n state? (C	Gujarat-2007)
	(A)	$(n-1) d^5 ns^2$			(B)	$(n-1) d^8 ns^2$		
	(C)	$(n-1) d^5 ns^1$			(D)	$(n-1) d^3 ns^2$		
112.	Whic	ch of following is us	seofp	otassium die	hromate?[(Gujarat-2008]		
	(A)	To oxidise ferrous	s ions i	nto ferric ion	s in acidic m	edium as an oxic	lizing age	ent.
	(B)	As an insecticide		(C)	In electropl	ating		
	(D)	As a reducing age	ent					
					\frown			
				<	61 >			

110	11 71.	1 CT (1	• 1		1.	1.		4.0	$(\mathbf{C}$	2000)		
113.	Whic	en of Lantha	nidecor	npou	na is u	sed in	pigme	nt ?	(Gujarat	-2009)		
	(A)	Tb (OH) 3			(B)	Lu (($OH)_3$	(C)	Ce (OH)	3	(D)	CeO ₂
114.	On w	hich factor,	does the	e stab	ility of	fan oxi	datior	n state ir	n lanthanic	le elemer	nts dep	end? [Gujarat-2008]
	(A)	Combined	effect o	f hya	dratio	n energ	gy and	ionizat	tion energy	у.		
	(B)	Electronic	configur	ation		(C)	Enth	alpy		(D)	Inten	nal energy
115.	What	t is the atom	ic numb	berof	the ek	ement	with N	1 ²⁺ ion h	naving elec	tronic co	onfigur	ration [Ar] 3d ⁸
	[Guja	arat-2009]										
	(A)	26		(B)	27			(C)	28		(D)	25
116.	Whic	ch of cantha	nide eler	ment	show	+2 and	1+3 oz	kidatior	n state ?	[AIII	MS-20	003]
	(A)	La		(B)	Nd			(C)	Ce		(D)	Eu
117.	Whic	ch of follow	ing is co	orrect	order	ofion	ic radi	ii of Y ⁺³	³ , La ³⁺ , Eu	³⁺ , Lu ³⁺ ?	[CBS	E-PMT-2003]
	(A)	Y ³⁺ , < La	u ³⁺ , < E	u ³⁺ , 2	> Lu ³	+		(B)	Y ³⁺ , <	Lu ³⁺ , <	< Eu ³	$^{3+}, < La^{3+}$
	(C)	$Lu^{3+}, < 1$	Eu ³⁺ , <	< La	³⁺ , <	Y^{3+}		(D)	La ³⁺ , <	Eu ³⁺ , <	: Lu ⁺³	$^{3}, < Y^{^{3+}}$
118.	Lantl	hanide cont	raction	is obs	erved	due to	increa	ase in	[K	erala MI	EE 200	03]
	(A)	Atomic rac	lii					(B)	Volume	of4forbit	tal	
	(C)	Effectiven	uclear cl	harge				(D)	Atomicn	umber		
119.	In	elen	nents, at	tomic	volur	ne dec	reasev	with inc	crease in a	tomic nu	ımber.	[AIEEE-2003]
	(A)	p-Block						(B)	f-Block			
	(C)	Radioactiv	e series					(D)	Superhe	avy elem	ents	
120.	Whic	ch of aqueou	ıs solutio	on is c	colour	ed?	[IIT-	1990]				
	(A)	$Zn (NO_3)_2$		(B)	LiN	O_3		(C)	Co (NO	$_{3})_{2}$	(D)	Potash Alum

1	С	21	В	41	D	61	Α	81	D	101	С
2	Α	22	D	42	Α	62	D	82	В	102	D
3	В	23	В	43	В	63	В	83	С	103	D
4	С	24	С	44	В	64	С	84	С	104	В
5	С	25	В	45	С	65	D	85	Α	105	С
6	Α	26	В	46	Α	66	Α	86	Α	106	Α
7	D	27	В	47	С	67	В	87	Α	107	В
8	В	28	D	48	С	68	С	88	Α	108	С
9	Α	29	В	49	Α	69	Α	89	В	109	В
10	В	30	Α	50	С	70	В	90	D	110	Α
11	С	31	D	51	С	71	Α	91	D	111	Α
12	D	32	С	52	Α	72	С	92	В	112	Α
13	Α	33	Α	53	D	73	D	93	В	113	D
14	В	34	Α	54	С	74	В	94	С	114	Α
15	С	35	D	55	В	75	D	95	Α	115	С
16	D	36	В	56	D	76	Α	96	В	116	D
17	В	37	В	57	В	77	С	97	D	117	С
18	D	38	D	58	В	78	В	98	Α	118	С
19	С	39	В	59	A	79	В	99	Α	119	В
20	Α	40	Α	60	<u>^</u>	, 80	С	100	С	120	С

KEY NOTE