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CPG-EE-2019 (Chemistry)-(SET-X)

10357



Total Questions: 100

Sr. No.			•	•	•				•	•	•	•			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•
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Time: 11/2 Hours	Total Questions: 100	Max. Marks: 100
Roll No. (in figures)	(in words)	
Candidate's Name ————		Date of Birth
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1.	Which of the follow	ring has least de-Brog	glie v	vavelength?	
	(1) $e^{-}$	(2) p	(3)	$CO_2$	(4) <i>SO</i> <sub>2</sub>
2.	The geometry of As	$sF_5$ is:			*
	(1) Pyramidal		(2)	Tetrahedral	
	(3) Trigonal bipyra	midal	(4)	Octahedral	
3.	The effective nucle	ar charge at the perip	hery	of Cr atom, usin	ng slater rule is:
	(1) 3.35	(2) 3.70	(3)	1.70	(4) 2.60
4.	The theoretical value	ue of magnetic mome	ent of	$Gd^{3+}$ is:	
	(1) 7.94	(2) 9.72	(3)	9.57	(4) 7.63
5.	Which of the follow	wing will <i>not</i> show H	I-bon	ding?	
×	(1) <i>HF</i>	(2) <i>NH</i> <sub>3</sub>	(3)	$H_2O$	(4) $CH_4$
6.	The oxide which g	ives $H_2O_2$ on treatm	ent v	vith dilute acid i	s:
	(1) <i>PbO</i> <sub>2</sub>	(2) $Na_2O_2$	(3)	$MnO_2$	$(4) TiO_2$
7.	Inorganic benzene	is:			
	$(1) BH_3OH_3$		(2)	$B_3N_3H_6$	8
	(3) $B_2H_6$		(4)	$B_4H_{10}$	
8.	The correct order of	of increasing size is:			
	$(1) Na^+ < Li^+ < Ba$	$e^{2+} < B^{3+}$	( )	$B^{3+} < Be^{2+} < L$	
	$(3) Be^{2+} < B^{3+} < N$	$Ja^+ < Li^+$	(4)	$Li^+ < Na^+ < B^3$	$^{3+} < Be^{2+}$
9.	Addition of As in	trace amounts to pure	e Ge	will result in the	formation of:
	(1) n-type semico	nductor		) Germanium a	
	(3) p-type semico	nductor	(4)	) Super conduc	ting-alloy
10.	Freon is:		(2	\	
	(1) <i>CCl</i> <sub>3</sub> <i>H</i>			) CF <sub>4</sub>	
	(3) $CF_3H_3$		(4	) $CCl_2F_2$	

11.	The aqueous solution	of which of the fol	llowi	ing has maximu	m pH	?
	(1) NaClO		(2)	NaClO <sub>2</sub>		
	(3) NaClO <sub>3</sub>		(4)	$NaClO_4$		
12.	Which one of the following	lowing compounds	will	exhibit linkage	isome	erism ?
	$(1) [Pt(NH_3)_2Cl_2]$		(2)	$[Co(NH_3)_5NO]$	2]Cl2	
	(3) $[Co(NH_3)_4Cl_2]C$	1	(4)	$[Co(en)_2Cl_2]Cl$	2	
13.	Which oxide of vanae	dium is most likely	to be	e basic and ionic	c ?	
	(1) <i>VO</i>	$(2) V_2O_3$	(3)	VO <sub>2</sub>	(4)	$V_2O_5$
14.	Which of the following	ng complex is non-	ionis	able ?		
	(1) $CoCl_3.6NH_3$		(2)	$CoCl_3.5NH_3$		
	(3) $CoCl_3 \cdot 4NH_3$		(4)	$CoCl_3.3NH_3$		
15.	EAN (Effective Aton	nic No.) of $Fe^{2+}$ ion	n in	$[Fe^{2+}(CN_6)]^{4-}$	is equ	ual to :
	(1) 26	(2) 36	(3)	18	(4)	54
16.	Which is used in cano	cer chemotherapy?				
	(1) Zeise's salt		(2)	Auranofin		
	(3) Cisplatin		(4)	None	•	
17.	Which pairing is wro	ng?				
	(1) $[Fe(H_2O)_6]^{2+}$ – F	Paramagnetic				
	(2) $[Fe(CN)_6]^{4-}$ Pa	ramagnetic				
	(3) $[CoF_6]^{3-}$ - Param	agnetic				
	(4) $Ni(CO)_4$ – Diama	agnetic				
18.	Formula of pitch blen	de is:				
	(1) $UO_2$ (	2) <i>U</i> <sub>3</sub> <i>O</i> <sub>8</sub>	(3)	$UF_4$	(4)	None of these
19.	Which one of the foll	owing is the best m	etho	d of preparation	of ac	cetophenone?
	(1) $PhCOOEt + CH_3$	$MgBr \rightarrow$	(2)	$PhCOCl + CH_3$	MgB1	$\rightarrow$
	(3) PhCONH2 + CH3	$MgBr \rightarrow$	(4)	$PhCN + CH_3M$	gBr –	<b>&gt;</b>
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(Atomic Nos. Y = 39, La = 57, Eu = 63, Lu = 71)

(1) 
$$Y^{3+} < La^{3+} < Eu^{3+} < Lu^{3+}$$

(2) 
$$Y^{3+} < Lu^{3+} < Eu^{3+} < La^{3+}$$

(3) 
$$Lu^{3+} < Eu^{3+} < La^{3+} < Y^{3+}$$

(4) 
$$La^{3+} < Eu^{3+} < Lu^{3+} < \gamma^{3+}$$

~ .	Age is soluble in a	annionia due to the j	ormation of:							
	(1) $Ag(NH_2)Cl$	$(2) [Ag(NH_3)_2]Cl$	(3) <i>AgNH</i> <sub>2</sub>	(4) $NH_4[AgCl(NH)_2]$						
28.	Hydrogen directly	combines with:								
	(1) Au	(2) <i>Cu</i>	(3) Ni	(4) <i>Ca</i>						
29.	Which is used in fi	lling cavities in teeth	?							
	(1) <i>Cu (Hg)</i>	(2) Ag (Hg)	(3) Zn (Hg)	(4) Ni (Hg)						
30.	$Mg^{2+}$ is prepared in	in photosynthesis by	chlorophyll because							
	(1) It has strong sp	in-orbit coupling								
	(2) It has weak spin	n-orbit coupling		\$						
	(3) It is a heavy metal									
	(4) It binds strongly	y with chlorophyll		s 9						
31.	In synthesis of Grig	gnards reagent, alkyl	halide reacts with Mg	g in presence of:						
	(1) An ester	(2) Dry ether	(3) Alcohol	(4) Amide						
32.	The strongest acidic	e strength is that of:								
	(1) $C_2H_5OH$	(2) H <sub>2</sub> O	(3) <i>HCN</i>	(4) Cl <sub>3</sub> CCOOH						
33.		e following species me as that present in t		the type of hybridization						
	(1) <i>PCl</i> <sub>5</sub>	(2) <i>SF</i> <sub>4</sub>	(3) $I_3^-$	(4) $SbCl_5^{2-}$						
34.	The Compton wave	length of an electron	$\lambda_c$ is expressed as	:						
	$(1) \ \frac{\lambda_c}{2\pi} = \frac{h}{m}$	$(2) \ \frac{\lambda_c}{2\pi} = \frac{\hbar}{2m}$	$(3) \frac{\lambda_c}{2\pi} = \frac{h}{mc}$	$(4) \ \frac{\lambda_c}{2\pi} = \frac{\hbar}{mc}$						
35.	If $\hat{A}$ and $\hat{B}$ are two	operators such that [	$[\hat{A}, \hat{B}] = 1$ , then value	the of $[\hat{A}, \hat{B}^2]$ is:						

(3)  $\hat{A}$ 

(2)  $2\hat{B}$ 

(1)  $\hat{B}$ 

36.	Which one of the following is correct re	lation?	
	(1) $S = RlnW$	(2) $S = klnW$	
	$(3)  C_p = \left(\frac{\partial H}{\partial T}\right)_V$	$(4)  C_v = \left(\frac{\partial E}{\partial T}\right)_P$	·
	(All the symbols have their usual meaning	ngs.)	
37.	The degrees of freedom present in the its solution in liquid will be:	system comprised of	a gas in equilibrium with
	(1) 2 (2) 1	(3) 3	(4) None of these
38.	Polydispersity Index (PDI) of a polymer	r molecular is express	sed as:
	$(1) \frac{M_w}{M_n} \qquad (2) \frac{M_n}{M_w}$	(3) $M_w \times M_n$	$(4)  M_w + M_n$
	Where $M_w$ and $M_n$ are mass-average molymer sample.	olar mass and numb	er-average molar mass of a
39.	The radius of ${}^{27}_{13}Al$ nucleous is:		
	(1) $4.5 \times 10^{-14} \mathrm{m}$	(2) $4.5 \times 10^{-15} \mathrm{m}$	
	(3) $4.5 \times 10^{-13} \mathrm{m}$	(4) $4.5 \times 10^{-16} \mathrm{m}$	
40.	The temperature at which the virial coe	efficient of a real gas	is zero is called:
	(1) Boiling point	(2) Eutectic point	
	(3) Boyle temperature	(4) Critical tempe	rature
41.	The internal pressure of an ideal gas is	:	
	(1) zero (2) infinite	(3) 1	(4) None of these
42.	The standard state for a solid is:		
	(1) Pure state of the solid at one atmos	spheric pressure	
	(2) Pure state of the solid at one atmos		
	(3) Pure state of the solid at one atmos	spheric pressure and	298 K temperature

(4) Pure state of the solid at one atmospheric pressure at any given temperature

43.	The Millar indices	of crystal planes cut	throu	gh the crystal ax	is at $(2a, 3b, c)$ are:
	(1) (1 2 2)	(2) (2 3 6)	(3)	(6 3 2)	(4) (3 2 6)
44.	Which one of the fo	llowing statements	is <i>tru</i>	e?	
	(1) Work is a state	function.			
	(2) Entropies are ac	lditive and probabil	lities a	re multiplicative	
	(3) Entropies are m	ultiplicative and pro	obabil	ities are additive	
	(4) The entropy po	ssessed by substanc	e at 29	98 K is called res	idual Entropy.
45.		brium with its vapo			The molecules in the two
	(1) Chemical poten	tial	(2)	Enthalpy	E 50
	(3) Entropy		(4)	None of these	
46.	In which of the follo	owing reactions, the	collis	ion theory of rea	actions rate is valid?
	(1) Reaction between	en two diatomic mo	lecule	S	
	(2) Reaction between	en an atom and a dia	atomic	molecule	
	(3) Reaction between	en two complex mo	lecule	S	
	(4) Reaction between	en two atoms			
47.	The cell potential is	a/an:			
	(1) Colligative prop	erty	(2)	Thermodynamic	property
	(3) Extensive prope	rty	(4)	Intensive proper	ty
48.	For an isentropic ch	ange of state:			
	(1) dS = 0	(2) dS = 1	(3)	dH = 0	(4) None of these
49.	Isotonic solutions ha	ve same :		4	
	(1) Viscosity		(2)	Surface tension	
141.121	(3) Freezing point		(4)	Osmotic pressur	e
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50.	The rotational spectrum of a rigid diatomic rotator is comprised of equally spaced lines with spacing equal to:						
	(1) B	(2) 2 B	(3) 2.5 <i>B</i>	(4) 3 B			
51.	The critical tempera	ature of a liquid havis	ng boiling point 73°C	C is:			
	(1) 246°C	(2) 219°C	(3) 182°C	(4) None of these			
52.	Which of the follow	wing will show an ES	SR spectrum?				
	(1) $Cu^+$ ion	(2) N <sub>2</sub> molecule	(3) $Cu^{2+}$ ion	(4) CH <sub>4</sub> molecule			
53.		could be used to mannel equation. The sai		by unpaired electron, which			
	(1) $Q = a\rho$	$(2) Q = a + \rho$	(3) $a = Q\rho$	$(4) Q = a - \rho$			
	where $\rho$ is the unconstant.	paired electron dens	ity on carbon atom	and a is hyperfine splitting			
54.	The molecule which	ch is IR inactive and	Raman active is:				
¥	(1) Protein	(2) <i>HCl</i>	(3) <i>SO</i> <sub>2</sub>	(4) $N_2$			
55.	The pH of an aque	eous solution of $1 \times 1$	$0^{-7}$ M <i>HCl</i> is :				
	(1) 7		(2) slightly less th	nan 7			
	(3) slightly higher	r than 7	(4) none of these				
56.	When a beam of l	ight is passed through	n a colloidal solution	, it suffers :			
	(1) Reflection	(2) Refraction	(3) Scattering	(4) All of these			
57.	Dry ice is used in sprayed on a fire, as:	n fire extinguishers. it quickly changes in	It is stored in solid nto gas called $CO_2$ .	form in the cylinder. When The change of state is known			
	(1) Sublimation		(2) Evaporation				
	(3) Condensation	1	(4) Distillation				
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58.	Milk is a/an:			
	(1) Suspension	(2) Pure solution	(3) Gel	(4) Emulsion
59.	The IR absorption	at $1665 \text{ cm}^{-1}$ in salid	cylic acid is due to:	
	(1) C – H bending		(2) O – H stretchi	ng
	(3) $C = O$ stretchin	g	(4) O – H bending	3
60.	Strong covalent box	nds exist between po	lymer chains in:	
	(1) Elastomers	(2) Thermoplasts	(3) Thermosets	(4) All polymers
61.	Which of the follow	ving statements abou	t tetramethylsilane i	s incorrect?
	(1) It is Inert			
	(2) It is used to pro	vide a reference aga	inst which other pea	ks are measured
	(3) It is volatile and	d can be easily distill	led off and used agai	n
	(4) It produces a si	ngle peak at $\delta = 10$		
62.	The ionic strength of	of 0.25 molal $K_2SO_4$	solution will be:	
	(1) 0.25	(2) 0.50	(3) 0.75	(4) 0.60
63.	Debye-Hückel limit	ting law equation rel	ates:-	
	(1) Activity coeffic	cient with ionic stren	gth of the solution	
	(2) Mean ionic coe	fficient with ionic str	rength of the solution	n
	(3) Activity coeffic	cient with square of t	he ionic strength of	the solution
	(4) None of these			
64.	In the lead-acid batt	ery during charging,	the cathode reaction	n is:
	(1) Reduction of P	$b^{2+}$ to $Pb$	(2) Formation of I	$PbSO_4$
	(3) Formation of P	$bO_2$	(4) None of these	

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- In the phenomenon of Larmor pression, the angular frequency of pression, "Larmor frequency" is expressed as:

  - (1)  $w = r + B_z$  (2)  $w = r B_z$
- (3)  $w = r / B_z$  (4)  $w = rB_z$

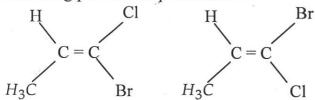
where  $r = \frac{\mu}{I(h/2\pi)}$  and all the notations have usual meanings.

- Which of the following relations represent Clasius-Claypeyron equation?
  - (1)  $\left| \frac{\partial}{\partial T} (G/T) \right|_{\mathcal{R}} = -\frac{H}{T^2}$
- (2)  $\left| \frac{\partial}{\partial T} (G/T) \right|_{R} = H$

(3)  $\frac{\partial}{\partial T} lnk_P = \frac{\Delta H^{\circ}}{RT^2}$ 

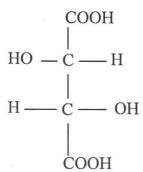
- (4)  $\frac{\partial}{\partial T} lnP = \frac{\Delta H^{\circ}_{\text{vaporization}}}{RT^2}$
- Which of the following reaction involves rearrangement of nitrogen yields?
  - (1) Wittig reaction

- (2) Von-Richter reaction
- (3) Sommlet-Hauser reaction
- (4) Pinacol-Pinacolone rearrangement
- **68.** Following pair of compounds are:



(1) Enantiomers

- (2) Diastereomers
- (3) Geometrical isomers
- (4) Homomers
- **69.** Absolute configuration of:



- (1) 2S, 3S
- (2) 2R, 3R
- (3) 2S, 3R
- (4) 2R, 3S

70.	Which among	the following	reagents gives	syn addition	with alkenes
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I  $Br_2$ 

II Dil  $KMnO_4$  /  $^-OH$ 

III  $OSO_4/NaSO_3H/H_2O$ 

IV  $H_2/Ni/\Delta$ 

Select the answer from the codes given below:

- (1) Only I
- (2) II and III
- (3) II, III and IV
- (4) Only IV
- 71. Which of the following compounds shows a sharp IR absorption band at  $1700 \text{ cm}^{-1}$  and a broad band at  $3300 \text{ cm}^{-1}$ ?
  - (1) Ethanol

(2) Ethanoic acid

(3) Propanone

- (4) Diethyl ether
- **72.** A signal in NMR appears at 30Hz on a 60 MHz instrument. Same signal on a 400 MHz instrument will appear at :
  - (1) 30 Hz
- (2) 90 Hz
- (3) 200 Hz
- (4) 400 Hz

73. 
$$\bigcirc -COCl \xrightarrow{H_2/Pd. BaSO_4} A \xrightarrow{NaOH}$$
Product

The product in the reaction is:

(1) O-COONa

(2)  $\bigcirc$   $\rightarrow$  CHC

(3)  $\langle O \rangle$ - $CH_2OH$ 

(4)  $\bigcirc$ -COONa +  $\bigcirc$ -CH<sub>2</sub>OH

**74.** Which of the following compounds gives iodoform on reaction with NaOH and  $I_2$ ?

(1) *CH*<sub>3</sub>*CH*<sub>2</sub>*CH*<sub>2</sub>*OH* 

- (2)  $CH_3CH_2CH-CH_3$
- (3) CH<sub>3</sub>CH<sub>2</sub>CCH<sub>2</sub>CH<sub>3</sub>
- (4)  $CH_3CH_2$   $CH CH_3$  CHO

**75.** Stability of  $(CH_3)_3C^+$  can be explained by :

- (1) Inductive effect
- (2) Mesomeric effect
- (3) Hyperconjugation
- (4) Both Inductive effect and Hyperconjugation

76. Which of the following does not react with benzene in presence of anhydrous AlCl<sub>3</sub>?

(1) 
$$\langle O \rangle$$
-COCI

$$(2) \left( \bigcirc -CO \right)_2 O$$

$$(3) \bigcirc -Cl$$

(4) 
$$\langle \bigcirc \rangle$$
-  $CH_2Cl$ 

77. 
$$OCH_3$$

$$Br \xrightarrow{KNH_2} liq.NH_3$$

The product obtained in above reaction is:

(1) 
$$OCH_3$$
 $NH_2$ 

$$OCH_3 \\ NH_2$$

$$(3) \bigcirc NH_2$$

**78.** Phenol can be converted into salicylaldehyde using:

(1) Kolbe's reaction

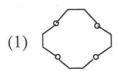
- (2) Reimer-Tiemann reaction
- (3) Friedal crafts reaction
- (4) Cross aldol condensation

**79.**  $C_3H_6O(A)$  does not reduce Tollen's reagent, does not give iodoform test, but reacts with HI. A can be :

(1)  $CH_3COCH_3$ 

- (2) CH<sub>3</sub>CH<sub>2</sub>CHO
- $(3) CH_2 = CH O CH_3$
- $\begin{array}{ccc} (4) & H_3C CH CH_2 \\ & & \\ &$

**80.** 18-Crown-6 is represented by :



(2)

(3) Both are correct

(4) None is correct

81. Allylic halogen substitution can be done with:

- (1) Halogen at high temperature
- (2) NBS in sunlight
- (3) Sulphuryl chloride in sunlight
- (4) All of these

82. Allylic alcohol is obtained when glycerol reacts with the following at 260°C:

- (1) Formic acid
- (2) Oxalic acid
- (3) Both
- (4) None

83.  $(CH_3)_3C - CH = CH_2 \xrightarrow{X} (H_3C)_3C - CH - CH_3 X \text{ can be :} OH$ 

- (1)  $BH_3 . THF / H_2O_2 . ^-OH$
- (2)  $H_3O^+$
- (3)  $Hg(OAC)_2 / NaBH_4, NaOH$
- (4) None

84. m-cresol on bromination gives:

$$(1) \begin{array}{c} Br & CH_3 \\ \hline OH \\ Br \end{array}$$

$$(2) \qquad \begin{array}{c} CH_3 \\ Br \\ OH \end{array}$$

$$(3) \bigcirc CH_2Br \\ Br \\ OH$$

$$(4) \bigcirc OH$$

$$Br$$

**85.** Dipole moment is shown by :

- (1) 2, 2-dimethylpropane
- (2) Trans-2-pentene
- (3) Trans-1,2-dichloroethene
- (4) 2, 2, 3, 3-tetrabromobutane

**86.** Which of the following does not give white precipitate when boiled with alcoholic silver nitrate?

(1) Methyl chloride

(2) Carbon tetrachloride

(3) Benzyl chloride

(4) Vinyl chloride

**87.** The formation of cyanohydrin from a ketone is an example of :

- (1) Electrophilic addition
- (2) Nucleophilic addition
- (3) Electrophilic substitution
- (4) Nucleophilic substitution

**88.** When acetaldehyde is heated with Fehling solution it gives a precipitate of :

- (1) Cu
- (2) CuO
- (3)  $Cu_2O$
- (4) Cu, CuO,  $Cu_2O$

89. In the cannizaro reaction given below

 $2PhCHO \xrightarrow{\Theta_{OH}} PhCH_2OH + PhCOO \stackrel{\Theta}{,}$  the slowest step is :

- (1) Attack of  ${}^{\Theta}OH$  at the carbonyl group
- (2) Transfer of hydride to carbonyl group
- (3) The abstraction of proton from carboxylic acid
- (4) The deprotonation of  $PhCH_2OH$

Which of the following carboxylic acids undergo decarboxylation easity? 90.

- (1)  $C_6H_5COCH_2COOH$
- (2)  $C_6H_5COCOOH$
- (3)  $C_6H_5CH(OH)COOH$
- (4)  $C_6H_5CH(NH_2)COOH$

91. In benzilic acid rearrangement:

- (1) Benzaldehyde is converted to benzoin
  - (2) Benzoin is converted to benzilic acid
  - (3) Benzilic acid is converted to benzoin
  - (4) Benzil is converted to benzilic acid

Grignard reagent shows addition on:

$$(1) \quad C = C$$

(1) 
$$C = O$$
 (2)  $C = S$  (3)  $-C = N$ 

$$(3) -C \equiv N$$

93. A positive carbylamine test is given by:

- (1) N, N-Dimethylaniline
- (2) 2-4- Dimethylaniline
- (3) N, N-dimethyl-p-nitroaniline
- (4) p-methyl benzylamine

94. 
$$CH_3 \xrightarrow{(i) Mg / Ether} A$$

$$(ii) CO_2 / H_3 O^{\oplus}$$

$$(iii) KMnO_4 / OH^-$$

$$(iv) \Delta$$

A is:

(1) 
$$OCCH_3$$

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95. 
$$O_2N$$
  $O_2$   $O_2N$   $O_2$   $O_2$   $O_2N$   $O_2$   $O$ 

Product is:

(1) Picric acid

(2) Phenol

(3) Chlorobenzene

(4) No reaction since (C - Cl) bond is stable

**96.** 
$$\langle \bigcirc \rangle - N(CH_3)_2 \xrightarrow{(i) HNO_2} A + B$$

A and B are:

(1) 
$$HO - \bigcirc NO$$
,  $(CH_3)_2 NH$  (2)  $HO - \bigcirc OH$ ,  $(CH_3)_2 NH$ 

(2) 
$$HO-\bigcircOH$$
,  $(CH_3)_2NH$ 

(3) 
$$HO-\langle \bigcirc \rangle$$
-NO,  $CH_3CH_2NH_2$  (4) None is correct

- **97.** A  $\beta$ -hydroxy carbonyl compound is obtained by the action of *NaOH* on :
  - (1)  $R_3C$  . CHO
- (2)  $C_6H_5CHO$
- (3)  $CH_3CHO$
- (4) *HCHO*
- **98.** Which have acidic H, but not reacting with NaHCO<sub>3</sub>?

(3) 
$$CH_3CCH_2CN$$
 (4)  $NH_3$ 

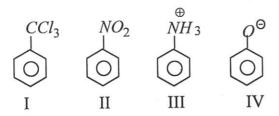
- 99. Predominant product formed when HCl adds to 2,4-hexadiene is:
  - (1) 4-chloro-2-hexene

(2) 2-chloro-3-hexene

(3) 2-chloro-4-hexene

(4) 1-chloro-2-hexene

**100.** Electrophile  $NO_2^{\oplus}$  attacks the following:



In which cases  $NO_2^{\oplus}$  will be at meta position:

(1) II and IV

(2) I, II and III

(3) II and III only

(4) I only

Total No. of Printed Pages: 17

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CPG-EE-2019 (Chemistry)-(SET-X)

10358

В

Total

Total Questions : 100

Time . 172 Hours		Total Questi	ons : 100		Max. Marks: 100
Roll No. (in figures)	-	_ (in words)			-
Candidate's Name ———				Date of Birth_	
Father's Name ————			Mother's Na	me	
Date of Exam :					
* .		•			
(Signature of the Cand	idate)			(Signature of	f the Invigilator)

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- All questions are compulsory and carry equal marks. The candidates are required to attempt all questions.
- 2. The candidate must return this question booklet and the OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfairmeans / 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 shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University website. The complaint be sent by the students to the Controller of Examinations by hand or through email. 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 booklet itself. Answers *must not* be ticked in the question booklet.
- 6. Use only black or blue ball point pen of good quality in the OMR Answer-Sheet.
- 7. There will be negative marking. Each correct answer will be awarded one full mark and each incorrect answer will be negatively marked for which the candidate will get ¼ Mark (0.25 Mark) discredit. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
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	1.	The aqueous solution of which of the following	llowing has maximum pH?
		(1) NaClO	(2) NaClO <sub>2</sub>
-:		(3) NaClO <sub>3</sub>	(4) NaClO <sub>4</sub>
	2.	Which one of the following compounds	will exhibit linkage isomerism?
		(1) $[Pt(NH_3)_2Cl_2]$	(2) $[Co(NH_3)_5 NO_2]Cl_2$
		$(3) [Co(NH_3)_4Cl_2]Cl$	$(4) [Co(en)_2Cl_2]Cl_2$
	3.	Which oxide of vanadium is most likely	to be basic and ionic?
		(1) $VO$ (2) $V_2O_3$	(3) $VO_2$ (4) $V_2O_5$
,	4.	Which of the following complex is non-	ionisable?
		(1) $CoCl_3.6NH_3$	(2) $CoCl_3 . 5NH_3$
		(3) $CoCl_3 \cdot 4NH_3$	(4) $CoCl_3 . 3NH_3$
	5.	EAN (Effective Atomic No.) of $Fe^{2+}$ io	on in $[Fe^{2+}(CN_6)]^{4-}$ is equal to :
		(1) 26 (2) 36	(3) 18 (4) 54
	6.	Which is used in cancer chemotherapy?	
		(1) Zeise's salt	(2) Auranofin
		(3) Cisplatin	(4) None
	7.	Which pairing is wrong?	
		(1) $[Fe(H_2O)_6]^{2+}$ – Paramagnetic	
		(2) $[Fe(CN)_6]^{4-}$ Paramagnetic	
		(3) $[CoF_6]^{3-}$ – Paramagnetic	
		(4) $Ni(CO)_4$ – Diamagnetic	
	8.	Formula of pitch blende is:	
		(1) $UO_2$ (2) $U_3O_8$	(3) $UF_4$ (4) None of these
	9.	Which one of the following is the best m	nethod of preparation of acetophenone?
		(1) $PhCOOEt + CH_3MgBr \rightarrow$	(2) $PhCOCl + CH_3MgBr \rightarrow$
		(3) $PhCONH_2 + CH_3MgBr \rightarrow$	$(4) PhCN + CH_3MgBr \rightarrow$
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Dilute *HCl* is used to separate following radical:

- (1)  $Ag^+$
- (2)  $Ca^{2+}$
- (3)  $Sn^{2+}$
- (4)  $Ba^{2+}$

In benzilic acid rearrangement:

(1) Benzaldehyde is converted to benzoin

(2) Benzoin is converted to benzilic acid

(3) Benzilic acid is converted to benzoin

(4) Benzil is converted to benzilic acid

**12.** Grignard reagent shows addition on :

(1) 
$$C = O$$
 (2)  $C = S$  (3)  $-C = N$ 

$$(2) \quad C = S$$

$$(3) -C \equiv N$$

(4) All

**13.** A positive carbylamine test is given by :

- (1) N, N-Dimethylaniline
- (2) 2-4- Dimethylaniline
- (3) N, N-dimethyl-p-nitroaniline
- (4) p-methyl benzylamine

14. 
$$CH_{3} \xrightarrow{(i) Mg / Ether} A$$

$$(ii) CO_{2} / H_{3}O^{\oplus}$$

$$(iii) KMnO_{4} / OH^{-}$$

$$(iv) \Delta$$

A is:

(1) 
$$OCCH_3$$

3

15. 
$$O_2N$$
  $\longrightarrow$   $NO_2$   $\longrightarrow$   $NO_2$   $\longrightarrow$   $NO_2$   $\longrightarrow$  Product

Product is:

(1) Picric acid

(2) Phenol

(3) Chlorobenzene

(4) No reaction since (C - Cl) bond is stable

**16.** 
$$\langle \bigcirc \rangle - N(CH_3)_2 \xrightarrow{(i) HNO_2} A + B$$

A and B are:

(1) 
$$HO-\bigcirc$$
- $NO$ ,  $(CH_3)_2NH$ 

(2) 
$$HO-\bigcircOH$$
,  $(CH_3)_2NH$ 

(1) 
$$HO-\bigcirc NO$$
,  $(CH_3)_2NH$  (2)  $HO-\bigcirc -OH$ ,  $(CH_3)_2NH$  (3)  $HO-\bigcirc -NO$ ,  $CH_3CH_2NH_2$  (4) None is correct

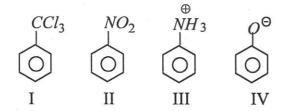
- 17. A  $\beta$ -hydroxy carbonyl compound is obtained by the action of NaOH on :
  - (1)  $R_3C \cdot CHO$
- (2)  $C_6H_5CHO$
- (3) CH<sub>3</sub>CHO
- (4) *HCHO*
- **18.** Which have acidic H, but not reacting with NaHCO<sub>3</sub>?
  - (1) *CH*<sub>3</sub>*COOH*
- (2)  $\bigcirc$  OH (3)  $CH_3$   $CCH_2$  CN (4)  $NH_3$
- 19. Predominant product formed when HCl adds to 2,4-hexadiene is:
  - (1) 4-chloro-2-hexene

(2) 2-chloro-3-hexene

(3) 2-chloro-4-hexene

(4) 1-chloro-2-hexene

**20.** Electrophile  $NO_2^{\oplus}$  attacks the following:



In which cases  $NO_2^{\oplus}$  will be at meta position:

(1) II and IV

(2) I, II and III

(3) II and III only

- (4) I only
- **21.** Which of the following compounds shows a sharp IR absorption band at  $1700 \text{ cm}^{-1}$  and a broad band at  $3300 \text{ cm}^{-1}$ ?
  - (1) Ethanol

(2) Ethanoic acid

(3) Propanone

- (4) Diethyl ether
- **22.** A signal in NMR appears at 30Hz on a 60 MHz instrument. Same signal on a 400 MHz instrument will appear at :
  - (1) 30 Hz
- (2) 90 Hz
- (3) 200 Hz
- (4) 400 Hz

23. 
$$\bigcirc$$
  $-COCl \xrightarrow{H_2/Pd. BaSO_4} A \xrightarrow{NaOH}$  Product

The product in the reaction is:

(1) (O)-COONa

(2) (CHO

(3)  $\langle O \rangle$ - $CH_2OH$ 

- (4)  $\langle \bigcirc \rangle$ -COONa +  $\langle \bigcirc \rangle$ -CH<sub>2</sub>OH
- **24.** Which of the following compounds gives iodoform on reaction with NaOH and  $I_2$ ?
  - (1)  $CH_3CH_2CH_2OH$

- (2)  $CH_3CH_2CH CH_3$
- $(3) CH_3CH_2CCH_2CH_3$
- (4)  $CH_3CH_2$  CH  $-CH_3$  CHO

- **25.** Stability of  $(CH_3)_3C^+$  can be explained by :
  - (1) Inductive effect
  - (2) Mesomeric effect
  - (3) Hyperconjugation
  - (4) Both Inductive effect and Hyperconjugation
- **26.** Which of the following does not react with benzene in presence of anhydrous  $AlCl_3$ ?
  - $(1) \ \ \ \ \ \ \ \ ) -COCl$

 $(2) \left( \left\langle \bigcirc \right\rangle - CO \right)_2 C$ 

(3)  $\langle O \rangle$ -Cl

(4)  $\langle O \rangle$ - $CH_2Cl$ 

27. 
$$OCH_3$$

$$Br \xrightarrow{KNH_2} liq.NH_3$$

The product obtained in above reaction is:

$$(1) \bigcirc NH_2$$

$$(2) \qquad OCH_3 \\ NH_2$$

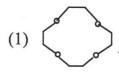
$$(3) \bigcirc NH_2$$

- 28. Phenol can be converted into salicylaldehyde using:
  - (1) Kolbe's reaction

- (2) Reimer-Tiemann reaction
- (3) Friedal crafts reaction
- (4) Cross aldol condensation

- **29.**  $C_3H_6O(A)$  does not reduce Tollen's reagent, does not give iodoform test, but reacts with HI. A can be:
  - (1)  $CH_3COCH_3$

- (2)  $CH_3CH_2CHO$
- $(3) CH_2 = CH O CH_3$
- $(4) H_3C CH CH_2$
- **30.** 18-Crown-6 is represented by :



(2)

(3) Both are correct

- (4) None is correct
- 31. The critical temperature of a liquid having boiling point 73°C is:
  - (1) 246°C

(2) 219°C

(3) 182°C

- (4) None of these
- 32. Which of the following will show an ESR spectrum?
  - (1)  $Cu^+$  ion

(2)  $N_2$  molecule

(3)  $Cu^{2+}$  ion

- (4) CH<sub>4</sub> molecule
- **33.** The ESR spectrum could be used to map molecular orbital by unpaired electron, which is aided by McConnel equation. The said equation is:
  - (1)  $Q = a\rho$

(2)  $Q = a + \rho$ 

(3)  $a = Q\rho$ 

(4)  $Q = a - \rho$ 

where  $\rho$  is the unpaired electron density on carbon atom and a is hyperfine splitting constant.

- 34. The molecule which is IR inactive and Raman active is:
  - (1) Protein

(2) HCl

(3) SO<sub>2</sub>

 $(4) N_2$ 

35	5.	The pH of an aqueous solution of $1 \times 10^{-7}$ M <i>HCl</i> is :						
	^	(1) 7	(2) slightly less than 7					
		(3) slightly higher than 7	(4) none of these					
36	ŝ.	When a beam of light is passed through a	a colloidal solution, it suffers:					
		(1) Reflection	(2) Refraction					
		(3) Scattering	(4) All of these					
37	37. Dry ice is used in fire extinguishers. It is stored in solid form in the cylinde sprayed on a fire, it quickly changes into gas called $CO_2$ . The change of state i as:							
		(1) Sublimation	(2) Evaporation					
		(3) Condensation	(4) Distillation					
38	3.	Milk is a/an:						
		(1) Suspension	(2) Pure solution					
		(3) Gel	(4) Emulsion					
39	9.	The IR absorption at 1665 cm <sup>-1</sup> in salic	ylic acid is due to:					
		(1) C – H bending	(2) O – H stretching					
		(3) $C = O$ stretching	(4) O – H bending					
40	).	Strong covalent bonds exist between poly	ymer chains in:					
		(1) Elastomers	(2) Thermoplasts					
		(3) Thermosets	(4) All polymers					
4	۱.	In synthesis of Grignards reagent, alkyl halide reacts with Mg in presence of:						
		(1) An ester (2) Dry ether	(3) Alcohol (4) Amide					
42	2.	The strongest acidic strength is that of:						
		(1) $C_2H_5OH$ (2) $H_2O$	(3) <i>HCN</i> (4) <i>Cl</i> <sub>3</sub> <i>CCOOH</i>					
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					E
43.		e following species ne as that present in	the central atom has the other three?	s the type of h	ybridization
	(1) <i>PCl</i> <sub>5</sub>	(2) SF <sub>4</sub>	(3) $I_3^-$	(4) $SbCl_5^{2-}$	
44.	The Compton wave	length of an electron	n, $\lambda_c$ is expressed as	: "	
	$(1) \frac{\lambda_c}{2\pi} = \frac{h}{m}$		$(2) \ \frac{\lambda_c}{2\pi} = \frac{\hbar}{2m}$		

(4)  $\frac{\lambda_c}{2\pi} = \frac{\hbar}{mc}$ 

**45.** If  $\hat{A}$  and  $\hat{B}$  are two operators such that  $[\hat{A}, \hat{B}] = 1$ , then value of  $[\hat{A}, \hat{B}^2]$  is:

- (1)  $\hat{B}$  (2)  $2\hat{B}$  (3)  $\hat{A}$  (4)  $2\hat{A}$
- **46.** Which one of the following is *correct* relation?

(3)  $\frac{\lambda_c}{2\pi} = \frac{h}{mc}$ 

- (1) S = RlnW (2) S = klnW
- (3)  $C_p = \left(\frac{\partial H}{\partial T}\right)_V$  (4)  $C_v = \left(\frac{\partial E}{\partial T}\right)_P$

(All the symbols have their usual meanings.)

**47.** The degrees of freedom present in the system comprised of a gas in equilibrium with its solution in liquid will be:

- (1) 2 (2) 1 (3) 3 (4) None of these
- 48. Polydispersity Index (PDI) of a polymer molecular is expressed as :
  - (1)  $\frac{M_w}{M_n}$  (2)  $\frac{M_n}{M_w}$  (3)  $M_w \times M_n$  (4)  $M_w + M_n$

Where  $M_w$  and  $M_n$  are mass-average molar mass and number-average molar mass of a polymer sample.

**49.** The radius of  ${}^{27}_{13}Al$  nucleous is :

- (1)  $4.5 \times 10^{-14} \,\mathrm{m}$  (2)  $4.5 \times 10^{-15} \,\mathrm{m}$
- (3)  $4.5 \times 10^{-13} \,\mathrm{m}$  (4)  $4.5 \times 10^{-16} \,\mathrm{m}$

50.	The temperature at which the virial coefficient of a real gas is zero is called:					
	(1) Boiling point		(2) Eutectic point			
	(3) Boyle temperature		(4) Critical temper	rature		
51.	Wilson disease is c	aused by the excess	of:			
	(1) Zinc	(2) Copper	(3) Magnesium	(4) Lead		
52.	In the compound F	$e_4[Fe(CN)_6]$ the resp	pective oxidation states of Fe are:			
	(1) II, III	(2) II, II	(3) III, II	(4) III, III		
53.	In vitro reaction of	excess of $O_2$ with from	ee heme B in aqueous	s medium, end product is:		
	(1) Hematin					
	(2) Heme B <i>CO</i> <sub>2</sub>					
	(3) $[O_2^ \text{Fe}(III) -$	protoporphyrin – IX	]			
	(4) All of these					
54.	The main reason for larger number of oxidation states exhibited by the actinoids than the corresponding lanthanoids is :					
	(1) More energy difference between 5f and 6d orbitals than between 4f and 5d orbitals.					
,	(2) Lesser energy difference between 5f and 6d orbitals than between 4f and 5d orbitals.					
	(3) Larger atomic s	size of actinoids than	the lanthanoids.			
	(4) Greater reactive	e nature of actinoids	than the lanthanoids			
55.	Which of the follow	wing has zero dipole	moment?			
	(1) <i>ClF</i>	(2) <i>PCl</i> <sub>3</sub>	$(3)$ $SiF_4$	(4) CFCl <sub>3</sub>		
56.	The correct order o	f ionic radii of $Y^{3+}$ ,	$La^{3+}$ , $Eu^{3+}$ and $Lu$	<sup>3+</sup> is:		
	(Atomic Nos. $Y = 3$	39, $La = 57$ , $Eu = 63$	Lu = 71			
	(1) $Y^{3+} < La^{3+} < E$	$2u^{3+} < Lu^{3+}$	(2) $Y^{3+} < Lu^{3+} < E$	$2u^{3+} < La^{3+}$		
	(3) $Lu^{3+} < Eu^{3+} < La^{3+} < Y^{3+}$ (4) $La^{3+} < Eu^{3+} < Lu^{3+} < Y^{3+}$					
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57.	AgCl is soluble in ammo	nia due to the fo	rma	tion of:	
	(1) $Ag(NH_2)Cl$		(2)	$[Ag(NH_3)_2]Cl$	
	(3) <i>AgNH</i> <sub>2</sub>	6 100	(4)	$NH_4[AgCl(NH)]$	$H)_2$
58.	Hydrogen directly comb	ines with:			
	$(1) Au \qquad (2)$	Cu	(3)	Ni	(4) Ca
59.	Which is used in filling of	cavities in teeth	?		e Ž
	(1) Cu (Hg)		(2)	Ag (Hg)	
	(3) Zn (Hg)		(4)	Ni (Hg)	
60.	$Mg^{2+}$ is prepared in pho	otosynthesis by o	hlor	ophyll because:	
	(1) It has strong spin-or	bit coupling		*	
	(2) It has weak spin-orb	it coupling			
	(3) It is a heavy metal				
	(4) It binds strongly wit	h chlorophyll		* * * * * * * * * * * * * * * * * * *	
61.	The internal pressure of	an ideal gas is:		6 2	
	(1) zero (2)	infinite	(3)	1	(4) None of these
62.	The standard state for a	solid is :			
	(1) Pure state of the soli	d at one atmosp	herio	pressure	
	(2) Pure state of the soli	d at one atmosp	herio	pressure and 27	3 K temperature
	(3) Pure state of the soli	d at one atmosp	heri	pressure and 29	98 K temperature
	(4) Pure state of the soli	d at one atmosp	heri	pressure at any	given temperature
63.	The Millar indices of cry	ystal planes cut t	hrou	igh the crystal ax	as at $(2a, 3b, c)$ are:
	(1) (1 2 2)		(2)	(2 3 6)	
	(3) (6 3 2)		(4)	(3 2 6)	
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P. T. O.

64.	Which one of the following statements is true?							
	1) Work is a state function.							
	(2) Entropies are additive and probabilities are multiplicative.							
	(3) Entropies are multiplicative and probabilities are additive.							
(4) The entropy possessed by substance at 298 K is called residual Entropy.								
65.								
	(1) Chemical potential (2) Enthalpy							
	(3) Entropy (4) None of these							
66.	In which of the following reactions, the collision theory of reactions rate is valid?							
	(1) Reaction between two diatomic molecules							
	(2) Reaction between an atom and a diatomic molecule							
	(3) Reaction between two complex molecules							
	(4) Reaction between two atoms							
67.	The cell potential is a/an:							
	(1) Colligative property (2) Thermodynamic property							
	(3) Extensive property (4) Intensive property							
68.	For an isentropic change of state:							
	(1) $dS = 0$ (2) $dS = 1$ (3) $dH = 0$ (4) None of these							
69.	Isotonic solutions have same:							
	(1) Viscosity (2) Surface tension							
	(3) Freezing point (4) Osmotic pressure							
70.	The rotational spectrum of a rigid diatomic rotator is comprised of equally spaced lines with spacing equal to:							
	(1) B (2) 2 B (3) 2.5 B (4) 3 B							

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- Which of the following statements about tetramethylsilane is *incorrect*?
  - (1) It is Inert
  - (2) It is used to provide a reference against which other peaks are measured
  - (3) It is volatile and can be easily distilled off and used again
  - (4) It produces a single peak at  $\delta = 10$
- **72.** The ionic strength of 0.25 molal  $K_2SO_4$  solution will be :
  - (1) 0.25
- (2) 0.50
- (3) 0.75
- (4) 0.60

- 73. Debye-Hückel limiting law equation relates:
  - (1) Activity coefficient with ionic strength of the solution
  - (2) Mean ionic coefficient with ionic strength of the solution
  - (3) Activity coefficient with square of the ionic strength of the solution
  - (4) None of these
- 74. In the lead-acid battery during charging, the cathode reaction is:
  - (1) Reduction of  $Pb^{2+}$  to Pb
- (2) Formation of  $PbSO_4$

(3) Formation of  $PbO_2$ 

- (4) None of these
- In the phenomenon of Larmor pression, the angular frequency of pression, "Larmor frequency" is expressed as:
  - (1)  $w = r + B_z$  (2)  $w = r B_z$  (3)  $w = r / B_z$  (4)  $w = rB_z$

where  $r = \frac{\mu}{I(h/2\pi)}$  and all the notations have usual meanings.

- Which of the following relations represent Clasius-Claypeyron equation?
  - (1)  $\left[\frac{\partial}{\partial T}(G/T)\right]_{R} = -\frac{H}{T^2}$
- (2)  $\left[ \frac{\partial}{\partial T} (G/T) \right]_{R} = H$

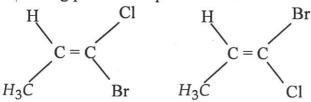
(3)  $\frac{\partial}{\partial T} lnk_P = \frac{\Delta H^{\circ}}{RT^2}$ 

(4)  $\frac{\partial}{\partial T} lnP = \frac{\Delta H^{\circ}_{\text{vaporization}}}{RT^2}$ 

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- 77. Which of the following reaction involves rearrangement of nitrogen yields?
  - (1) Wittig reaction

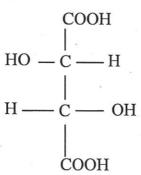
- (2) Von-Richter reaction
- (3) Sommlet-Hauser reaction
- (4) Pinacol-Pinacolone rearrangement
- 78. Following pair of compounds are:



(1) Enantiomers

(2) Diastereomers

- (3) Geometrical isomers
- (4) Homomers
- **79.** Absolute configuration of:



- (1) 2S, 3S
- (2) 2R, 3R
- (3) 2S, 3R
- (4) 2R, 3S
- 80. Which among the following reagents gives syn addition with alkenes:
  - I  $Br_2$

II Dil  $KMnO_4$  /  $^-OH$ 

III  $OSO_4/NaSO_3H/H_2O$ 

IV  $H_2/Ni/\Delta$ 

Select the answer from the codes given below:

(1) Only I

(2) II and III

(3) II, III and IV

- (4) Only IV
- **81.** Which of the following has least de-Broglie wavelength?
  - (1)  $e^{-}$
- (2) p
- (3) CO<sub>2</sub>
- (4) SO<sub>2</sub>

**82.** The geometry of  $AsF_5$  is:

	(1) Pyramidal		(2)	Tetrahedral				
	(3) Trigonal bipyramidal  The effective nuclear charge at the periph			(4) Octahedral				
83.				hery of Cr atom, using slater rule is:				
	(1) 3.35	(2) 3.70	(3)	1.70	(4) 2.60			
84.	The theoretical value	e of magnetic mome	nt of	$Gd^{3+}$ is:				
*	(1) 7.94	(2) 9.72	(3)	9.57	(4) 7.63			
85.	Which of the follow	ing will <i>not</i> show H	-bon	ding?	, , , , , , , , , , , , , , , , , , , ,			
	(1) <i>HF</i>	(2) NH <sub>3</sub>	(3)	H <sub>2</sub> O	(4) CH <sub>4</sub>			
86.	The oxide which giv	ves $H_2O_2$ on treatme	nent with dilute acid is:					
	(1) <i>PbO</i> <sub>2</sub>	(2) Na <sub>2</sub> O <sub>2</sub>	(3)	$MnO_2$	(4) <i>TiO</i> <sub>2</sub>			
87.	Inorganic benzene is	s :						
	(1) <i>BH</i> <sub>3</sub> <i>OH</i> <sub>3</sub>	*	(2)	$B_3N_3H_6$				
	(3) $B_2H_6$		(4)	$B_4H_{10}$				
88.	The correct order of	increasing size is:		7				
	$(1) Na^+ < Li^+ < Be^2$	$^{2+} < B^{3+}$	(2)	$B^{3+} < Be^{2+} < Li$	$^+$ < $Na^+$			
	(3) $Be^{2+} < B^{3+} < Na$	+ <li+< th=""><th>(4)</th><th><math display="block">Li^+ &lt; Na^+ &lt; B^{3+}</math></th><th><math>^{+}</math>&lt;<math>Be^{2+}</math></th></li+<>	(4)	$Li^+ < Na^+ < B^{3+}$	$^{+}$ < $Be^{2+}$			
89.	Addition of As in tra	ace amounts to pure	Ge v	vill result in the	formation of:			
	(1) n-type semicone	ductor	(2)	Germanium ars	senic			
	(3) p-type semicone	ductor	(4)	Super conducti	ng-alloy			
90.	Freon is:			a 80	(1)			
	(1) CCl <sub>3</sub> H		(2)	CF <sub>4</sub>				
	(3) $CF_3H_3$		(4)	CCl <sub>2</sub> F <sub>2</sub>				
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91. Allylic halogen substitution can be done with:

- (1) Halogen at high temperature
- (2) NBS in sunlight
- (3) Sulphuryl chloride in sunlight
- (4) All of these

92. Allylic alcohol is obtained when glycerol reacts with the following at 260°C:

- (1) Formic acid
- (2) Oxalic acid
- (3) Both
- (4) None

**93.**  $(CH_3)_3C - CH = CH_2 \xrightarrow{X} (H_3C)_3C - CH - CH_3 X \text{ can be : } OH$ 

- (1)  $BH_3 . THF / H_2O_2 . ^-OH$
- (2)  $H_3O^+$
- (3)  $Hg(OAC)_2 / NaBH_4, NaOH$
- (4) None

94. m-cresol on bromination gives:

$$(1) \begin{array}{c} Br & CH_3 \\ \hline OH \\ Br \end{array}$$

$$(3) \bigcirc CH_2Br$$

$$OH$$

(2) 
$$CH_3$$
  $Br$   $OH$ 

$$(4) \bigcirc CH_3$$

$$OH$$

**95.** Dipole moment is shown by :

- (1) 2, 2-dimethylpropane
- (2) Trans-2-pentene
- (3) Trans-1,2-dichloroethene
- (4) 2, 2, 3, 3-tetrabromobutane

96.	Which of the following does not give white precipitate when boiled with alcoholic silver nitrate?					
	(1) Methyl chloride	(2) Carbon tetrachloride				
	(3) Benzyl chloride	(4) Vinyl chloride				
97.	The formation of cyanohydrin from a ke	tone is an example of:				
	(1) Electrophilic addition	(2) Nucleophilic addition				
	(3) Electrophilic substitution	(4) Nucleophilic substitution				
98.	When acetaldehyde is heated with Fehlin	ng solution it gives a precipitate of:				
	(1) Cu (2) CuO	(3) $Cu_2O$ (4) $Cu, CuO, Cu_2O$				
99.	In the cannizaro reaction given below					
	$2PhCHO \xrightarrow{\Theta_{OH}} PhCH_2OH + PhCO$	$O^{\Theta}$ , the slowest step is :				
	(1) Attack of ${}^{\Theta}OH$ at the carbonyl ground	p.				
	(2) Transfer of hydride to carbonyl grou	ip .				
	(3) The abstraction of proton from carb	oxylic acid				
	(4) The deprotonation of <i>PhCH</i> <sub>2</sub> <i>OH</i>					
100.	Which of the following carboxylic acids	s undergo decarboxylation easity?				
	(1) $C_6H_5COCH_2COOH$	(2) $C_6H_5COCOOH$				
	(3) $C_6H_5CH(OH)COOH$	(4) $C_6H_5CH(NH_2)COOH$				

### Total No. of Printed Pages: 17

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

CPG-EE-2019 (Chemistry)-(SET-X)





	M.			Sr. No.	•••••
Γime : 1½ Hours		Total Questi	ions : <b>100</b>		Max. Marks : 100
Roll No. (in figures)		(in words)			
Candidate's Name ———	***************************************			Date of Birth-	
ather's Name ————			Mother's Name		****
Date of Exam :				¥	
(Signature of the Candi	date)		-	(Signature o	of the Invigilator)

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

- 1. All questions are *compulsory* and carry equal marks. The candidates are required to attempt all questions.
- 2. The candidate *must return* this question booklet and the OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfairmeans / 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 shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University website. The complaint be sent by the students to the Controller of Examinations by hand or through email. 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 booklet itself. Answers *must not* be ticked in the question booklet.
- 6. Use only black or blue ball point pen of good quality in the OMR Answer-Sheet.
- 7. There will be negative marking. Each correct answer will be awarded one full mark and each incorrect answer will be negatively marked for which the candidate will get ¼ Mark (0.25 Mark) discredit. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
- 8. Before answering the questions, the candidates should ensure that they have been supplied correct & complete question booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

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1. The internal pressure of an ideal gas is:

	(1) zero	(2) infinite	(3) 1		(4) None of	these		
2.	The standard state f	for a solid is :						
	(1) Pure state of the	e solid at one atmo	spheric press	ure				
	(2) Pure state of th	e solid at one atmo	spheric press	ure and 2	73 K tempera	ture		
	(3) Pure state of th	e solid at one atmo	spheric press	ure and 2	98 K tempera	ture		
	(4) Pure state of th	e solid at one atmo	spheric press	ure at any	given temper	rature		
3.	The Millar indices	of crystal planes cu	it through the	crystal a	xis at $(2a, 3b,$	c) are:		
	(1) (1 2 2)		(2) (2 3 6	5)				
	(3) (6 3 2)		(4) (3 2 6	5)				
4.	Which one of the f	ollowing statement	s is <i>true</i> ?			2 3		
	(1) Work is a state	function.	*					
	(2) Entropies are a	dditive and probab	ilities are mu	ltiplicativ	e.			
	(3) Entropies are r	nultiplicative and p	probabilities a	re additiv	re.			
	(4) The entropy po	ossessed by substan	nce at 298 K i	s called r	esidual Entroj	oy.		
5.	A liquid is in equil phases have the sa		oours at its bo	iling poir	nt. The molecu	ules in the two		
	(1) Chemical pote	ntial	(2) Enth	alpy	k.			
	(3) Entropy		(4) None	e of these				
6.	In which of the fol	lowing reactions, t	he collision th	heory of 1	eactions rate	is valid?		
	(1) Reaction betw	(1) Reaction between two diatomic molecules						
	(2) Reaction betw	een an atom and a	diatomic mol	ecule				
	(3) Reaction betw	reen two complex r	nolecules					
	(4) Reaction betw	veen two atoms						
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7.	The cell potential is a/an:	
	(1) Colligative property	(2) Thermodynamic property
	(3) Extensive property	(4) Intensive property
8.	For an isentropic change of state:	
	(1) dS = 0	(2) $dS = 1$
	(3) $dH = 0$	(4) None of these
•	Instanta colutions have some	
9.	Isotonic solutions have same:	(2) Surface tension
*	(1) Viscosity	(4) Osmotic pressure
	(3) Freezing point	(4) Osmone pressure
10.	The rotational spectrum of a rigid diato	mic rotator is comprised of equally spaced lines
	with spacing equal to:	
	(1) B (2) 2 B	(3) 2.5 B (4) 3 B
11.	Wilson disease is caused by the excess	of:
	(1) Zinc	(2) Copper
	(3) Magnesium	(4) Lead
12.	In the compound $Fe_4[Fe(CN)_6]$ the res	pective oxidation states of Fe are:
	(1) II, III	(2) II, II
	(3) III, II	(4) III, III
13.	In vitro reaction of excess of $O_2$ with fi	ree heme B in aqueous medium, end product is:
	(1) Hematin	
	(2) Heme B $CO_2$	
	(3) $[O_2^ \text{Fe}(III) - \text{protoporphyrin} - I\Sigma$	<b>K</b> ]
	(4) All of these	
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14.	The main reason for larger number of oxidation	n states exhibi	ited by the	actinoids	than
	the corresponding lanthanoids is:				

- (1) More energy difference between 5f and 6d orbitals than between 4f and 5d orbitals.
- (2) Lesser energy difference between 5f and 6d orbitals than between 4f and 5d orbitals.
- (3) Larger atomic size of actinoids than the lanthanoids.
- (4) Greater reactive nature of actinoids than the lanthanoids.
- 15. Which of the following has zero dipole moment?
  - (1) ClF
- (2) *PCl*<sub>3</sub>
- (3)  $SiF_4$
- (4) CFCl<sub>3</sub>

**16.** The correct order of ionic radii of 
$$Y^{3+}$$
,  $La^{3+}$ ,  $Eu^{3+}$  and  $Lu^{3+}$  is:

(Atomic Nos. Y = 39, La = 57, Eu = 63, Lu = 71)

- (1)  $Y^{3+} < La^{3+} < Eu^{3+} < Lu^{3+}$
- (2)  $Y^{3+} < Lu^{3+} < Eu^{3+} < La^{3+}$
- (3)  $Lu^{3+} < Eu^{3+} < La^{3+} < Y^{3+}$  (4)  $La^{3+} < Eu^{3+} < Lu^{3+} < Y^{3+}$
- 17. AgCl is soluble in ammonia due to the formation of:
  - (1)  $Ag(NH_2)Cl$
- (2)  $[Ag(NH_3)_2]Cl$  (3)  $AgNH_2$
- (4)  $NH_{4}[AgCl(NH)_{2}]$

- **18.** Hydrogen directly combines with :
  - (1) Au
- (2) *Cu*
- (3) Ni
- (4) Ca

- **19.** Which is used in filling cavities in teeth?
  - (1) Cu(Hg)
- (2) Ag (Hg)
- (3) Zn(Hg)
- (4) Ni (Hg)
- **20.**  $Mg^{2+}$  is prepared in photosynthesis by chlorophyll because :
  - (1) It has strong spin-orbit coupling
    - (2) It has weak spin-orbit coupling
    - (3) It is a heavy metal
    - (4) It binds strongly with chlorophyll

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- In benzilic acid rearrangement:
  - (1) Benzaldehyde is converted to benzoin
  - (2) Benzoin is converted to benzilic acid
  - (3) Benzilic acid is converted to benzoin
  - (4) Benzil is converted to benzilic acid
- 32. Grignard reagent shows addition on:

(1) 
$$C = O$$
 (2)  $C = S$  (3)  $-C = N$  (4) All

$$(2) \quad C = S$$

$$(3) -C \equiv N$$

- 33. A positive carbylamine test is given by:
  - (1) N, N-Dimethylaniline
  - (2) 2-4- Dimethylaniline
  - (3) N, N-dimethyl-p-nitroaniline
  - (4) p-methyl benzylamine

34. 
$$CH_{3} \xrightarrow{(i) Mg / Ether} A$$

$$(ii) CO_{2} / H_{3}O^{\oplus}$$

$$(iii) KMnO_{4} / OH^{-}$$

$$(iv) \Delta$$

A is:

(1) 
$$CH_3$$

35. 
$$O_2N$$
  $\longrightarrow$   $NO_2$   $\longrightarrow$   $NO_2$   $\longrightarrow$   $NO_2$   $\longrightarrow$  Product

Product is:

(1) Picric acid

(2) Phenol

(3) Chlorobenzene

(4) No reaction since (C - Cl) bond is stable

**36.** 
$$\langle \bigcirc \rangle - N(CH_3)_2 \xrightarrow{(i) HNO_2} A + B$$

A and B are:

(1) 
$$HO-\bigcirc -NO$$
,  $(CH_3)_2NH$  (2)  $HO-\bigcirc -OH$ , (3)  $HO-\bigcirc -NO$ ,  $CH_3CH_2NH_2$  (4) None is correct

(2) 
$$HO-\langle \bigcirc \rangle$$
- $OH$ ,  $(CH_3)_2NH$ 

(3) 
$$HO - O - NO$$
,  $CH_3CH_2NH_2$ 

- 37. A  $\beta$ -hydroxy carbonyl compound is obtained by the action of NaOH on :
  - (1)  $R_3C \cdot CHO$
- (2)  $C_6H_5CHO$
- (3) *CH*<sub>3</sub>*CHO*
- (4) *HCHO*
- **38.** Which have acidic H, but not reacting with NaHCO<sub>3</sub>?
  - (1) *CH*<sub>3</sub>*COOH*
- (2)  $\bigcirc$  O  $\parallel$  (3)  $CH_3CCH_2CN$  (4)  $NH_3$
- Predominant product formed when HCl adds to 2,4-hexadiene is:
  - (1) 4-chloro-2-hexene

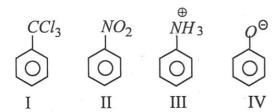
(2) 2-chloro-3-hexene

(3) 2-chloro-4-hexene

(4) 1-chloro-2-hexene

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**40.** Electrophile  $NO_2^{\oplus}$  attacks the following:



In which cases  $NO_2^{\oplus}$  will be at meta position:

(1) II and IV

(2) I, II and III

(3) II and III only

(4) I only

41. Which of the following statements about tetramethylsilane is incorrect?

- (1) It is Inert
- (2) It is used to provide a reference against which other peaks are measured
- (3) It is volatile and can be easily distilled off and used again
- (4) It produces a single peak at  $\delta = 10$

**42.** The ionic strength of 0.25 molal  $K_2SO_4$  solution will be :

- (1) 0.25
- (2) 0.50
- (3) 0.75
- (4) 0.60

**43.** Debye-Hückel limiting law equation relates :

- (1) Activity coefficient with ionic strength of the solution
- (2) Mean ionic coefficient with ionic strength of the solution
- (3) Activity coefficient with square of the ionic strength of the solution
- (4) None of these

44. In the lead-acid battery during charging, the cathode reaction is:

- (1) Reduction of  $Pb^{2+}$  to Pb
- (2) Formation of PbSO<sub>4</sub>

(3) Formation of PbO<sub>2</sub>

(4) None of these

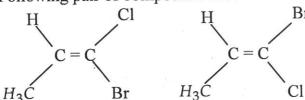
- In the phenomenon of Larmor pression, the angular frequency of pression, "Larmor frequency" is expressed as:
  - (1)  $w = r + B_2$
- (2)  $w = r B_z$  (3)  $w = r / B_z$  (4)  $w = rB_z$

where  $r = \frac{\mu}{I(h/2\pi)}$  and all the notations have usual meanings.

- Which of the following relations represent Clasius-Claypeyron equation? 46.
  - (1)  $\left| \frac{\partial}{\partial T} (G/T) \right|_{\mathcal{D}} = -\frac{H}{T^2}$
- $(2) \left[ \frac{\partial}{\partial T} (G/T) \right]_{P} = H$
- (3)  $\frac{\partial}{\partial T} lnk_P = \frac{\Delta H^{\circ}}{RT^2}$

- (4)  $\frac{\partial}{\partial T} lnP = \frac{\Delta H^{\circ}_{\text{vaporization}}}{RT^{2}}$
- Which of the following reaction involves rearrangement of nitrogen yields? 47.
  - (1) Wittig reaction

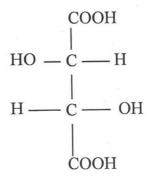
- (2) Von-Richter reaction
- (3) Sommlet-Hauser reaction
- (4) Pinacol-Pinacolone rearrangement
- Following pair of compounds are:



(1) Enantiomers

(2) Diastereomers

- (3) Geometrical isomers
- (4) Homomers
- **49.** Absolute configuration of:



- (1) 2S, 3S
- (2) 2R, 3R
- (3) 2S, 3R
- (4) 2R, 3S

50. Which among the following reagents gives syn addition with alkenes:

I  $Br_2$ 

II Dil  $KMnO_4$  /  $^-OH$ 

III OSO<sub>4</sub> / NaSO<sub>3</sub>H / H<sub>2</sub>O

IV  $H_2/Ni/\Delta$ 

Select the answer from the codes given below:

- (1) Only I
- (2) II and III
- (3) II, III and IV
- (4) Only IV
- 51. In synthesis of Grignards reagent, alkyl halide reacts with Mg in presence of:
  - (1) An ester
- (2) Dry ether
- (3) Alcohol
- (4) Amide

- **52.** The strongest acidic strength is that of:
  - (1)  $C_2H_5OH$

(2)  $H_2O$ 

(3) HCN

- (4) Cl<sub>3</sub>CCOOH
- **53.** In which one of the following species the central atom has the type of hybridization which is not the same as that present in the other three?
  - (1) PCl<sub>5</sub>
- (2)  $SF_4$
- (3)  $I_3^-$
- (4)  $SbCl_5^{2-}$
- **54.** The Compton wave length of an electron,  $\lambda_c$  is expressed as :
  - $(1) \ \frac{\lambda_c}{2\pi} = \frac{h}{m}$

 $(2) \ \frac{\lambda_c}{2\pi} = \frac{\hbar}{2m}$ 

 $(3) \ \frac{\lambda_c}{2\pi} = \frac{h}{mc}$ 

- (4)  $\frac{\lambda_c}{2\pi} = \frac{\hbar}{mc}$
- **55.** If  $\hat{A}$  and  $\hat{B}$  are two operators such that  $[\hat{A}, \hat{B}] = 1$ , then value of  $[\hat{A}, \hat{B}^2]$  is:
  - (1)  $\hat{B}$
- (2)  $2\hat{B}$
- (3)  $\hat{A}$
- (4)  $2\hat{A}$
- **56.** Which one of the following is *correct* relation?
  - (1) S = RlnW

(2) S = klnW

(3)  $C_p = \left(\frac{\partial H}{\partial T}\right)_V$ 

(4)  $C_v = \left(\frac{\partial E}{\partial T}\right)_{D}$ 

(All the symbols have their usual meanings.)

57.	its solution in liquid will be:	system comprised of	a gas in equilibrium with
	(1) 2 (2) 1	(3) 3	(4) None of these
58.	Polydispersity Index (PDI) of a polymer	molecular is express	sed as:
	$(1) \frac{M_w}{M_n} \qquad (2) \frac{M_n}{M_w}$	(3) $M_w \times M_n$	$(4)  M_w + M_n$
) 11	Where $M_w$ and $M_n$ are mass-average more polymer sample.	olar mass and number	er-average molar mass of a
59.	The radius of $_{13}^{27}Al$ nucleous is:		
	(1) $4.5 \times 10^{-14} \mathrm{m}$	(2) $4.5 \times 10^{-15} \mathrm{m}$	
	(3) $4.5 \times 10^{-13} \mathrm{m}$	(4) $4.5 \times 10^{-16} \mathrm{m}$	
60.	The temperature at which the virial coef	fficient of a real gas i	s zero is called:
	(1) Boiling point	(2) Eutectic point	1
	(3) Boyle temperature	(4) Critical temper	rature
61.	Which of the following compounds shand a broad band at 3300 cm <sup>-1</sup> ?	ows a sharp IR abs	orption band at 1700 cm <sup>-1</sup>
	(1) Ethanol	(2) Ethanoic acid	
	(3) Propanone	(4) Diethyl ether	
62.	A signal in NMR appears at 30Hz on a instrument will appear at :	60 MHz instrument.	Same signal on a 400 MHz
	(1) 30 Hz (2) 90 Hz	(3) 200 Hz	(4) 400 Hz
63.	$\bigcirc -COCl \xrightarrow{H_2 / Pd. BaSO_4} A \xrightarrow{No.}$	$\rightarrow$ Product	
	The product in the reaction is:		
	(1) $\langle \bigcirc \rangle$ -COONa	$(2) \bigcirc CHO$	
	(3) $\bigcirc$ $-CH_2OH$	(4) O-COON	$a + \bigcirc -CH_2OH$

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- Which of the following compounds gives iodoform on reaction with NaOH and  $I_2$ ?
  - (1)  $CH_3CH_2CH_2OH$
- (2)  $CH_3CH_2 \stackrel{!}{C}H CH_3$
- (2)  $CH_3CH_2$   $CH CH_3$  CHO
- Stability of  $(CH_3)_3C^+$  can be explained by :
  - (1) Inductive effect
  - (2) Mesomeric effect
  - (3) Hyperconjugation
  - (4) Both Inductive effect and Hyperconjugation
- Which of the following does not react with benzene in presence of anhydrous AlCl<sub>3</sub>?

67. 
$$OCH_3$$

$$Br \xrightarrow{KNH_2} liq.NH_3$$

The product obtained in above reaction is:

(1) 
$$OCH_3$$
 $NH_2$ 

$$OCH_3 \longrightarrow NH_2$$

$$(3) \bigcirc OCH_3$$

$$NH_2$$

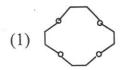
$$(4) \bigcirc OCH_3 OCH_3$$

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P. T. O.

- 68. Phenol can be converted into salicylaldehyde using:
  - (1) Kolbe's reaction
  - (2) Reimer-Tiemann reaction
  - (3) Friedal crafts reaction
  - (4) Cross aldol condensation
- **69.**  $C_3H_6O(A)$  does not reduce Tollen's reagent, does not give iodoform test, but reacts with HI. A can be :
  - (1)  $CH_3COCH_3$

- (2)  $CH_3CH_2CHO$
- $(3) CH_2 = CH O CH_3$
- $\begin{array}{ccc} (4) & H_3C CH CH_2 \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\$
- 70. 18-Crown-6 is represented by:



(2)

(3) Both are correct

- (4) None is correct
- 71. Allylic halogen substitution can be done with:
  - (1) Halogen at high temperature
  - (2) NBS in sunlight
  - (3) Sulphuryl chloride in sunlight
  - (4) All of these
- 72. Allylic alcohol is obtained when glycerol reacts with the following at 260°C:
  - (1) Formic acid
- (2) Oxalic acid
- (3) Both
- (4) None

**73.** 
$$(CH_3)_3C - CH = CH_2 \xrightarrow{X} (H_3C)_3C - CH - CH_3 X$$
 can be:

- (1)  $BH_3$  .  $THF/H_2O_2$  .  $^-OH$
- (2)  $H_3O^+$
- (3)  $Hg(OAC)_2 / NaBH_4, NaOH$
- (4) None
- 74. m-cresol on bromination gives:

$$(1) \begin{array}{c} Br & CH_3 \\ \hline OH \\ Br \end{array}$$

$$(2) \qquad \begin{array}{c} CH_3 \\ OH \end{array}$$

$$(3) \bigcirc CH_2Br$$

$$OH$$

$$(4) \bigcirc CH_3$$

$$OH$$

- **75.** Dipole moment is shown by :
  - (1) 2, 2-dimethylpropane
- (2) Trans-2-pentene
- (3) Trans-1,2-dichloroethene
- (4) 2, 2, 3, 3-tetrabromobutane
- **76.** Which of the following does not give white precipitate when boiled with alcoholic silver nitrate?
  - (1) Methyl chloride

(2) Carbon tetrachloride

(3) Benzyl chloride

- (4) Vinyl chloride
- 77. The formation of cyanohydrin from a ketone is an example of:
  - (1) Electrophilic addition
- (2) Nucleophilic addition
- (3) Electrophilic substitution
- (4) Nucleophilic substitution

78.	When acetaldehyde	is heated with Fehlir	ng solution it	gives a pre	cipitate of:
	(1) Cu	(2) CuO	(3) $Cu_2O$	(4)	$Cu, CuO, Cu_2O$
79.	In the cannizaro rea	ction given below	*		
	$2PhCHO \xrightarrow{\Theta_{OH}}$	$PhCH_2OH + PhCO$	$O^{\Theta}$ , the slow	est step is:	
	(1) Attack of <sup>O</sup> OH	at the carbonyl grou	ıp		
	(2) Transfer of hyd	lride to carbonyl grou	ıp		
	(3) The abstraction	of proton from carb	oxylic acid		
	(4) The deprotonat	ion of PhCH2OH	•		y
80.	Which of the follow	wing carboxylic acids	s undergo de	carboxylatio	on easity?
	$(1) C_6H_5COCH_2C$	СООН	(2) $C_6H_5$	СОСООН	
	$(3) C_6H_5CH(OH)$	)СООН	(4) $C_6H_5$	$CH(NH_2)C$	'ООН
81.	The aqueous soluti	on of which of the fo	ollowing has	maximum p	Н?
	(1) NaClO		(2) NaClo	$O_2$	
	(3) NaClO <sub>3</sub>		(4) NaClo	$O_4$	
82.	Which one of the	following compounds	s will exhibit	t linkage iso	merism?
	(1) $[Pt(NH_3)_2Cl_2$			$(H_3)_5 NO_2$	
	(3) $[Co(NH_3)_4Cl_2$	<u>2</u> ]Cl	(4) [Co(en	$n)_2 Cl_2 ]Cl_2$	
83.	Which oxide of va	nadium is most likel	y to be basic	and ionic?	
	(1) <i>VO</i>	(2) $V_2O_3$	(3) <i>VO</i> <sub>2</sub>	(	$(4) V_2O_5$
84	. Which of the follo	owing complex is nor	n-ionisable?		
	(1) CoCl <sub>3</sub> .6NH <sub>3</sub>		(2) CoCl		
	(3) CoCl <sub>3</sub> . 4NH <sub>3</sub>		(4) CoCl	$_3.3NH_3$	,
85	. EAN (Effective A	atomic No.) of Fe <sup>2+</sup>	ion in [Fe <sup>2+</sup>	$(CN_6)$ ] <sup>4-</sup> is	equal to:
	(1) 26	(2) 36	(3) 18	77 II W	(4) 54
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86.	Which is used in cancer chemotherapy?	
	(1) Zeise's salt	(2) Auranofin
	(3) Cisplatin	(4) None
87.	Which pairing is wrong?	
	(1) $[Fe(H_2O)_6]^{2+}$ – Paramagnetic	
	(2) $[Fe(CN)_6]^{4-}$ Paramagnetic	
	(3) $[CoF_6]^{3-}$ – Paramagnetic	
	(4) $Ni(CO)_4$ – Diamagnetic	
88.	Formula of pitch blende is: (1) $UO_2$ (2) $U_3O_8$	(3) $UF_4$ (4) None of these
89.	Which one of the following is the best m	nethod of preparation of acetophenone?
	(1) $PhCOOEt + CH_3MgBr \rightarrow$	(2) $PhCOCl + CH_3MgBr \rightarrow$
	(3) $PhCONH_2 + CH_3MgBr \rightarrow$	$(4) PhCN + CH_3MgBr \rightarrow$
90.	Dilute HCl is used to separate following	g radical:
	(1) $Ag^+$ (2) $Ca^{2+}$	(3) $Sn^{2+}$ (4) $Ba^{2+}$
91.	The critical temperature of a liquid havi	ng boiling point 73°C is:
	(1) 246°C (2) 219°C	(3) 182°C (4) None of these
92.	Which of the following will show an ES	SR spectrum?
	(1) $Cu^+$ ion	(2) N <sub>2</sub> molecule
	(3) $Cu^{2+}$ ion	(4) CH <sub>4</sub> molecule
93.	The ESR spectrum could be used to mais aided by McConnel equation. The sai	ap molecular orbital by unpaired electron, which id equation is:
	(1) $Q = a\rho$ (2) $Q = a + \rho$	(3) $a = Q\rho$ (4) $Q = a - \rho$
	where ρ is the unpaired electron densi	ity on carbon atom and a is hyperfine splitting

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94.	The molecule which	is IR inactive and R	ama	n active is:	
	(1) Protein	(2) <i>HCl</i>	(3)	SO <sub>2</sub>	(4) N <sub>2</sub>
95.	The pH of an aqueo	us solution of $1 \times 10$	$^{-7}$ M	HCl is:	
	(1) 7		(2)	slightly less than	n 7
	(3) slightly higher	than 7	(4)	none of these	*
96.	When a beam of lig	ht is passed through	a co	lloidal solution, i	t suffers :
	(1) Reflection	(2) Refraction	(3)	Scattering	(4) All of these
97.	Dry ice is used in sprayed on a fire, it as:	fire extinguishers. It quickly changes into	t is s	stored in solid for scalled $CO_2$ . Th	orm in the cylinder. When e change of state is known
	(1) Sublimation	e a a	(2)	Evaporation	
	(3) Condensation		(4)	) Distillation	
98.	Milk is a/an:				
	(1) Suspension	(2) Pure solution	(3	) Gel	(4) Emulsion
99.	The IR absorption	at 1665 cm <sup>-1</sup> in sali	icyli	e acid is due to:	
	(1) C – H bending		(2	) O – H stretchin	ng
	(3) C = O stretchi	ng	(4	O – H bending	;
100	Strong covalent bo	onds exist between po	olym	er chains in:	a .
	(1) Elastomers	(2) Thermoplasts	(3	3) Thermosets	(4) All polymers

Total No. of Printed Pages: 17

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## CPG-EE-2019 (Chemistry)-(SET-X)

10360





		Sr. No	
Time: 1½ Hours	Total Questions : 100		Max. Marks: 100
Roll No. (in figures)	(in words)		
Candidate's Name —————		— Date of Birth—	
Father's Name	Mother's Na	me	
Date of Exam :			
		v	
(Signature of the Candidate)		(Signature of	f the Invigilator)

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

- 1. All questions are compulsory and carry equal marks. The candidates are required to attempt all questions.
- 2. The candidate must return this question booklet and the OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfairmeans / 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 shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University website. The complaint be sent by the students to the Controller of Examinations by hand or through email. 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 booklet itself. Answers must not be ticked in the question booklet.
- 6. Use only black or blue ball point pen of good quality in the OMR Answer-Sheet.
- 7. There will be negative marking. Each correct answer will be awarded one full mark and each incorrect answer will be negatively marked for which the candidate will get 1/4 Mark (0.25 Mark) discredit. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
- 8. Before answering the questions, the candidates should ensure that they have been supplied correct & complete question booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

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						-							
1.	Which	of the	following	compounds	shows	a	sharp	IR	absorption	band	at	1700	$cm^{-1}$
	and a b	road ba	and at 3300	$10^{-1}$ ?									

(1) Ethanol

(2) Ethanoic acid

(3) Propanone

(4) Diethyl ether

**2.** A signal in NMR appears at 30Hz on a 60 MHz instrument. Same signal on a 400 MHz instrument will appear at :

- (1) 30 Hz
- (2) 90 Hz
- (3) 200 Hz
- (4) 400 Hz

3. 
$$\langle \bigcirc \rangle$$
-COCl  $\xrightarrow{H_2/Pd.\ BaSO_4} A \xrightarrow{NaOH}$  Product

The product in the reaction is:

(1) (O)-COONa

(2) (CHO

(3)  $\langle O \rangle$ - $CH_2OH$ 

(4)  $\bigcirc$ -COONa +  $\bigcirc$ -CH<sub>2</sub>OH

**4.** Which of the following compounds gives iodoform on reaction with NaOH and  $I_2$ ?

(1)  $CH_3CH_2CH_2OH$ 

(2)  $CH_3CH_2CH-CH_3$ 

$$\begin{matrix} O \\ \parallel \\ (3) & CH_3CH_2 \ C \ CH_2 \ CH_3 \end{matrix}$$

(4) 
$$CH_3CH_2$$
  $CH - CH_3$   $CHO$ 

**5.** Stability of  $(CH_3)_3C^+$  can be explained by :

- (1) Inductive effect
- (2) Mesomeric effect
- (3) Hyperconjugation
- (4) Both Inductive effect and Hyperconjugation

- 6. Which of the following does not react with benzene in presence of anhydrous AlCl<sub>3</sub>?
  - (1)  $\langle \bigcirc \rangle$ -COCl

 $(2) \left( \left\langle \bigcirc \right\rangle - CO \right)_2 C$ 

(3)  $\langle O \rangle$ -Cl

- (4)  $\langle \bigcirc \rangle$   $CH_2Cl$
- 7.  $OCH_3$   $Br \xrightarrow{KNH_2} liq.NH_3$

The product obtained in above reaction is:

 $(1) \bigcirc NH_2$ 

 $OCH_3 \\ ONH_2$ 

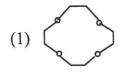
 $(3) \bigcirc NH_2$ 

- $(4) \bigcirc OCH_3 OCH_3$
- 8. Phenol can be converted into salicylaldehyde using:
  - (1) Kolbe's reaction

- (2) Reimer-Tiemann reaction
- (3) Friedal crafts reaction
- (4) Cross aldol condensation
- **9.**  $C_3H_6O(A)$  does not reduce Tollen's reagent, does not give iodoform test, but reacts with HI. A can be:
  - (1)  $CH_3COCH_3$

- (2)  $CH_3CH_2CHO$
- $(3) \quad CH_2 = CH O CH_3$
- $(4) H_3C CH CH_2$

10. 18-Crown-6 is represented by:



(2)

(3) Both are correct

(4) None is correct

11. The critical temperature of a liquid having boiling point 73°C is:

- (1) 246°C
- (2) 219°C
- (3) 182°C
- (4) None of these

12. Which of the following will show an ESR spectrum?

(1)  $Cu^+$  ion

(2)  $N_2$  molecule

(3)  $Cu^{2+}$  ion

(4) CH<sub>4</sub> molecule

13. The ESR spectrum could be used to map molecular orbital by unpaired electron, which is aided by McConnel equation. The said equation is:

(1)  $Q = a\rho$ 

(2)  $Q = a + \rho$ 

(3)  $a = Q\rho$ 

(4)  $Q = a - \rho$ 

where  $\rho$  is the unpaired electron density on carbon atom and a is hyperfine splitting constant.

14. The molecule which is IR inactive and Raman active is:

- (1) Protein
- (2) HCl
- (3) SO<sub>2</sub>
- $(4) N_2$

**15.** The pH of an aqueous solution of  $1 \times 10^{-7}$  M HCl is :

(1) 7

- (2) slightly less than 7
- (3) slightly higher than 7
- (4) none of these

16. When a beam of light is passed through a colloidal solution, it suffers:

(1) Reflection

(2) Refraction

(3) Scattering

(4) All of these

<b>17.</b>	7. Dry ice is used in fire extinguishers. It is stored in solid form in the cylinder. V sprayed on a fire, it quickly changes into gas called CO <sub>2</sub> . The change of state is kn as:					
	(1) Sublimation	(2) Evaporation				
	(3) Condensation	(4) Distillation				
18.	Milk is a/an:					
	(1) Suspension (2) Pure solution	(3) Gel (4) Emulsion				
19.	The IR absorption at 1665 cm <sup>-1</sup> in salic	ylic acid is due to:				
	(1) C – H bending	(2) O – H stretching				
	(3) $C = O$ stretching	(4) O – H bending				
20.	Strong covalent bonds exist between pol	ymer chains in :				
	(1) Elastomers	(2) Thermoplasts				
	(3) Thermosets	(4) All polymers				
21.	In synthesis of Grignards reagent, alkyl	halide reacts with Mg in presence of:				
	(1) An ester	(2) Dry ether				
	(3) Alcohol	(4) Amide				
22.	The strongest acidic strength is that of:					
	(1) $C_2H_5OH$	(2) H <sub>2</sub> O				
	(3) <i>HCN</i>	(4) Cl <sub>3</sub> CCOOH				
23.	In which one of the following species which is not the same as that present in	the central atom has the type of hybridization the other three?				
,	(1) <i>PCl</i> <sub>5</sub> (2) <i>SF</i> <sub>4</sub>	(3) $I_3^-$ (4) $SbCl_5^{2-}$				
24.	The Compton wave length of an electron	$\lambda_c$ is expressed as :				

(1)  $\frac{\lambda_c}{2\pi} = \frac{h}{m}$  (2)  $\frac{\lambda_c}{2\pi} = \frac{\hbar}{2m}$  (3)  $\frac{\lambda_c}{2\pi} = \frac{h}{mc}$  (4)  $\frac{\lambda_c}{2\pi} = \frac{\hbar}{mc}$ 

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						e e	5
25.	If $\hat{A}$ and $\hat{B}$ are two	operators s	uch that	[Â,	$\hat{B}$ ] = 1, then val	ue of $[\hat{A}, \hat{B}^2]$ is:	
	(1) <i>B</i>	$(2) 2\hat{B}$		(3)	Â	(4) $2\hat{A}$	
26.	Which one of the fo	ollowing is a	correct re	elatio	n ?		
	(1) $S = RlnW$			(2)	S = klnW		
	(3) $C_p = \left(\frac{\partial H}{\partial T}\right)_V$			(4)	$C_v = \left(\frac{\partial E}{\partial T}\right)_P$		
	(All the symbols ha	ve their usu	al meani	ngs.)			
27.	The degrees of free its solution in liquid	7	nt in the	syste	m comprised o	f a gas in equilibrium with	1
	(1) 2	(2) 1		(3)	3	(4) None of these	
28.	Polydispersity Inde	x (PDI) of a	polyme	r mol	ecular is expres	sed as:	
	$(1) \ \frac{M_w}{M_n}$			(2)	$\frac{M_n}{M_w}$		
	(3) $M_w \times M_n$		8	(4)	$M_w + M_n$		
	Where $M_w$ and $M_n$ polymer sample.	are mass-av	verage m	olar	mass and numb	er-average molar mass of a	a
29.	The radius of $\frac{27}{13}Al$	nucleous is	3:				
	(1) $4.5 \times 10^{-14} \mathrm{m}$		187	(2)	$4.5\times10^{-15}\mathrm{m}$		
	(3) $4.5 \times 10^{-13} \mathrm{m}$			(4)	$4.5 \times 10^{-16}  \text{m}$		
30.	The temperature at	which the v	ririal coe	fficie	nt of a real gas	is zero is called:	
	(1) Boiling point			(2)	Eutectic point		
	(3) Boyle tempera	ture		(4)	Critical tempe	rature	
31.	The aqueous soluti	on of which	of the fo	ollow	ing has maximu	ım pH ?	
	(1) NaClO			(2)	$NaClO_2$		
	(3) NaClO <sub>3</sub>			(4)	NaClO <sub>4</sub>		

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32.	Which one of the fo	llowing compounds	will exhibit linkage isomerism?				
	(1) $[Pt(NH_3)_2Cl_2]$		(2)	$[Co(NH_3)_5NO_2]$	]Cl <sub>2</sub>		
	(3) $[Co(NH_3)_4Cl_2]$	Cl	(4)	$[Co(en)_2Cl_2]Cl_2$			
33.	Which oxide of van	adium is most likely	to be	e basic and ionic	?		
	(1) <i>VO</i>	(2) $V_2O_3$	(3)	$VO_2$	(4) $V_2O_5$		
34.	Which of the follow	ving complex is non-	ionis	able?			
	(1) <i>CoCl</i> <sub>3</sub> .6 <i>NH</i> <sub>3</sub>		(2)	$CoCl_3.5NH_3$			
	(3) $CoCl_3 . 4NH_3$		(4)	$CoCl_3$ . $3NH_3$			
35.	EAN (Effective Ato	omic No.) of Fe <sup>2+</sup> io	n in	$[Fe^{2+}(CN_6)]^{4-}$ i	is equal to:		
	(1) 26	(2) 36	(3)	18	(4) 54		
36.	Which is used in ca	ncer chemotherapy?					
	(1) Zeise's salt		(2)	Auranofin			
	(3) Cisplatin	*	(4)	None			
37.	Which pairing is wi	rong?			v		
	(1) $[Fe(H_2O)_6]^{2+}$	Paramagnetic					
	(2) $[Fe(CN)_6]^{4-} - I$	Paramagnetic					
	(3) $[CoF_6]^{3-}$ – Para	magnetic					
	(4) $Ni(CO)_4$ – Dian	nagnetic					
38.	Formula of pitch bl						
	(1) <i>UO</i> <sub>2</sub>	(2) $U_3O_8$	(3)	UF <sub>4</sub>	(4) None of these		
39.	Which one of the fo	ollowing is the best m	netho	od of preparation	of acetophenone?		
*	(1) $PhCOOEt + CH$	$_3MgBr \rightarrow$	(2)	$PhCOCl + CH_3$	$MgBr \rightarrow$		
	(3) $PhCONH_2 + Ch$	$H_3MgBr \rightarrow$	(4)	$PhCN + CH_3M$	$gBr \rightarrow$		
40.	Dilute <i>HCl</i> is used	to separate following	radi	cal:			
	(1) Ag <sup>+</sup>	(2) $Ca^{2+}$	(3)	$Sn^{2+}$	(4) $Ba^{2+}$		

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**41.** In benzilic acid rearrangement :

- (1) Benzaldehyde is converted to benzoin
- (2) Benzoin is converted to benzilic acid
- (3) Benzilic acid is converted to benzoin
- (4) Benzil is converted to benzilic acid

**42.** Grignard reagent shows addition on :

(1) 
$$C = O$$
 (2)  $C = S$  (3)  $-C = N$ 

$$(2) \quad C = S$$

$$(3) -C \equiv N$$

(4) All

43. A positive carbylamine test is given by:

- (1) N, N-Dimethylaniline
- (2) 2-4- Dimethylaniline
- (3) N, N-dimethyl-p-nitroaniline
- (4) p-methyl benzylamine

44. 
$$CH_{3} \xrightarrow{(i) Mg / Ether} A$$

$$(ii) CO_{2} / H_{3}O^{\oplus}$$

$$(iii) KMnO_{4} / OH^{-}$$

$$(iv) \Delta$$

*A* is:

(1) 
$$\bigcirc CH_3$$

45. 
$$O_2N$$
  $\longrightarrow$   $NO_2$   $\longrightarrow$   $NO_2$   $\longrightarrow$   $NO_2$   $\longrightarrow$  Product

Product is:

(1) Picric acid

(2) Phenol

(3) Chlorobenzene

(4) No reaction since (C - Cl) bond is stable

**46.** 
$$\bigcirc N(CH_3)_2 \xrightarrow{(i) HNO_2} A + B$$

A and B are:

(1) 
$$HO-\bigcirc \bigcirc -NO$$
,  $(CH_3)_2NH$  (2)  $HO-\bigcirc \bigcirc -OH$ ,  $(CH_3)_2NH$  (3)  $HO-\bigcirc \bigcirc -NO$ ,  $CH_3CH_2NH_2$  (4) None is correct

(2) 
$$HO-\bigcircOH$$
,  $(CH_3)_2NH$ 

(3) 
$$HO-\langle \bigcirc \rangle$$
-NO,  $CH_3CH_2NH_2$ 

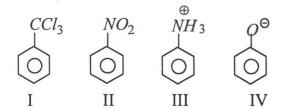
- **47.** A  $\beta$ -hydroxy carbonyl compound is obtained by the action of *NaOH* on :
  - (1)  $R_3C \cdot CHO$
- (2)  $C_6H_5CHO$
- (3)  $CH_3CHO$
- (4) *HCHO*
- Which have acidic H, but not reacting with NaHCO<sub>3</sub>?
- (1)  $CH_3COOH$  (2)  $\bigcirc\bigcirc$   $\bigcirc$   $\bigcirc$  O  $\parallel$   $\parallel$  (3)  $CH_3CCH_2CN$  (4)  $NH_3$
- Predominant product formed when HCl adds to 2,4-hexadiene is:
  - (1) 4-chloro-2-hexene

(2) 2-chloro-3-hexene

(3) 2-chloro-4-hexene

(4) 1-chloro-2-hexene

**50.** Electrophile  $NO_2^{\oplus}$  attacks the following:



In which cases  $NO_2^{\oplus}$  will be at meta position :

(1) II and IV

(2) I, II and III

(3) II and III only

(4) I only

**51.** Which of the following statements about tetramethylsilane is *incorrect*?

(1) It is Inert

(2) It is used to provide a reference against which other peaks are measured

(3) It is volatile and can be easily distilled off and used again

(4) It produces a single peak at  $\delta = 10$ 

**52.** The ionic strength of 0.25 molal  $K_2SO_4$  solution will be:

- (1) 0.25
- (2) 0.50
- (3) 0.75
- (4) 0.60

**53.** Debye-Hückel limiting law equation relates :

(1) Activity coefficient with ionic strength of the solution

(2) Mean ionic coefficient with ionic strength of the solution

(3) Activity coefficient with square of the ionic strength of the solution

(4) None of these

**54.** In the lead-acid battery during charging, the cathode reaction is :

- (1) Reduction of  $Pb^{2+}$  to Pb
- (2) Formation of PbSO<sub>4</sub>

(3) Formation of  $PbO_2$ 

(4) None of these

- In the phenomenon of Larmor pression, the angular frequency of pression, "Larmor frequency" is expressed as: (1)  $w = r + B_z$  (2)  $w = r - B_z$  (3)  $w = r / B_z$  (4)  $w = rB_z$

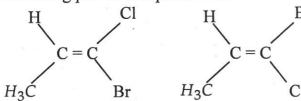
where  $r = \frac{\mu}{I(h/2\pi)}$  and all the notations have usual meanings.

- Which of the following relations represent Clasius-Claypeyron equation? 56.
  - (1)  $\left| \frac{\partial}{\partial T} (G/T) \right|_{P} = -\frac{H}{T^2}$
- (2)  $\left| \frac{\partial}{\partial T} (G/T) \right|_{\Gamma} = H$

(3)  $\frac{\partial}{\partial T} lnk_P = \frac{\Delta H^{\circ}}{RT^2}$ 

- (4)  $\frac{\partial}{\partial T} lnP = \frac{\Delta H^{\circ}_{\text{vaporization}}}{PT^{2}}$
- Which of the following reaction involves rearrangement of nitrogen yields?
  - (1) Wittig reaction

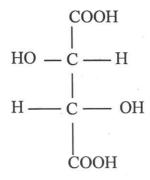
- (2) Von-Richter reaction
- (3) Sommlet-Hauser reaction
- (4) Pinacol-Pinacolone rearrangement
- **58.** Following pair of compounds are:



(1) Enantiomers

(2) Diastereomers

- (3) Geometrical isomers
- (4) Homomers
- **59.** Absolute configuration of:



- (1) 2S, 3S
- (2) 2R, 3R
- (3) 2S, 3R
- (4) 2R, 3S

60. Which among the following reagents gives syn addition with alkenes:

I  $Br_2$ 

II Dil  $KMnO_4 / {}^-OH$ 

III  $OSO_4/NaSO_3H/H_2O$ 

IV  $H_2/Ni/\Delta$ 

Select the answer from the codes given below:

- (1) Only I
- (2) II and III
- (3) II, III and IV
- (4) Only IV

**61.** Allylic halogen substitution can be done with:

- (1) Halogen at high temperature
- (2) NBS in sunlight
- (3) Sulphuryl chloride in sunlight
- (4) All of these

62. Allylic alcohol is obtained when glycerol reacts with the following at 260°C:

- (1) Formic acid
- (2) Oxalic acid
- (3) Both
- (4) None

**63.**  $(CH_3)_3C - CH = CH_2 \xrightarrow{X} (H_3C)_3C - CH - CH_3 X \text{ can be : } OH$ 

- (1)  $BH_3 . THF / H_2O_2 . ^-OH$
- (2)  $H_3O^+$
- $(3) \ Hg(OAC)_2 / NaBH_4, NaOH$
- (4) None

**64.** m-cresol on bromination gives :

$$(1) \begin{array}{c} Br & CH_3 \\ \hline OH \\ Br \end{array}$$

$$(2) \quad OH$$

(3) 
$$CH_2Br$$
 $Br$ 
 $OH$ 

$$(4) \circ \bigcirc OH$$

65.	Dipole moment is shown by:	
	(1) 2, 2-dimethylpropane	(2) Trans-2-pentene
	(3) Trans-1,2-dichloroethene	(4) 2, 2, 3, 3-tetrabromobutane
66.	Which of the following does not give silver nitrate?	white precipitate when boiled with alcoholic
	(1) Methyl chloride	(2) Carbon tetrachloride
* *	(3) Benzyl chloride	(4) Vinyl chloride
67.	The formation of cyanohydrin from a ke	tone is an example of:
	(1) Electrophilic addition	(2) Nucleophilic addition
	(3) Electrophilic substitution	(4) Nucleophilic substitution
68.	When acetaldehyde is heated with Fehli	ng solution it gives a precipitate of:
	(1) Cu (2) CuO	(3) $Cu_2O$ (4) $Cu, CuO, Cu_2O$
69.	In the cannizaro reaction given below	
	$2PhCHO \xrightarrow{\Theta_{OH}} PhCH_2OH + PhCO$	$O^{\Theta}$ , the slowest step is :
9	(1) Attack of ${}^{\Theta}OH$ at the carbonyl ground	ıp
9,	(2) Transfer of hydride to carbonyl group	up
	(3) The abstraction of proton from carb	oxylic acid
	(4) The deprotonation of <i>PhCH</i> <sub>2</sub> <i>OH</i>	
70.	Which of the following carboxylic acids	s undergo decarboxylation easity?
	(1) $C_6H_5COCH_2COOH$	(2) $C_6H_5COCOOH$
	(3) $C_6H_5CH(OH)COOH$	(4) $C_6H_5CH(NH_2)COOH$
71.	The internal pressure of an ideal gas is	
	(1) zero (2) infinite	(3) 1 (4) None of these
CPG-	EE-2019/(Chemistry)-(SET-X)/(D)	

72.	The standard state for a solid is:	
	(1) Pure state of the solid at one atm	mospheric pressure
	(2) Pure state of the solid at one atm	nospheric pressure and 273 K temperature
	(3) Pure state of the solid at one atm	nospheric pressure and 298 K temperature
	(4) Pure state of the solid at one atm	mospheric pressure at any given temperature
73.	The Millar indices of crystal planes	cut through the crystal axis at $(2a, 3b, c)$ are:
	(1) (1 2 2) (2 3 6)	(3) (6 3 2) (4) (3 2 6)
74.	Which one of the following stateme	ents is <i>true</i> ?
	(1) Work is a state function.	
	(2) Entropies are additive and proba	abilities are multiplicative.
	(3) Entropies are multiplicative and	l probabilities are additive.
	(4) The entropy possessed by substa	ance at 298 K is called residual Entropy.
75.	A liquid is in equilibrium with its va phases have the same :	apours at its boiling point. The molecules in the two
	(1) Chemical potential	(2) Enthalpy
	(3) Entropy	(4) None of these
76.	In which of the following reactions,	the collision theory of reactions rate is valid?
	(1) Reaction between two diatomic	molecules
	(2) Reaction between an atom and a	a diatomic molecule
	(3) Reaction between two complex	molecules
	(4) Reaction between two atoms	
77.	The cell potential is a/an:	
	(1) Colligative property	(2) Thermodynamic property
	(3) Extensive property	(4) Intensive property
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78.	For an isentropic c	hange of state:		y
	(1) dS = 0	(2) $dS = 1$	(3) dH = 0	(4) None of these
79.	Isotonic solutions	have same :		
	(1) Viscosity		(2) Surface tension	n
	(3) Freezing point	i	(4) Osmotic press	eure
80.	The rotational spec with spacing equal		omic rotator is compr	rised of equally spaced lines
	(1) B	(2) 2 B	$(3) \ 2.5 B$	(4) 3 B
81.	Wilson disease is	caused by the excess	of:	
	(1) Zinc	(2) Copper	(3) Magnesium	(4) Lead
82.	In the compound	$Fe_4[Fe(CN)_6]$ the res	spective oxidation sta	ites of Fe are:
	(1) II, III	(2) II, II	(3) III, II	(4) III, III
83.	In vitro reaction of	f excess of $O_2$ with f	ree heme B in aqueou	us medium, end product is:
	(1) Hematin			
	(2) Heme B CO <sub>2</sub>			
	(3) $[O_2^ \text{Fe}(III) -$	– protoporphyrin – I	X ]	
	(4) All of these			
84.	The main reason the corresponding	•	f oxidation states ex	hibited by the actinoids than
	(1) More energy	difference between 5	of and 6d orbitals that	n between 4f and 5d orbitals.
	(2) Lesser energ orbitals.	y difference between	en 5f and 6d orbita	ls than between 4f and 5d
	(3) Larger atomic	c size of actinoids th	an the lanthanoids.	
	(4) Greater reacti	ive nature of actinoic	ds than the lanthanoic	ls.
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85.	Which of the follow	ving has zero dipole r	nom	ent?		
	(1) <i>ClF</i>	(2) <i>PCl</i> <sub>3</sub>	(3)	SiF <sub>4</sub>	(4	CFCl <sub>3</sub>
86.	The correct order of	f ionic radii of $Y^{3+}$ ,	La <sup>3+</sup>	, $Eu^{3+}$ and $L$	и <sup>3+</sup> і	s:
	(Atomic Nos. $Y = 3$	9, $La = 57$ , $Eu = 63$ ,	Lu=	= 71)		
	$(1) Y^{3+} < La^{3+} < Ea$	$u^{3+} < Lu^{3+}$	(2)	$\gamma^{3+} < Lu^{3+} <$	Еи <sup>3+</sup>	$< La^{3+}$
	(3) $Lu^{3+} < Eu^{3+} < Lu^{3+}$	$La^{3+} < Y^{3+}$	(4)	$La^{3+} < Eu^{3+} <$	₹ Lu³	$3+<\gamma^{3+}$
87.	AgCl is soluble in a	mmonia due to the fo	orma	tion of:		
	(1) $Ag(NH_2)Cl$	(2) $[Ag(NH_3)_2]Cl$	(3)	$AgNH_2$	(4	NH <sub>4</sub> [ $AgCl(NH)_2$ ]
88.	Hydrogen directly o	combines with:				
	(1) Au	(2) <i>Cu</i>	(3)	Ni	(4	) Ca
89.	Which is used in fil	ling cavities in teeth	?			
	(1) Cu (Hg)	(2) Ag (Hg)	(3)	Zn (Hg)	(4	Ni (Hg)
90.	Mg <sup>2+</sup> is prepared in	n photosynthesis by	chlor	ophyll becaus	e :	
	(1) It has strong spi	in-orbit coupling				
	(2) It has weak spir	n-orbit coupling				
	(3) It is a heavy me	etal				
	(4) It binds strongly	y with chlorophyll				4 40 40 40 40 40 40 40 40 40 40 40 40 40
91.	Which of the follow	ving has least de-Bro	glie	wavelength?		
	(1) e <sup>-</sup>	(2) p	(3)	CO <sub>2</sub>	(4	1) SO <sub>2</sub>
92.	The geometry of As	$sF_5$ is:				
	(1) Pyramidal		(2)	Tetrahedral		
	(3) Trigonal bipyramidal		(4)	Octahedral		
93.	The effective nuclea	ar charge at the perip	hery	of Cr atom, u	sing	slater rule is:
	(1) 3.35	(2) 3.70	(3)	1.70	(4	1) 2.60

50)				
94.	The theoretical value	e of magnetic mome	nt of $Gd^{3+}$ is:	
	(1) 7.94	(2) 9.72	(3) 9.57	(4) 7.63
95.	Which of the follow	ving will <i>not</i> show H	-bonding ?	8
	(1) HF	(2) NH <sub>3</sub>	(3) <i>H</i> <sub>2</sub> <i>O</i>	(4) CH <sub>4</sub>
96.	The oxide which gi	ves $H_2O_2$ on treatme	ent with dilute ac	id is:
	(1) <i>PbO</i> <sub>2</sub>	(2) $Na_2O_2$	(3) <i>MnO</i> <sub>2</sub>	·(4) TiO <sub>2</sub>
97.	Inorganic benzene	s:		
	$(1)$ $BH_3OH_3$		(2) $B_3N_3H_6$	
	(3) $B_2H_6$		(4) $B_4H_{10}$	
98.	The correct order o	f increasing size is:		**
	$(1) Na^+ < Li^+ < Be$	$^{2+} < B^{3+}$	(2) $B^{3+} < Be^{2+}$	$< Li^+ < Na^+$
	$(3) Be^{2+} < B^{3+} < Ne^{3+}$	$a^+ < Li^+$	$(4) Li^+ < Na^+ <$	$B^{3+} < Be^{2+}$
99.	Addition of As in tr	race amounts to pure	Ge will result in	the formation of:
	(1) n-type semicon	ductor	(2) Germanium	n arsenic
	(3) p-type semicor	ductor	(4) Super cond	ucting-alloy
100.	Freon is:			
	(1) <i>CCl</i> <sub>3</sub> <i>H</i>		(2) CF <sub>4</sub>	
	$(3) CF_3H_3$		(4) $CCl_2F_2$	

Question	Α	В	zed Entrance E	D
No.				
1	4	1	1	2
2	3	2	4 .	3
3	4	1	2	4
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7	2	2	4	1
8	2	2	1	2
9	1	2	4	1
10	4	1	2	2
11	1	4	2	2
12	2	4	3	3
13	1	4	1	3
14	4	2	2	4
15	2	1	3	2
16	3	1	2	3
.7	2	3	2	1
.8	2	2	4	4
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7	1	1	3	2
3	1	4	2	2
)	2	3	2	2
	3	3	2	1
	1	2	4	4



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Question No.	Α	В	С	D
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L.	4	4 .	1	2
2	3	3	2	3



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Question	r key of CHEMI	В	С	Total La
No.				D
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19	2	2	3	1
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