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PG-EE-2015

SUBJECT: Chemistry

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		Sr. No
Time: 11/4 Hours	Max. Marks: 100	Total Questions: 100
Roll No. (in figures)	_ (in words)	
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(Signature of the Candidate)		Signature of the Invigilator)

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- 1. All questions are compulsory.
- 2. The candidates *must return* the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means/misbehaviour will be registered against him/her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
- 3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing within two hours after the test is over. No such complaint(s) will be entertained thereafter.
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- 5. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
- 6. Use only Black or Blue Ball Point Pen of good quality in the OMR Answer-Sheet.
- 7. Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

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1.	The number of optically active isomer (1) 4 (2) 8	s of HOCH ₂ (CHOF (3) 16	H) ₄ CHO is: (4) 24	
2.	Geometry of trifluoromethyl free radi (1) Planar (2) Pyramidal	cal is: (3) V-shaped	(4) Tetrahedral	
3,	on treatment with aqueo	us KOH gives :		
S S S S S S S S S S S S S S S S S S S	H_3C CH_3 OH OH OH OH OH	(3)	OH (4)	
4.	Chloroform easily gets converted to sunlight. Which of the following phosgene? (1) Ethanol (3) Diethyl carbonate	OH to poisonous phos substances is add (2) Sodium car (4) Sodium hy	bonate	and of
5.	n-Butane reacts with Br_2 at 130° to g (1) $CH_3 - CH_2 - CH - CH_3$ Br CH_3 (3) $H_3C - C - Br$ CH_3	ive more amount of (2) CH ₃ CH ₂ C. (4) All in equa	H ₂ CH ₂ Br	
6.	The reaction of $CH_3CH = CH - \bigcirc -$	OH with HBr gives (2) CH ₂ CH ₂ C		

7. Preparation of alkyl halides in laboratory is least preferred by:

(1) Halide exchange

(2) Direct halogenation of alkanes

(4) $CH_3CH-CH_2-\bigcirc -Br$

- (3) Treatment of alcohols
- (4) Addition of hydrogen halides to alkenes

- 8. Allyl alcohol is obtained when glycerol reacts with following at 260°C:
 - (1) Formic acid
- (2) Oxalic acid
- (3) Both

Predict the major product:

$$\langle O \rangle$$
+ excess HI \rightarrow

- (1) $HO CH_2 CH_2 CH_2 CH_2 I$ (2) $HOCH_2CH_2CH_2CH_2OH$
- (3) $I CH_2CH_2CH_2 CH_2 I$
- (4) No reaction
- 10. Conversion of chlorobenzene into phenol of Dow's process is an example of:
 - (1) Free radical substitution
- (2) Nucleophilic substitution
- (3) Electrophilic substitution
- (4) Rearrangement
- 11. Predict the products of reaction below:

OH
$$COCH_3$$

OH $COCH_3$

OH $COCH_3$

(1) O (3) O (4) Both (1) and (2)

- The product formed in the following reaction $C_6H_5 O CH_3 \xrightarrow{HI}$ are:
 - (1) C_6H_5OH and CH_3I
- (2) C_6H_5I and CH_3OH

 CH_3

(3) C_6H_5I and CH_3

(4) C_6H_6 and CH_3OI

13.
$$CH_3$$
 $Cold$
 $Alkaline \ KMnO_4$
 $AcOH$
 $Acoh$

$$CH_3$$
 CH_3 OH OH

(4) None of these

(2)

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14. 3-methyl, 3-hexanol can be prepared by:

- (1) CH₃MgI and 3-hexanone, followed by hydrolysis
- (2) C_2H_5MgI and 2-pentanone, followed by hydrolysis
- (3) C_3H_7MgI and 2-butanone, followed by hydrolysis

(4) Any of the methods above

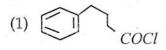
15. Which of the following does not give ethylamine on reduction?

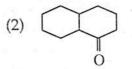
- (1) Methylcyanide (2) Ethylnitrile
- (3) Nitroethane
- (4) Acetamide

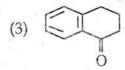
16. Activation of benzene ring by $-NH_2$ in aniline can be reduced by treating with:

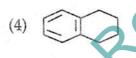
- (1) Dilute HCl
- (2) Ethyl alcohol
- (3) Acetic acid
- (4) Acetyl chloride

17. COOH on reaction with $SOCl_2$ and then $AlCl_3$ forms:









18. Hydrogenation of $C_6H_5CHOHCOOH$ over $Pd-Al_2O_3$ catalyst in methanol gives:

(1) C_6H_5COOH

- (2) *С₆H₁₁СЙОНСООН*
- (3) $C_6H_5CHOHCH_2OH$
- (4) $C_6H_{11}CH_2COOH$

19. $C_7H_{12} \xrightarrow{(i) \ KMnO_4} H_3C C CH_2 CH_2 CH_2 CH_2 COOH, C_7H_{12}$ is:

- (1) $CH_3C \equiv C CH_2CH_2CH_2CH_3$
- (2) CH₂

(3) CH₃

(4) $H_2C = CH - CH_2CH_2 C = CH_2$ CH_3

20. When 2-methyl propene is heated with acetyl chloride in presence of $SnCl_2$, the product is

- (1) $CH_3 C(Me)CH_2COCH_3$
- (2) CH₃ CH CH₂COCH₃

Ċl

N.

(3) CH₃CO₂CMe₃

(4) $CH_3COC = CH_3$ Me

21.	further treated with NaOH solution, which	with HNO ₂ and the product so formed is the produces blue colouration. X can be:
e 2	(1) $CH_3CH_2NH_2$ (2) $CH_3CH_2NO_2$	(3) CH_3CH_2ONO (4) $(CH_3)_2CHNO_2$
22.	(3) Hexamethylenetetramine	(2) Terephthalic aid (4) Isoprene
23.	a molecule of ethanol to form: (1) Methyl phenyl pyrazolone (3) Methyl oxazolone	mine and product formed immediately loses (2) 4-methylcoumarin (4) Methyl isoxazolone
24.	In UV the following compound would start the follow	how absorption at: (3) 304 nm (4) 317 nm
25.	(1) 200	arrangement of nitrogen yields? (2) Von-Richter reaction (4) Pinacol-Pinacolone rearrangement
*	но-с-н	
26.	COOF	gallerge and the segment of the con-
27	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	
	Reagent used for above reaction is: (1) $NaBH_4 / CH_3OH$ (3) SeO_2	 (2) MnO₂ (4) Br₂ followed by reaction with KOH
28	In the reaction \bigcirc - $COCl \frac{H_2/Pd-Bas}{\bigcirc}$	
	(1) O-COONa	(2) (O)-CHO
	(3) \bigcirc $-CH_2OH$	(4) Both \bigcirc -COONa and \bigcirc -CH ₂ OH
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- (1) Aldol condensation
- (2) Micheal addition followed by Dieckmann condensation
- (3) Claisen ester condesation
- (4) Micheal addition

30. The artificial sweetner used in soft drinks is:

- (1) Glucose
- (2) Fructose
- (3) Asparatin
- (4) Glycerol

31. The IUPAC name of compound $CH_2 - C - C - COOMe$ is $COOMe \ CH_2$

- (1) 2,3-dimethoxycarbonyl pent-1, 3-diene
- (2) 2-Ethylidene-3-methylidine dimethyl pentan-1, 5-dioate
- (3) 2-Ethylidine-3-methylidene-methyl-pentan-1, 5-dioate
- (4) None of these

32. m-cresol on bromination gives:

(1)
$$Br$$
 OH OH CH_2Br Br Br

$$(3) \bigcirc OH$$

$$OH$$

$$CH_2Br$$

$$OH$$

$$OH$$

$$OH$$

$$OH$$

33. Which of the following compounds on reaction with KNH_2 in Liq NH_3 does not involve Benzyne intermediate?

(1)
$$\bigcirc$$

$$C_1$$

$$C_1$$

$$CH_3$$

$$CH_3$$

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34.	Allylic halogen substitution can be done (1) Halogen at high temperature (3) Sulphuryl chloride in sunlight	(2) NBS in sunlight
	(3) $n = 3, 1 = 0, m = 0$	(2) $n = 3, l = 1, m = \pm 1$ (4) $n = 3, l = 2, m = \pm 2$
36.	Which of the following orbitals has zero	probability of finding the electron in yz plane
	(1) Px (2) Py	(3) Pz (4) dyz
37.	Which of the following orders regarding (1) $N > O > F$ (2) $F > O > N$	g the ionization energy is correct? (3) $N > O < F$ (4) $O > F > N$
38.	Most favourable conditions to form a co (1) large cation and small anion (3) small cation and small anion	
39.	Silicon doped with arsenic is an examp. (1) p-type (2) n-type	le of which type of semiconductor? (3) n, p-type (4) intrinsic
40.	Which of the following defect, if preser	at lowers the density of the crystal?
	(1) Frenkel	(2) Schottky
	(3) Edge dislocation	(4) Constitution of F-centres
41.	A hybrid orbital formed from s and p o	rbital can contribute to:
	(1) a σ bond only	(2) π -bond only
	(3) either a σ or π bond	(4) cannot be predicted
42.	During change of NO ⁺ to NO, the elec	tron is added to :
	(1) σ-orbital (2) π- orbital	(3) σ^* -orbital (4) π^* -orbital
43.	Intramolecular H-bonding is present in	n: De mone
	(1) meta nitrophenol	(2) salicylaldehyde
	(3) hydrogen chloride	(4) benzophenone
44.	Which forces are strongest amongst th	e following?
	(1) Ion-ion interaction	(2) Ion-dipole forces
E	(3) Dipole-dipole forces	(4) Dipole induced dipole forces
45.	The product obtained in the reaction of	of diborane with excess of ammonia is:
	(1) $B_2H_6.NH_3$ (2) $B_2H_6.2NH_3$	(3) $(BN)_x$ (4) Borazine

4	6.	Pyrophosphoric acid is:		
		(1) monobasic (2) dibasic	(3)	tribasic (4) tetrabasic
4	7.	The basic unit in layer and sheet silicates	s is:	
		(1) SiO_4^{4-} (2) $Si_2O_7^{6-}$	(3)	$(SiO_3)_n^{2n}$ (4) $(Si_2O_5)_n^{2n-}$
4	8.	Which of the following bonds is the stro	onge	st?
		(1) F–F (2) Cl–Cl	(3)	I-I (4) $Br-Br$
4	9.	Hybridization and structure of XeF_4 is:		
		(1) sp^3d , trigonal bipyramidal		
		(3) sp^3d^2 , square planar	(4)	sp^3d^2 , hexagonal
5	0.	Which of the following transition element	nt sh	nows the highest oxidation state?
		(1) Mn (2) Fe	(3)	V (4) Cr
5	1.	The planar complex (MABCD) gives :		XO
		(1) two optical isomers	300 C 300	two geometrical isomers
		(3) three optical isomers		three geometrical isomers
5	2.	Which one of the following compounds		
		(1) $NaNH_2$ (2) NH_4OH	(3)	$(NH_4)_2SO_2$ (4) $(NH_4)_2CO_3$
5	3.	The +3 ion of which of the following has	s hal	f filled of subshell ?
		(1) La (2) Lu	(3)	Gd (4) Ac
5	4.	In a nuclear reactor, oxides of which material?	of	the following metals are used as a fuel
		(1) Uranium and Actinium	(2)	Thorium and Actinium
		(3) Uranium, Thorium and Plutonium	(4)	Thorium, Actinium and Plutonium
5	5.	In qualitative analysis NH ₄ Cl is added	befo	re NH ₄ OH :
		(1) to decrease <i>OH</i> ⁻ concentration	(2)	to increase OH ⁻ concentration
		(3) for making HCl	(4)	statement is wrong
5	6.	The brown ring test for NO_2^- and NO_3^- the formula:	is d	ue to the formation of complex ion having
		(1) $[Fe(H_2O)_6]^{2+}$	(2)	$[Fe(NO)(CN)_5]^{2+}$
**		(3) $[Fe(H_2O)_5NO]^{2+}$	(4)	$[Fe(H_2O)(NO)_5]^{2+}$
5	7.	The crystal field stabilization energy (CI	FSE)	will be the highest for :
		AN THE RESERVE AND THE REPORT OF THE RESERVE AND THE RESERVE A		$[Mn(H_2O)_6]^{2+}$ (4) $[Co(NH_3)_6]^{3+}$
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58.	The expected spin-only magnetic moments for $[Fe(CN)_6]^{4-}$ and $[FeF_6]^{3-}$ respectively
	are: (1) 1.73 and 1.73 BM (2) 1.73 and 5.92 BM (3) 0.0 and 1.73 BM (4) 0.0 and 5.92 BM
	In tetrahedral geometry, which are of the following sets of electronic configurations will have orbital contribution to the magnetic moment? (1) d^3 , d^4 , d^8 and d^9 (2) d^1 , d^6 , d^7 and d^9 (3) d^3 , d^4 , d^7 and d^9 (4) d^1 , d^3 , d^4 and d^9
60.	The most suitable route to prepare the trans isomer of $[PtCl_2(NH_3)(PPh_3)]$ is:
	(1) $[PtCl_4]^{2-}$ with PPh_3 followed by reaction with NH_3
Ta Wile	(2) $[PtCl_4]^{2-}$ with NH_3 followed by reaction with PPh_3
	(3) $[Pt(NH_3)_4]^{2+}$ with HCl followed by reaction with PPh_3
	(4) $[Pt(NH_3)_4]^{2+}$ with PPh_3 followed by reaction with HCI
61.	The ground state term symbol for d^3 is: (1) ${}^4F_{3/2}$ (2) ${}^4F_{9/2}$ (3) ${}^4D_{5/2}$ (4) ${}^4P_{3/2}$
62.	The pair of metal carbonyl complexes that are isoelectronic is:
	(1) $[Ni(CO)_4]$ and $V(CO)_6$ (2) $[Co(CO)_4]^-$ and $Ni(CO)_4$ (3) $[Cr(CO)_4]$ and $V(CO)_6$ (4) $[Fe(CO)_4]^-$ and $Cr(CO)_6$
	(3) [C/(CO)6] and (CO)6
63.	Which one of the following is a soft acid according to Pearson's concept of hard and
	soft acids? (1) Ag^+ (2) I^{7+} (3) Sr^{2+} (4) Al^{3+}
64.	Which one of the following chemical species can behave both as a Bronsted-Lowry
	acid and a base? (1) H_3O^+ (2) HCO_3^- (3) NO_3^- (4) SO_4^{2-}
65.	In oxyhaemoglobin Fe is in state: (1) Low spin and diamagnetic (2) Low spin and paramagnetic (3) High spin and diamagnetic (4) High spin and paramagnetic
66.	Zeise's salt is represented by:
	(1) H_2PtCl_6 (2) $[PtCl_4]^{2-}$ (3) $[ZnCl_4]^{2-}$ (4) $[PtCl_3(n^2-C_2H_4)]$
67.	$[T_i(H_2O)]_{i=1}^{3+}$ is caused by:
	(1) charge transfer (2) $t_2 \rightarrow e$ (3) $e \rightarrow t$ (4) John-Teller effect
10 10 10 10 10 10 10 10 10 10 10 10 10 1	(5) (7)
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Which of the following is correct? 68.

(1)
$$[A^2, B] = \hat{A}[\hat{A}, \hat{B}] + [\hat{A}, \hat{B}] \hat{A}$$

(2)
$$[A^2, B] = \hat{A}[\hat{B}, \hat{A}] + [\hat{A}, \hat{B}] \hat{A}$$

(3)
$$[A^2, B] = \hat{A}[\hat{A}, \hat{B}] + \hat{A}[\hat{A}, \hat{B}]$$

(4) None of the above

The operator for square of linear momentum, \hat{p}^2 is given by :

$$(1) \quad \hat{p}^2 = \hbar^2 \nabla^2$$

(2)
$$h^2\nabla^2$$

(3)
$$\hat{p}^2 = -\hbar^2 \nabla^2$$
 (4) $i\hbar \nabla^2$

(4)
$$i\hbar\nabla^2$$

70. Eigen value is always a:

Entropy is related to probability by relation: 71.

$$(1) S = RlnW$$

$$(2) S = \frac{R}{\ln W}$$

(3)
$$S = klnW$$

$$(4) \quad S = \frac{k}{\ln W}$$

72. The organic compound C_2H_6O possess:

(1) One equivalent CH₃ group

(2) Two equivalent CH₃ groups

(3) Two non-equivalent CH₃ groups

(4) None of these

Thermal conductivity of gas is independent of: 73.

(1) Pressure

(2) Temperature

(3) Mean free path

(4) Heat capacity at constant volume

70 The vibrational degrees of freedom of a protein molecule containing 44,700 atoms are:

(1) 13,410

(2) 44,700

(3) 31

(4) 1,34,100

The equation for predicting atmospheric pressure, called Barometric formula is:

$$(1) \quad P = P_0 \exp\left(\frac{-Mgx}{RT}\right)$$

(2)
$$P = P_0 \exp\left(\frac{Mgx}{RT}\right)$$

(3)
$$P = P_0 \exp\left(\frac{Mg}{RT}\right)$$

$$(4) \quad P = P_0 \exp\left(\frac{Mgx^2}{RT}\right)$$

where x, g are the altitude and acceleration due to gravity.

The Vander Waals equation for n' moles of gas is expressed by :

$$(1) \quad P = \frac{RT}{V - nb} - \frac{an^2}{V^2}$$

$$(2) \quad P = \frac{nRT}{V - nb} - \frac{an^2}{V^2}$$

$$(3) \quad P = \frac{nRT}{nV - b} \frac{an^2}{V^2}$$

(4)
$$P = \frac{nRT}{V - b} - \frac{an^2}{V^2}$$

The mass less particles are:

(1) Protons

(2) α-rays

(3) gamma rays

(4) β-particles

Absorbance A of the solution is expressed as:

(1)
$$\log\left(\frac{I}{I_0}\right)$$

$$(2) \quad \frac{I}{I_0}$$

(3)
$$\ln\left(\frac{I}{I_0}\right)$$

(4)
$$\log \frac{I_0}{I}$$

79. A real gas most closely approaches the behaviour of a perfect gas at: (1) low pressure and high temperature (2) high pressure and low temperature (4) high pressure and high temperature (3) low pressure and low temperature The boiling point of a liquid is 36°C. Assuming that it obeys Trouton's rule, its molar heat of vaporization will be: (2) 27. 192 KJ mol⁻¹ (1) 271.92 KJ mol⁻¹ (4) 2.71 KJ mol⁻¹ (3) 2719.2 KJ mol⁻¹ The Miller indices of crystal planes which cut through the crystal axis at (2a, -3b, -3c) (4) (232) $(3) \ \left(3\,\overline{2}\,\overline{2}\right)$ $(2) \quad (\overline{2} \ 3 \ \overline{2})$ (1) $(\overline{2}\overline{2}3)$ A tetragonal crystal possesses the following axis of symmetry: (4) three-fold (3) four-fold (2) six-fold The temperature below which a gas becomes cooler on expansion is called: (1) two-fold (2) Inversion temperature 83. (1) Boyle temperature (4) Boiling point (3) Critical temperature For one mole of the gaseous mixture, the entropy of mixing is given by : (2) $\Delta S_{mix} = -R \sum \ln x_i$ (1) $\Delta S_{mix} = -R \sum r_i \ln x_i$ $\Delta S_{mix} = -R \sum x_i \ln x_i$ where r_i, x_i represent activity coefficient and mole fraction of components in the (3) $\Delta S_{mix} = -R \sum r_i \ln r_i$ mixture. Which of the followings is correct? (2) $\left(\frac{\partial S}{\partial P}\right)_T = \left(\frac{\partial V}{\partial S}\right)_P$ (1) $\left(\frac{\partial S}{\partial P}\right)_T = -\left(\frac{\partial V}{\partial T}\right)_P$ (4) $\left(\frac{\partial T}{\partial V}\right)_{S} = \left(\frac{\partial P}{\partial S}\right)_{V}$ (3) $\left(\frac{\partial S}{\partial V}\right)_{T} = -\left(\frac{\partial P}{\partial T}\right)_{T}$ The standard state for a solid is the pure state of solid at: (1) one atmospheric pressure and 273°C (2) one atmospheric pressure and given temperature (3) 273 K (4) one atmospheric pressure and 273 K 87. In the limit $T \rightarrow 0$, for a crystal: $(4) S_T = C_{V/T}$ (3) $S_T = C_{P/3}$ $(2) S_T = C_V$ where C_P , C_V are heat capacity at constant pressure and volume respectively. $(1) S_T = C_P$

88.		93°C ($k_f = 1.86$) 50 gm in 5 litre of 50 gm in five litr	of water	
89.	spacing between (123) planes will be:	15	100 pm, c = 150 pr. 4) 2.9 pm	n. The
00		.25 pm (
90.		uananajan (1) Pure colution	
			4) Pure solution	
91.	 The rate constant for a second-order reaction concentration of the reactant is 0.05 mol dm⁻³ 			initial
	(1) 100 minutes (2) 10 minutes (3) 3	00 seconds (4) 1.0 minute	
92.	 Triple point is the point where: (1) Three components are in equilibrium (2) The number of degrees of freedom is three (3) The number of degrees of freedom is zero (4) Three components are not in equilibrium 			
93.	 For the distribution of organic solute between coefficient k = √C₂ / C₁ suggest that: (1) solute exist as monomer in Benzene (2) solute as exist as dimer in benzene (3) solute exist as dimer in water (4) None of these 	water (C_1) and	benzene (C_2), pa	rtition
94.	. In the lead acid battery during charging the ca	athodic reaction	is:	
	(1) Formation of $PbSO_4$ (2) F	Formation of PbC	O_2	
	(3) Reduction of Pb^{2+} to Pb^{+1} (4) F	Reduction of Pb	⁺² to <i>Pb</i>	3
95.	Which of the following is not a state function (1) Work (2) Enthalpy (3) I		4) Gibbs free ene	rgy
96.	The pH of a solution obtained by mixing 25 $(k_w = 10^{-14} \text{ mol}^2 \text{dm}^{-6})$ will be:	5 ml of 0.2 M H	Cl with 50 ml of	NaOH
	(1) 10 (2) 1.3 (3) 1	.3 ((4) 12	
97.	 The emulsifiers consist of: (1) Ionic compound (2) Ionic surfactants (3) Ionic as well as Non-ionogenic surfactant (4) Non-ionic surfactants 			
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98.	The rotational spectra of a rigid diatomic	rotato	or consist	s of equall	y spaced	l lines with
	spacing equal to:	S .				

- (1) 2B
- (2) B
- (3) 3B
- (4) 3B/2

where B is the rotational constant.

- Strong covalent bond exists between polymer chains in:
 - (1) Thermoplasts (2) Thermosets
- (3) Elastomers
- (4) All polymers

- 100. Choose the correct one:
 - (1) $1 \text{ ev} = 806.56 \text{ cm}^{-1}$
- (2) $1 \text{ ev} = 806506 \text{ cm}^{-1}$
 - (3) $1 \text{ ev} = 80.656 \text{ cm}^{-1}$

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В		Sr. No. 10350
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Mother's Name	Date of Examination	
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PG-EE-2015/Chemistry/(B)

1. Predict the products of reaction below:

$$\bigcirc -OH + CH_3 CCI \xrightarrow{AlCl_3} \bigcirc$$

$$OH \qquad OCOCH_3$$

$$(1) \bigcirc O \qquad (2) \bigcirc O \qquad (3) \bigcirc O \qquad (4) \cdot Both (1) \text{ and } (2)$$

$$COCH_3$$

- The product formed in the following reaction $C_6H_5 O CH_3 \xrightarrow{HI}$ are:
 - (1) C_6H_5OH and CH_3I
- (2) C_6H_5I and CH_3OH

(3) C_6H_5I and CH_3I

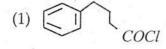
(4) C_6H_6 and CH_3OI

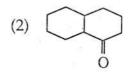
3.
$$\underbrace{CH_3}_{Alkaline\ KMnO_4} A \xrightarrow{CrCO_3} B; A \text{ and } B \text{ are } :$$

(1)
$$CH_3$$
 CH_3 $CH_$

- 4. 3-methyl, 3-hexanol can be prepared by:
 - (1) CH3MgI and 3-hexanone, followed by hydrolysis
 - (2) C2H5MgI and 2-pentanone, followed by hydrolysis
 - (3) C_3H_7MgI and 2-butanone, followed by hydrolysis
 - (4) Any of the methods above
- 5. Which of the following does not give ethylamine on reduction?
 - (1) Methylcyanide (2) Ethylnitrile
- (3) Nitroethane
- (4) Acetamide
- **6.** Activation of benzene ring by $-NH_2$ in aniline can be reduced by treating with:
 - (1) Dilute HCl
- (2) Ethyl alcohol (3) Acetic acid
- (4) Acetyl chloride

on reaction with $SOCl_2$ and then $AlCl_3$ forms:





- **8.** Hydrogenation of $C_6H_5CHOHCOOH$ over $Pd-Al_2O_3$ catalyst in methanol gives:
 - (1) C_6H_5COOH

- (2) $C_6H_{11}CHOHCOOH$
- (3) $C_6H_5CHOHCH_2OH$
- (4) $C_6H_{11}CH_2COON$
- 9. $C_7H_{12} \xrightarrow{(i) \ KMnO_4} H_3C C CH_2 CH_2 CH_2 CH_2 COOH, C_7H_{12}$ is:
 - $(1) \quad CH_3C = C CH_2CH_2CH_2CH_3$

- (4) $H_2C = CH CH_2CH_2 C = CH_2$
- 10. When 2-methyl propene is heated with acetyl chloride in presence of SnCl2, the product is:
 - (1) $CH_3 C(Me)CH_2COCH_3$

- (2) $CH_3CHCH_2COCH_3$ Me(4) $CH_3COC=CH_2$
- 11. The rate constant for a second-order reaction is $3.33 \times 10^{-2} \, \text{dm}^3 \, \text{mol}^{-1} \, \text{s}^{-1}$. If the initial concentration of the reactant is 0.05 mol dm^{-3} , then its half life period is:
 - (1) 100 minutes
- (2) 10 minutes
- (3) 300 seconds
- (4) 1.0 minute

- Triple point is the point where:
 - (1) Three components are in equilibrium
 - (2) The number of degrees of freedom is three
 - (3) The number of degrees of freedom is zero
 - (4) Three components are not in equilibrium

(4) None of these

23.	(1) Pressure (3) Mean free path	(2) Temperature (4) Heat capacity at constant volume
24.	(1) 13,410 (2) 44,700	protein molecule containing 44,700 atoms are: (3) 31 (4) 1,34,100
25.	The equation for predicting atmospheric	c pressure, called Barometric formula is :
	$(1) P = P_0 \exp\left(\frac{-Mgx}{RT}\right)$	$(2) P = P_0 \exp\left(\frac{Mgx}{RT}\right)$
	$(3) P = P_0 \exp\left(\frac{Mg}{RT}\right)$	$(4) P = P_0 \exp\left(\frac{Mgx^2}{RT}\right)$
	where x , g are the altitude and accelerati	ion due to gravity.
26.	The Vander Waals equation for 'n' mole	es of gas is expressed by :
500 g	$(1) P = \frac{RT}{V - nb} - \frac{an^2}{V^2}$	$(2) P = \frac{nRT}{V - nb} \frac{an^2}{V^2}$
	$(3) P = \frac{nRT}{nV - b} - \frac{an^2}{V^2}$	$(4) P = \frac{nRT}{V - b} - \frac{an^2}{V^2}$
27.	The mass less particles are: (1) Protons (2) α-rays	(3) gamma rays (4) β-particles
28.	Absorbance A of the solution is expresse	ed as:
77.	(1) $\log\left(\frac{I}{I_0}\right)$ (2) $\frac{I}{I_0}$	(3) $\ln\left(\frac{I}{I_0}\right)$ (4) $\log\frac{I_0}{I}$
29.	A real gas most closely approaches the h	behaviour of a perfect gas at :
	(1) low pressure and high temperature	(2) high pressure and low temperature(4) high pressure and high temperature
30.	The boiling point of a liquid is 36°C. As	ssuming that it obeys Trouton's rule, its mola
	heat of vaporization will be:	1
26	(1) 271.92 KJ mol ⁻¹ (3) 2719.2 KJ mol ⁻¹	(2) 27. 192 KJ mol ⁻¹ (4) 2. 71 KJ mol ⁻¹
31.	The planar complex (MABCD) gives :	
	(1) two optical isomers(3) three optical isomers	(2) two geometrical isomers(4) three geometrical isomers
32.	Which one of the following compounds	s will behave as ammono base in ammonia?
	(1) NaNH ₂ (2) NH ₄ OH	(3) $(NH_4)_2 SO_2$ (4) $(NH_4)_2 CO_3$
33.	The +3 ion of which of the following ha	as half filled of subshell ?
	(1) La (2) Lu	(3) Gd (4) Ac
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34.	In a nuclear reactor, oxides of which of the following metals are used as a fuel material?
100 M	(1) Uranium and Actinium (2) Thorium and Actinium
	(3) Uranium, Thorium and Plutonium (4) Thorium, Actinium and Plutonium
35.	In qualitative analysis NH_4Cl is added before NH_4OH : (1) to decrease OH^- concentration (2) to increase OH^- concentration (3) for making HCl (4) statement is wrong
36.	The brown ring test for NO_2^- and NO_3^- is due to the formation of complex ion having the formula :
	(1) $\left[Fe(H_2O)_6\right]^{2+}$ (2) $\left[Fe(NO)(CN)_5\right]^{2+}$
e Like	(3) $[Fe(H_2O)_5NO]^{2+}$ (4) $[Fe(H_2O)(NO)_5]^{2+}$
37.	The crystal field stabilization energy (CFSE) will be the highest for:
	(1) $[CoF_6]^{3-}$ (2) $[Co(CNS)_4]^{2-}$ (3) $[Mn(H_2O)_6]^{2+}$ (4) $[Co(NH_3)_6]^{3+}$
38.	The expected spin-only magnetic moments for $[Fe(CN)_6]^4$ and $[FeF_6]^{3-}$ respectively
	are: (1) 1.73 and 1.73 BM (2) 1.73 and 5.92 BM (3) 0.0 and 1.73 BM (4) 0.0 and 5.92 BM
39.	In tetrahedral geometry, which are of the following sets of electronic configurations will have orbital contribution to the magnetic moment? (1) d^3 , d^4 , d^8 and d^9 (2) d^1 , d^6 , d^7 and d^9 (3) d^3 , d^4 , d^7 and d^9 (4) d^1 , d^3 , d^4 and d^9
40.	[n or (vvv) (nnv)] .
	(1) $[PtCl_4]^{2-}$ with PPh_3 followed by reaction with NH_3
	(2) $[PtCl_4]^{2-}$ with NH_3 followed by reaction with PPh_3
	(3) $[Pt(NH_3)_4]^{2+}$ with HCl followed by reaction with PPh ₃
	(4) $[Pt(NH_3)_4]^{2+}$ with PPh_3 followed by reaction with HCl
	CH_CH ₂
41.	The IUPAC name of compound $CH_2 - C - C - COOMe$ is:
	COOMe CH2
	 2,3-dimethoxycarbonyl pent-1, 3-diene 2-Ethylidene-3-methylidine dimethyl pentan-1, 5-dioate 2-Ethylidine-3-methylidene-methyl-pentan-1, 5-dioate None of these
G-F	E-2015/Chemistry/(B) P. T. O

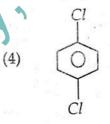
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43. Which of the following compounds on reaction with KNH₂ in Liq NH₃ does no involve Benzyne intermediate?

$$(1) \bigcirc^{Cl}$$

$$(3) H_5C_2 CH_2$$



44. 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

45. Which of the following sets of quantum numbers is not allowed?

(1)
$$n = 3, l = 1, m = +2$$

(2)
$$n = 3, 1 = 1, m = \pm 1$$

(3)
$$n = 3, 1 = 0, m = 0$$

(4)
$$n = 3, 1 = 2, m = \pm 2$$

46. Which of the following orbitals has zero probability of finding the electron in yz plane '

- (1) Px
- (2) Py
- (3) Pz
- (4) dyz

47. Which of the following orders regarding the ionization energy is correct?

- (1) N > O > F
- (2) F > O > N
- (3) N > O < F
- (4) O>F>N

PG-EE-2015/Chemistry/(B)

18.	Most favourable conditions to form a covalent bond is:
	(1) large cation and small anion (2) large cation and large anion
	(3) small cation and small anion (4) small cation and large anion
19.	Silicon doped with arsenic is an example of which type of semiconductor?
4	(1) p-type (2) n-type (3) n, p-type (4) intrinsic
50.	Which of the following defect, if present lowers the density of the crystal?
	(1) Frenkel (2) Schottky
	(3) Edge dislocation (4) Constitution of F-centres
51.	A nitrogenous substance X is treated with HNO_2 and the product so formed is further treated with $NaOH$ solution, which produces blue colouration. X can be: (1) $CH_3CH_2NH_2$ (2) $CH_3CH_2NO_2$ (3) CH_3CH_2ONO (4) $(CH_3)_2CHNO_2$
52.	The monomeric unit present in natural rubber is:
	(1) Butadiene (2) Terephthalic aid
	(3) Hexamethylenetetramine (4) Isoprene
53.	Ethylacetoacetate reacts with hydroxylamine and product formed immediately loses a molecule of ethanol to form:
u Sv 8	(1) Methyl phenyl pyrazolone (2) 4-methylcoumarin (3) Methyl oxazolone (4) Methyl isoxazolone
54.	In UV the following compound would show absorption at:
	(1) 280 nm (2) 259 nm (3) 304 nm (4) 317 nm
55.	Which of following reaction involves rearrangement of nitrogen yields?
	(1) Wittig reaction (2) Von-Richter reaction
	(3) Sommlet-Hauser rearrangement (4) Pinacol-Pinacolone rearrangement
	СООН
	HO-C-H
56.	Absolute configuration of $H - C - OH$ is:
	COOH (1) 25 25 (2) 2R 3R (3) 2S 3R (4) 2R 3S

57.	O O O O O O O O O O
	Reagent used for above reaction is : (1) $NaBH_4 / CH_3OH$ (2) MnO_2 (3) SeO_2 (4) Br_2 followed by reaction with KOH
58.	In the reaction $-\bigcirc -COCl \xrightarrow{H_2/Pd-BaSO_4} A \xrightarrow{NaOH} $ Product . The product is :
	(1) O-COONa (2) O-CHO
	(3) $\langle O \rangle$ - CH_2OH (4) Both $\langle O \rangle$ - $COONa$ and $\langle O \rangle$ - CH_2OH
59.	Heterocyclic β-ketoesters can be prepared by which one of following reactions?
	(1) Aldol condensation
	(2) Micheal addition followed by Dieckmann condensation
	(3) Claisen ester condesation
	(4) Micheal addition
60.	The artificial sweetner used in soft drinks is: (1) Glucose (2) Fructose (3) Asparatin (4) Glycerol
61.	A hybrid orbital formed from s and p orbital can contribute to :
	(1) a σ bond only (2) π -bond only
	(3) either a σ or π bond (4) cannot be predicted
62.	During change of NO+ to NO, the electron is added to:
	(1) σ -orbital (2) π - orbital (3) σ^* -orbital (4) π^* -orbital
63.	Intramolecular H-bonding is present in:
200	(1) meta nitrophenol (2) salicylaldehyde
	(3) hydrogen chloride (4) benzophenone
64.	Which forces are strongest amongst the following?
# \	(1) Ion-ion interaction (2) Ion-dipole forces
	(3) Dipole-dipole forces (4) Dipole induced dipole forces
65.	The product obtained in the reaction of diborane with excess of ammonia is :
	(1) $B_2H_6.NH_3$ (2) $B_2H_6.2NH_3$ (3) $(BN)_x$ (4) Borazine
66.	Pyrophosphoric acid is:
	(1) monobasic (2) dibasic (3) tribasic (4) tetrabasic
PG-EI	E-2015/Chemistry/(B)

67.	The basic unit in layer and sheet silicate	그런데 그렇게 되면 그게 그래요? 그 전 하는 그는 그 그렇게 되는 그 전에 되었다. 그런데 그를 보는 것이다.
	(1) SiO_4^{4-} (2) $Si_2O_7^{6-}$	(3) $(SiO_3)_n^{2n}$ (4) $(Si_2O_5)_n^{2n-}$
68.	Which of the following bonds is the str	
	(1) F–F (2) Cl–Cl	$(3) I-I \qquad \qquad (4) Br-Br$
69.		
	(1) sp^3d , trigonal bipyramidal	
70		(4) sp^3d^2 , hexagonal
70.	Which of the following transition elements (1) <i>Mn</i> (2) <i>Fe</i>	and the second s
74		(3) V (4) Cr
71.	The ground state term symbol for d^3 is (1) ${}^4F_{3/2}$ (2) ${}^4F_{9/2}$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
72.		
12.	The pair of metal carbonyl complexes the (1) $[Ni(CO)_4]$ and $V(CO)_6$	
		(4) $[Fe(CO)_4]^-$ and $Cr(CO)_6$
73.		1000000
	and anida?	id according to Pearson's concept of hard and
	(1) Ag^+ (2) I^{7+}	(3) Sr^{2+} (4) Al^{3+}
74.		species can behave both as a Bronsted-Lowry
	acid and a base?	
	(1) H_3O^+ (2) HCO_3^-	(3) NO_3^- (4) SO_4^{2-}
75.	In oxyhaemoglobin Fe is in state:	
	(1) Low spin and diamagnetic(3) High spin and diamagnetic	(2) Low spin and paramagnetic(4) High spin and paramagnetic
76.	Zeise's salt is represented by:	(±) Tright spirt and paramagnetic
		(2) [7:-C! 12- (1) [PIC! (2 C II)-]
	$(1) 11_2 11_4 (2) [F1C1_4]$	(3) $[ZnCl_4]^{2-}$ (4) $\left[PtCl_3(n^2-C_2H_4)^{-}\right]$
77.	The asymmetry in the electronic ab	sorption spectrum in the visible region of
	$[Ti(H_2O)_6]^{3+}$ is caused by:	(2)
A cell of	(1) charge transfer(3) e → t	(2) $t_2 \rightarrow e$ (4) John-Teller effect
78.	Which of the following is correct?	
	(1) $[A^2,B]=\hat{A}[\hat{A},\hat{B}]+[\hat{A},\hat{B}]\hat{A}$	(2) $[A^2, B] = \hat{A}[\hat{B}, \hat{A}] + [\hat{A}, \hat{B}] \hat{A}$
ð: .	(3) $[A^2, B] = \hat{A}[\hat{A}, \hat{B}] + \hat{A}[\hat{A}, \hat{B}]$	(4) None of the above
PG-FF	-2015/Chemistry/(B)	
	- Joseph Chicago (D)	P. T. O.

- The operator for square of linear momentum, \hat{p}^2 is given by :
 - (1) $\hat{p}^2 = \hbar^2 \nabla^2$ (2) $h^2 \nabla^2$
- $(3) \quad \hat{p}^2 = -\hbar^2 \nabla^2 \qquad (4) \quad i\hbar \nabla^2$

- Eigen value is always a:
 - (1) zero value

- (2) infinite value (3) positive value (4) negative value
- The number of optically active isomers of $HOCH_2(CHOH)_4CHO$ is:
 - (1) 4
- (2) 8
- (3) 16

- Geometry of trifluoromethyl free radical is:
 - (1) Planar
- (2) Pyramidal
- (3) V-shaped
- Tetrahedral
- on treatment with aqueous KOH gives 83.









- 84. Chloroform easily gets converted to poisonous phosgene in presence of air and sunlight. Which of the following substances is added to prevent formation of phosgene?
 - (1) Ethanol

(2) Sodium carbonate

(3) Diethyl carbonate

- (4) Sodium hydroxide
- n-Butane reacts with Br_2 at 130° to give more amount of:
 - (1) $CH_3 CH_2 CH CH_3$
- (2) $CH_3CH_2CH_2CH_2Br$

 CH_3 $(3) \quad H_3C - C - Br$

(4) All in equal amounts

86. The reaction of $CH_3CH = CH - OO - OH$ with HB_1	gives
--	-------

- (1) $CH_3CH_2CHBr \bigcirc OH$
- (2) $CH_3CH_2CHBr \bigcirc Br$
- (3) CH_3CH-CH_2-O -OH

 Br
- (4) $CH_3CH-CH_2-\bigcirc -Br$ Br

87. Preparation of alkyl halides in laboratory is least preferred by:

(1) Halide exchange

- (2) Direct halogenation of alkanes
- (3) Treatment of alcohols
- (4) Addition of hydrogen halides to alkenes

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

$$\langle O \rangle$$
 + excess HI \rightarrow

- (3) $I CH_2CH_2CH_2 CH_2 I$
- (4) No reaction

90. Conversion of chlorobenzene into phenol of Dow's process is an example of:

- (1) Free radical substitution
- (2) Nucleophilic substitution
- (3) Electrophilic substitution
- (4) Rearrangement

- $(1) \quad (\overline{2} \,\overline{2} \,3)$
- $(2) \quad (\overline{2} \ 3 \ \overline{2})$
- $(3) \ \left(3\ \overline{2}\ \overline{2}\right)$
- (4) (232)

92. A tetragonal crystal possesses the following axis of symmetry:

- (1) two-fold
- (2) six-fold
- (3) four-fold
- (4) three-fold

(1) Boyle temperature

- (2) Inversion temperature
- (3) Critical temperature
- (4) Boiling point

94. For one mole of the gaseous mixture, the entropy of mixing is given by:

- (1) $\Delta S_{mix} = -R \sum r_i \ln x_i$
- (2) $\Delta S_{mix} = -R \sum \ln x_i$
- (3) $\Delta S_{mix} = -R \sum_{i} r_i \ln r_i$
- $(4) \quad \Delta S_{mix} = -R \sum x_i \ln x_i$

where r_i, x_i represent activity coefficient and mole fraction of components in the mixture.

- Which of the followings is correct?
 - (1) $\left(\frac{\partial S}{\partial P}\right)_T = -\left(\frac{\partial V}{\partial T}\right)_T$

(2) $\left(\frac{\partial S}{\partial P}\right)_T = \left(\frac{\partial V}{\partial S}\right)_P$

(3) $\left(\frac{\partial S}{\partial V}\right)_T = -\left(\frac{\partial P}{\partial T}\right)_{t,t}$

- (4) $\left(\frac{\partial T}{\partial V}\right)_{S} = \left(\frac{\partial P}{\partial S}\right)_{V}$
- The standard state for a solid is the pure state of solid at:
 - (1) one atmospheric pressure and 273°C
 - (2) one atmospheric pressure and given temperature
 - (3) 273 K
 - (4) one atmospheric pressure and 273 K
- **97.** In the limit $T \rightarrow 0$, for a crystal:
 - (1) $S_T = C_P$
- $(2) S_T = C_V$
- (3) $S_T = C_{P/3}$ (4) $S_T = C_{V/T}$

where C_P , C_V are heat capacity at constant pressure and volume respectively.

- 98. Which aqueous solution of urea freezes at -0.93°C ($k_c = 1.86$) ?
 - (1) 30 gm in one litre of solution
- (2) 150 gm in 5 litre of water
- (3) 30 gm in 500 ml of water
- (4) 150 gm in five litre of solution
- The parameters of an orthorhombic unit cell is a = 50 pm, b = 100 pm, c = 150 pm. The spacing between (123) planes will be
 - (1) 29 pm
- (2) 0.029 pm
- (3) 0.29 pm
- (4) 2.9 pm

- 100. Milk is a/an:
 - (1) Gel
- (2) Emulsion
- (3) Suspension
- (4) Pure solution

for website June 9/2/15

Total No. of Printed Pages: 13

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PG-EE-2015

SUBJECT: Chemistry

C		10335 Sr. No.
Time: 1¼ Hours Roll No. (in figures)	Max. Marks : 100 (in words)	Total Questions : 100
Name	Father's Name	X O
Mother's Name	Date of Examination	
(Signature of the Candidate)	(5	Signature of the Invigilator)

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PG-EE-2015/Chemistry/(C)

A nitrogenous substance X is treated with HNO2 and the product so formed is further treated with NaOH solution, which produces blue colouration. X can be:

(1) $CH_3CH_2NH_2$ (2) $CH_3CH_2NO_2$ (3) CH_3CH_2ONO (4) $(CH_3)_2CHNO_2$

The monomeric unit present in natural rubber is:

(1) Butadiene

(2) Terephthalic aid

(3) Hexamethylenetetramine

(4) Isoprene

13.	Ethylacetoacetate reacts with hydroxylamine and product formed immediately lose a molecule of ethanol to form:
14.	In UV the following compound would show absorption at:
	(1) 280 nm (2) 259 nm (3) 304 nm (4) 317 nm
15.	Which of following reaction involves rearrangement of nitrogen yields?
	(1) Wittig reaction (2) Von-Richter reaction
	(3) Sommlet-Hauser rearrangement (4) Pinacol-Pinacolone rearrangement
	XO
	COOH
	но-с-н
16.	Absolute configuration of $H - C - OH$ is
	COOH
	(1) 2S, 3S (2) 2R, 3R (3) 2S, 3R (4) 2R, 3S
	O
17.	(o)-C-CH ₂ -(o) -C-C-(o)
	Reagent used for above reaction is:
	(1) $NaBH_4$ / CH_3OH (2) MnO_2
	(3) SeO_2 (4) Br_2 followed by reaction with KOH
10	In the reaction $O - COCl \xrightarrow{H_2/Pd-BaSO_4} A \xrightarrow{NaOH}$ Product. The product is:
18.	In the reaction $\bigcirc -COCl \xrightarrow{H_2/Fu-base_4} A \xrightarrow{Maior}$ Product. The product is:
	(2) (2) (1)(2)
	(1) \bigcirc COONa (2) \bigcirc CHO
92 1. (
× 2	(3) \bigcirc
19.	Heterocyclic β-ketoesters can be prepared by which one of following reactions?
	(1) Aldol condensation
	(2) Micheal addition followed by Dieckmann condensation
	(3) Claisen ester condesation (4) Michael addition
	(4) Micheal addition
20.	The artificial sweetner used in soft drinks is:
	(1) Glucose (2) Fructose (3) Asparatin (4) Glycerol
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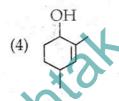
- 21. The number of optically active isomers of HOCH2(CHOH)4CHO is:
 - (1) 4
- $(2)^{3}$ 8
- (3) 16
- (4) 24

- 22. Geometry of trifluoromethyl free radical is:
 - (1) Planar
- (2) Pyramidal
- (3) V-shaped
- (4) Tetrahedral
- on treatment with aqueous KOH gives:









- 24. Chloroform easily gets converted to poisonous phosgene in presence of air and sunlight. Which of the following substances is added to prevent formation of phosgene?
 - (1) Ethanol

(2) Sodium carbonate

(3) Diethyl carbonate

- (4) Sodium hydroxide
- **25.** n-Butane reacts with Br_2 at 130° to give more amount of :
 - (1) $CH_3 CH_2 CH CH_3$
- (2) CH₃CH₂CH₂CH₂Br

 CH_3 (3) $H_3C - C - Br$ CH_3

- (4) All in equal amounts
- **26.** The reaction of $CH_3CH = CH OO OH$ with HBr gives :
 - (1) $CH_3CH_2CHBr O$ OH
- (2) $CH_3CH_2CHBr \bigcirc Br$
- (3) CH_3CH-CH_2-O-OH
- (4) $CH_3 CH CH_2 \bigcirc -Br$
- 27. Preparation of alkyl halides in laboratory is least preferred by:
 - (1) Halide exchange

- (2) Direct halogenation of alkanes
- (3) Treatment of alcohols
- (4) Addition of hydrogen halides to alkenes

28.	Allyl alcohol is obtained when glycerol reacts with following at 260°C: (1) Formic acid (2) Oxalic acid (3) Both (4) None
29.	Predict the major product:
	$\langle O \rangle$ + excess HI \rightarrow
	(1) $HO - CH_2 - CH_2 - CH_2 - CH_2 - I$ (2) $HOCH_2CH_2CH_2CH_2OH$ (3) $I - CH_2CH_2CH_2 - CH_2 - I$ (4) No reaction
30.	 (1) Free radical substitution (2) Nucleophilic substitution (3) Electrophilic substitution (4) Rearrangement
31.	concentration of the reactant is 0.05 mol dm ⁻³ , then its half life period is:
	(1) 100 minutes (2) 10 minutes (3) 300 seconds (4) 1.0 minute
32.	Triple point is the point where: (1) Three components are in equilibrium
	(2) The number of degrees of freedom is three
	(3) The number of degrees of freedom is zero
	(4) Three components are not in equilibrium
33.	For the distribution of organic solute between water (C_1) and benzene (C_2) , partitio
	coefficient $k = \sqrt{C_2}/C_1$ suggest that:
2 33	(1) solute exist as monomer in Benzene
	(2) solute as exist as dimer in benzene
	(3) solute exist as dimer in water
	(4) None of these
34	(NLO
	(1) Formation of $PbSO_4$ (2) Formation of PbO_2
= 14	(3) Reduction of Pb^{2+} to Pb^{+1} (4) Reduction of Pb^{+2} to Pb
35	Which of the following is not a state function?
	(1) Work (2) Enthalpy (3) Heat (4) Gibbs free energy
36	The pH of a solution obtained by mixing 25 ml of 0.2 MHCl with 50 ml of NaC $(k_w = 10^{-14} \text{mol}^2 \text{dm}^{-6})$ will be:
	(1) 10 (2) 1.3 (3) 13 (4) 12
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37.	The emulsifiers consist of:
	(1) Ionic compound
	(2) Ionic surfactants
	(3) Ionic as well as Non-ionogenic surfactant
	(4) Non-ionic surfactants
38.	The rotational spectra of a rigid diatomic rotator consists of equally spaced lines with spacing equal to :
	(1) 2B (2) B (3) 3B (4) 3B/2
	where B is the rotational constant.
39.	
	(1) Thermoplasts (2) Thermosets (3) Elastomers (4) All polymers
40.	Choose the correct one:
	(1) $1 \text{ ev} = 806.56 \text{ cm}^{-1}$ (2) $1 \text{ ev} = 806506 \text{ cm}^{-1}$
	(3) $1 \text{ ev} = 80.656 \text{ cm}^{-1}$ (4) $1 \text{ ev} = 8065.6 \text{ cm}^{-1}$
41.	The ground state term symbol for d^3 is: (1) ${}^4F_{3/2}$ (2) ${}^4F_{9/2}$ (3) ${}^4D_{5/2}$ (4) ${}^4P_{3/2}$
42.	The pair of metal carbonyl complexes that are isoelectronic is:
	(1) $[Ni(CO)_4]$ and $V(CO)_6$ (2) $[Co(CO)_4]$ and $Ni(CO)_4$
	(3) $\left[Cr(CO)_6\right]$ and $V(CO)_6$ (4) $\left[Fe(CO)_4\right]^-$ and $Cr(CO)_6$
43.	Which one of the following is a soft acid according to Pearson's concept of hard and
	soft acids? (1) Ag^+ (2) I^{7+} (3) Sr^{2+} (4) Al^{3+}
44.	Which one of the following chemical species can behave both as a Bronsted-Lowry
1367	acid and a base?
	(1) H_3O^+ (2) HCO_3^- (3) NO_3^- (4) SO_4^{2-}
45.	In oxyhaemoglobin Fe is in state: (1) Low spin and diamagnetic (2) Low spin and paramagnetic (3) High spin and diamagnetic (4) High spin and paramagnetic
46.	Zeise's salt is represented by :
	(1) H_2PtCl_6 (2) $[PtCl_4]^{2-}$ (3) $[ZnCl_4]^{2-}$ (4) $[PtCl_3(n^2-C_2H_4)^{-}]$

- The asymmetry in the electronic absorption spectrum in the visible region o $[Ti(H_2O)_6]^{3+}$ is caused by:
 - (1) charge transfer

(2) $t_2 \rightarrow e$

(3) $e \rightarrow t$

- (4) John-Teller effect
- Which of the following is correct?
 - (1) $[A^2, B] = \hat{A}[\hat{A}, \hat{B}] + [\hat{A}, \hat{B}] \hat{A}$ (2) $[A^2, B] = \hat{A}[\hat{B}, \hat{A}] + [\hat{A}, \hat{B}] \hat{A}$
 - (3) $[A^2, B] = \hat{A}[\hat{A}, \hat{B}] + \hat{A}[\hat{A}, \hat{B}]$
- (4) None of the above
- The operator for square of linear momentum, \hat{p}^2 is given by :
 - (1) $\hat{p}^2 = \hbar^2 \nabla^2$ (2) $h^2 \nabla^2$

- 50. Eigen value is always a:
 - (1) zero value
- (2) infinite value
- (3) positive value (4) negative value

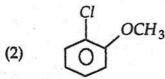
 - CH-CH₃
- The IUPAC name of compound $CH_2 C C COOMe$ is:

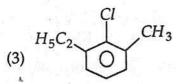
- (1) 2,3-dimethoxycarbonyl pent-1,3-diene
- (2) 2-Ethylidene-3-methylidine dimethyl pentan-1, 5-dioate
- (3) 2-Ethylidine-3-methylidene-methyl-pentan-1, 5-dioate
- (4) None of these
- m-cresol on bromination gives:

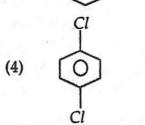
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53. Which of the following compounds on reaction with KNH2 in Liq NH3 does not involve Benzyne intermediate?









- 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
- 55. Which of the following sets of quantum numbers is not allowed?

(1)
$$n = 3, l = 1, m = +2$$

(2)
$$n = 3, l = 1, m = \pm 1$$

(3)
$$n = 3, 1 = 0, m = 0$$

(4)
$$n = 3, l = 2, m = \pm 2$$

56. Which of the following orbitals has zero probability of finding the electron in yz plane?

$$(1)$$
 Px

$$(3)$$
 P_2

Which of the following orders regarding the ionization energy is correct? **57.**

(1)
$$N > O > F$$

(2)
$$F > O > N$$

(2)
$$F > O > N$$
 (3) $N > O < F$

(4)
$$O > F > N$$

- 58. Most favourable conditions to form a covalent bond is:
 - (1) large cation and small anion
- (2) large cation and large anion
- (3) small cation and small anion
- (4) small cation and large anion
- 59. Silicon doped with arsenic is an example of which type of semiconductor?
 - (1) p-type
- (2) n-type
- (3) n, p-type
- (4) intrinsic
- 60. Which of the following defect, if present lowers the density of the crystal?
 - (1) Frenkel

(2) Schottky

(3) Edge dislocation

- (4) Constitution of F-centres
- 61. Entropy is related to probability by relation:

(1)
$$S = RlnW$$

$$(2) S = \frac{R}{lnW}$$

(3)
$$S = klnW$$

(3)
$$S = klnW$$
 (4) $S = \frac{k}{lnW}$

The organic compound C_2H_6O possess:

Thermal conductivity of gas is independent of:

(2) 44,700

where x, g are the altitude and acceleration due to gravity

(3) Two non-equivalent CH3 groups

(1) One equivalent CH₃ group

(1) Pressure

(1) 13,410

65.

(3) Mean free path

(1) $P = P_0 \exp\left(\frac{-Mgx}{RT}\right)$

(3) $P = P_0 \exp\left(\frac{Mg}{RT}\right)$

66.	The Vander Waals equation for 'n' moles	s of g	gas is expressed by:
	$RT = an^2$	(2)	nRT an
	(1) $P = \frac{1}{V - nb} - \frac{1}{V^2}$ (3) $P = \frac{nRT}{nV - b} - \frac{an^2}{V^2}$	(4)	$P = \frac{nRT}{V - b} - \frac{an^2}{V^2}$
67.	The mass less particles are: (1) Protons (2) α -rays	(3)	gamma rays (4) β-particles
68.	Absorbance A of the solution is expressed (1) $\log \left(\frac{I}{I_0} \right)$ (2) $\frac{I}{I_0}$	(3)	$ \ln\left(\frac{I}{I_0}\right) \qquad (4) \log\frac{I_0}{I} $
69.	A real gas most closely approaches the last (1) low pressure and high temperature (3) low pressure and low temperature	(2) (4)	high pressure and low temperature high pressure and high temperature
70.	heat of vaporization will be: (1) 271.92 KJ mol ⁻¹ (3) 2719.2 KJ mol ⁻¹	(2) (4)	ning that it obeys Trouton's rule, its molar 27. 192 KJ mol ⁻¹ 2. 71 KJ mol ⁻¹
71.	The Miller indices of crystal planes whare: (1) $(\overline{2} \overline{2} 3)$ (2) $(\overline{2} 3 \overline{2})$		(a) $(3\overline{2}\overline{2})$ (4) (232)
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25.

(2) Two equivalent CH₃ groups

(4) Heat capacity at constant volume

(4) 1,34,100

(4) None of these

(2) Temperature

 $(2) \quad P = P_0 \exp\left(\frac{Mgx}{RT}\right)$

The vibrational degrees of freedom of a protein molecule containing 44,700 atoms are:

The equation for predicting atmospheric pressure, called Barometric formula is:

(3) 31

P		
60		

- **72.** A tetragonal crystal possesses the following axis of symmetry:
 - (1) two-fold
- (2) six-fold
- (3) four-fold
- (4) three-fold
- 73. The temperature below which a gas becomes cooler on expansion is called:
 - (1) Boyle temperature

- (2) Inversion temperature
- (3) Critical temperature
- (4) Boiling point
- 74. For one mole of the gaseous mixture, the entropy of mixing is given by:
 - $(1) \quad \Delta S_{mix} = -R \sum r_i \ln x_i$
- (2) $\Delta S_{mix} = -R \sum_{i} \ln x_i$
- (3) $\Delta S_{mix} = -R \sum_{i} r_i \ln r_i$

(4) $\Delta S_{mix} = -R \sum_{i} x_i \ln x_i$

where r_i, x_i represent activity coefficient and mole fraction of components in the mixture.

- Which of the followings is correct?
 - (1) $\left(\frac{\partial S}{\partial P}\right)_T = -\left(\frac{\partial V}{\partial T}\right)_P$

- (3) $\left(\frac{\partial S}{\partial V}\right)_{T} = -\left(\frac{\partial P}{\partial T}\right)_{V}$
- (2) $\left(\frac{\partial S}{\partial P}\right)_T = \left(\frac{\partial V}{\partial S}\right)_P$ (4) $\left(\frac{\partial T}{\partial V}\right)_S = \left(\frac{\partial P}{\partial S}\right)_V$
- The standard state for a solid is the pure state of solid at:
 - (1) one atmospheric pressure and 273°C
 - (2) one atmospheric pressure and given temperature
 - (3) 273 K
 - (4) one atmospheric pressure and 273 K
- **77.** In the limit $T \rightarrow 0$, for a crystal :
 - $(1) S_T = C_P$
- $(2) S_T = C_V$
- (3) $S_T = C_{P/3}$
- (4) $S_T = C_{V/T}$

where C_P , C_V are heat capacity at constant pressure and volume respectively.

- 78. Which aqueous solution of urea freezes at -0.93°C ($k_f = 1.86$) ?
 - (1) 30 gm in one litre of solution
- (2) 150 gm in 5 litre of water
- (3) 30 gm in 500 ml of water
- (4) 150 gm in five litre of solution
- The parameters of an orthorhombic unit cell is a = 50 pm, b = 100 pm, c = 150 pm. The spacing between (123) planes will be:
 - (1) 29 pm
- (2) 0.029 pm
- (3) 0.29 pm
- (4) 2.9 pm

- 80. Milk is a/an:
 - (1) Gel
- (2) Emulsion (3) Suspension
- (4) Pure solution

- The product formed in the following reaction $C_6H_5 O CH_3 \xrightarrow{HI}$ are:
 - (1) C_6H_5OH and CH_3I
- (2) C_6H_5I and CH_3OH

(3) C_6H_5I and CH_3I

(4) C_6H_6 and CH_3O

83.
$$CH_3$$

$$Cold$$

$$Alkaline KMnO4 A CrCO3 AcOH B; A and B are$$

(1)
$$CH_3$$
 CH_3 $CH_$

(3)
$$CH_3$$
 CH_3 (4) None of these OH

- 3-methyl, 3-hexanol can be prepared by:
 - (1) CH₃MgI and 3-hexanone, followed by hydrolysis
 - (2) C_2H_5MgI and 2-pentanone, followed by hydrolysis
 - (3) C_3H_7MgI and 2-butanone, followed by hydrolysis
 - (4) Any of the methods above
- Which of the following does not give ethylamine on reduction?
 - (1) Methylcyanide (2) Ethylnitrile
- (3) Nitroethane
- (4) Acetamide
- Activation of benzene ring by $-NH_2$ in aniline can be reduced by treating with:

 - (1) Dilute HCl (2) Ethyl alcohol (3) Acetic acid
- (4) Acetyl chloride

- on reaction with $SOCl_2$ and then $AlCl_3$ forms:

- Hydrogenation of $C_6H_5CHOHCOOH$ over $Pd-Al_2O_3$ catalyst in methanol gives:
 - (1) C_6H_5COOH

- (2) C_6H_{11} CHOHCOOH (4) C_6H_{11} CH₂COOH
- (3) $C_6H_5CHOHCH_2OH$
- 89. $C_7H_{12} \xrightarrow{(i) \ KMnO_4} H_3C C CH_2 CH_2 CH_2 CH_2 COOH, C_7H_{12} is:$
 - (1) $CH_3C \equiv C CH_2CH_2CH_2CH_3$

(3)

- $CH CH_2CH_2C = CH_2$
- When 2-methyl propene is heated with acetyl chloride in presence of SnCl2, the 90. product is:
 - (1) $CH_3 C(Me)CH_2COCH_3$
- (2) CH₃CHCH₂COCH₃

(3) CH₃CO₂CMe₃

- $(4) CH_3COC = CH_2$
- The planar complex (MABCD) gives: 91.
 - (1) two optical isomers

- (2) two geometrical isomers
- (3) three optical isomers
- (4) three geometrical isomers
- Which one of the following compounds will behave as ammono base in ammonia? 92.
 - (1) NaNH₂
- (2) NH₄OH
- (3) $(NH_4)_2SO_2$
- $(4) (NH_4)_2 CO_3$
- The +3 ion of which of the following has half filled of subshell? 93.
 - (1) La
- (2) Lu
- (3) Gd
- (4) Ac

94.	In a nuclear reactor, oxides of which material?	of	the following metals are used as a fuel
	(1) Uranium and Actinium	(2)	Thorium and Actinium
	(3) Uranium, Thorium and Plutonium	(4)	Thorium, Actinium and Plutonium
95.	In qualitative analysis NH_4Cl is added (1) to decrease OH^- concentration (3) for making HCl	(2)	re NH_4OH : to increase OH^- concentration statement is wrong
96.	The brown ring test for NO_2^- and NO_3^- the formula :	is d	ue to the formation of complex ion having
	(1) $[Fe(H_2O)_6]^{2+}$	(2)	$[Fe(NO)(CN)_5]^{2+}$
	(3) $[Fe(H_2O)_5NO]^{2+}$	(4)	$[Fe(H_2O)(NO)_5]^{2+}$
97.	The crystal field stabilization energy (C	FSE)	will be the highest for :
	(1) $[CoF_6]^{3-}$ (2) $[Co(CNS)_4]^{2-}$	(3)	$[Mn(H_2O)_6]^{2+}$ (4) $[Co(NH_3)_6]^{3+}$
98.	The expected spin-only magnetic momare:	ents	for $[Fe(CN)_6]^{4-}$ and $[FeF_6]^{3-}$ respectively
	(1) 1.73 and 1.73 BM (3) 0.0 and 1.73 BM		1.73 and 5.92 BM 0.0 and 5.92 BM
99.	will have orbital contribution to the ma	gnet	following sets of electronic configurations ic moment? d^1 , d^6 , d^7 and d^9 d^1 , d^3 , d^4 and d^9
00.	The most suitable route to prepare the t	rans	s isomer of $[PtCl_2(NH_3)(PPh_3)]$ is:
	(1) $[PtCl_4]^{2-}$ with PPh_3 followed by re	eacti	on with NH ₃

- (2) $[PtCl_4]^{2-}$ with NH_3 followed by reaction with PPh_3 (3) $[Pt(NH_3)_4]^{2+}$ with HCl followed by reaction with PPh_3
- (4) $[Pt(NH_3)_4]^{2+}$ with PPh_3 followed by reaction with HCl

For website

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PG-EE-2015

SUBJECT: Chemistry

		10364
		Sr. No
Time : 1¼ Hours Roll No. (in figures)	Max. Marks : 100 (in words)	Total Questions : 100
Name	Father's Name	*0,
Mother's Name	Date of Examination_	
(Signature of the Candidate)	H 1	(Signature of the Invigilator)
CANDIDATES MUST READ TH	IE FOLLOWING INFORMATIO	N/INSTRUCTIONS BEFORE

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

- 1. All questions are compulsory.
- 2. The candidates must return the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means/misbehaviour will be registered against him/her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
- 3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing within two hours after the test is over. No such complaint(s) will be entertained thereafter.
- 4. 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.
- 5. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
- 6. Use only Black or Blue Ball Point Pen of good quality in the OMR Answer-Sheet.
- 7. Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

1.	Entropy is related to probability by relation:
	(1) $S = R \ln W$ (2) $S = \frac{R}{\ln W}$ (3) $S = k \ln W$ (4) $S = \frac{k}{\ln W}$
2.	The organic compound C_2H_6O possess: (1) One equivalent CH_3 group (2) Two equivalent CH_3 groups (3) Two non-equivalent CH_3 groups (4) None of these
3.	Thermal conductivity of gas is independent of: (1) Pressure (2) Temperature (3) Mean free path (4) Heat capacity at constant volume
4.	The vibrational degrees of freedom of a protein molecule containing 44,700 atoms are: (1) 13,410 (2) 44,700 (3) 31 (4) 1,34,100
5.	The equation for predicting atmospheric pressure, called Barometric formula is:
	(1) $P = P_0 \exp\left(\frac{-Mgx}{RT}\right)$ (2) $P = P_0 \exp\left(\frac{Mgx}{RT}\right)$
	(3) $P = P_0 \exp\left(\frac{Mg}{RT}\right)$ (4) $P = P_0 \exp\left(\frac{Mgx^2}{RT}\right)$
	where x , g are the altitude and acceleration due to gravity.

The Vander Waals equation for 'n' moles of gas is expresse (1) $P = \frac{RT}{V - nb} - \frac{an^2}{V^2}$ (3) $P = \frac{nRT}{nV - h} - \frac{an^2}{V^2}$

7. The mass less particles are:

(1) Protons

D

- (2) α -rays
- (3) gamma rays
- (4) β-particles

8. Absorbance A of the solution is expressed as:

- (1) $\log\left(\frac{I}{I_0}\right)$ (2) $\frac{I}{I_0}$
- (3) $\ln\left(\frac{I}{I_0}\right)$ (4) $\log\frac{I_0}{I}$

9. A real gas most closely approaches the behaviour of a perfect gas at:

- (1) low pressure and high temperature (2) high pressure and low temperature
- (3) low pressure and low temperature (4) high pressure and high temperature

10. The boiling point of a liquid is 36°C. Assuming that it obeys Trouton's rule, its molar heat of vaporization will be:

(1) 271.92 KJ mol⁻¹

(2) 27. 192 KJ mol⁻¹

(3) 2719.2 KJ mol⁻¹

(4) 2.71 KJ mol⁻¹

	11.	The planar complex (MABCD) gives: (1) two optical isomers (2) two geometrical isomers (3) three optical isomers (4) three geometrical isomers
	12.	Which one of the following compounds will behave as ammono base in ammonia? (1) $NaNH_2$ (2) NH_4OH (3) $(NH_4)_2SO_2$ (4) $(NH_4)_2CO_3$
	13.	The +3 ion of which of the following has half filled of subshell? (1) La (2) Lu (3) Gd (4) Ac
	14.	In a nuclear reactor, oxides of which of the following metals are used as a fu material? (1) Uranium and Actinium (2) Thorium and Actinium (3) Uranium, Thorium and Plutonium (4) Thorium, Actinium and Plutonium
	15.	In qualitative analysis NH_4Cl is added before NH_4OH : (1) to decrease OH^- concentration (2) to increase OH^- concentration (3) for making HCl (4) statement is wrong
	16.	The brown ring test for NO_2^- and NO_3^- is due to the formation of complex ion havin the formula:
		(1) $[Fe(H_2O)_6]^{2+}$ (2) $[Fe(NO)(CN)_5]^{2+}$ (3) $[Fe(H_2O)_5NO]^{2+}$ (4) $[Fe(H_2O)(NO)_5]^{2+}$
	17.	The crystal field stabilization energy (CFSE) will be the highest for : (1) $[CoF_6]^{3-}$ (2) $[Co(CNS)_4]^{2-}$ (3) $[Mn(H_2O)_6]^{2+}$ (4) $[Co(NH_3)_6]^{3+}$
	18.	The expected spin-only magnetic moments for $[Fe(CN)_6]^{4-}$ and $[FeF_6]^{3-}$ respectively are: (1) 1.73 and 1.73 BM (2) 1.73 and 5.92 BM (3) 0.0 and 1.73 BM (4) 0.0 and 5.92 BM
	19.	In tetrahedral geometry, which are of the following sets of electronic configuration will have orbital contribution to the magnetic moment? (1) d^3 , d^4 , d^8 and d^9 (2) d^1 , d^6 , d^7 and d^9 (3) d^3 , d^4 , d^7 and d^9 (4) d^1 , d^3 , d^4 and d^9
	20.	The most suitable route to prepare the trans isomer of $[PtCl_2(NH_3)(PPh_3)]$ is: (1) $[PtCl_4]^{2-}$ with PPh_3 followed by reaction with NH_3
		 (1) [PtCl₄] With PPh₃ followed by reaction with NH₃ (2) [PtCl₄]²⁻ with NH₃ followed by reaction with PPh₃ (3) [Pt(NH₃)₄]²⁺ with HCl followed by reaction with PPh₃ (4) [Pt(NH₃)₄]²⁺ with PPh₃ followed by reaction with HCl
PC		2015/Chemistry/(D)

COOMe CH2

(1) 2,3-dimethoxycarbonyl pent-1, 3-diene

(2) 2-Ethylidene-3-methylidine dimethyl pentan-1, 5-dioate

(3) 2-Ethylidine-3-methylidene-methyl-pentan-1, 5-dioate

(4) None of these

D

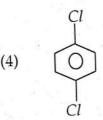
22. m-cresol on bromination gives:

(1)
$$Br$$
 OH Br OH

23. Which of the following compounds on reaction with KNH2 in Liq NH3 does not involve Benzyne intermediate?

$$OCH_3$$

$$H_5C_2 \qquad Cl \qquad CH_3$$
(3)



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

25. Which of the following sets of quantum numbers is not allowed?

(1) n = 3, l = 1, m = +2

(2) $n = 3, l = 1, m = \pm 1$

(3) n = 3, 1 = 0, m = 0

(4) $n = 3, 1 = 2, m = \pm 2$

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26.	6. Which of the following orbitals has zero probability	of finding the electron in yz plane
	$(1) Px \qquad (2) Py \qquad (3) Pz$	(4) dyz
27.	7. Which of the following orders regarding the ioniza	ation energy is correct?
	(1) $N > O > F$ (2) $F > O > N$ (3) $N > O$	O < F (4) $O > F > N$
28.	8. Most favourable conditions to form a covalent bon	d is:
	(1) large cation and small anion (2) large	cation and large anion
	(3) small cation and small anion (4) small	cation and large anion
29.	9. Silicon doped with arsenic is an example of which	type of semiconductor?
	(1) p-type (2) n-type (3) n, p-t	ype (4) intrinsic
30.	0. Which of the following defect, if present lowers th	e density of the crystal?
	(1) Frenkel (2) Schot	tky
	(3) Edge dislocation (4) Cons	titution of F-centres .
31.	31. Predict the products of reaction below:	
	$\bigcirc -OH + CH_3 CCI \xrightarrow{AlCl_3} \rightarrow$	
	OH OH OC	COCH ₃
	(1) (2) (3) (3)	(4) Both (1) and (2)

32. The product formed in the following reaction $C_6H_5 - O - CH_3 \xrightarrow{HI}$ are:

COCH₃

- (1) C_6H_5OH and CH_3I
- (2) C_6H_5I and CH_3OH

(3) C_6H_5I and CH_3I

(4) C_6H_6 and CH_3OI

33.
$$\underbrace{CH_3}_{Alkaline \ KMnO_4} A \xrightarrow{CrCO_3} B; A \text{ and } B \text{ are } :$$

(1)
$$CH_3$$
 CH_3 OH OH

(2)
$$CH_3$$
 CH_3 O O

(3)
$$CH_3$$
 CH_3 OH OH

(4) None of these

34. 3-methyl, 3-hexanol can be prepared by:

- (1) CH₃MgI and 3-hexanone, followed by hydrolysis
- (2) C_2H_5MgI and 2-pentanone, followed by hydrolysis
- (3) C₃H₇MgI and 2-butanone, followed by hydrolysis
- (4) Any of the methods above

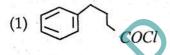
Which of the following does not give ethylamine on reduction? 35.

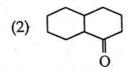
- (1) Methylcyanide (2) Ethylnitrile
- (3) Nitroethane
- (4) Acetamide

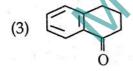
36. Activation of benzene ring by $-NH_2$ in aniline can be reduced by treating with:

- (1) Dilute HCl
- (2) Ethyl alcohol (3) Acetic acid
- (4) Acetyl chloride

on reaction with SOCl2 and then AlCl3 forms:



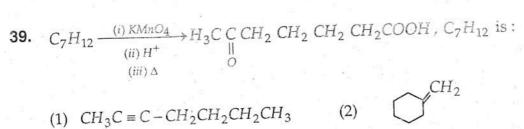


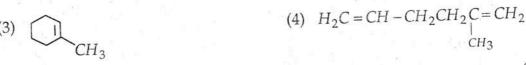


38. Hydrogenation of $C_6H_5CHOHCOOH$ over $Pd-Al_2O_3$ catalyst in methanol gives:

 C_6H_5COOH

- (2) $C_6H_{11}CHOHCOOH$
- (3) $C_6H_5CHOHCH_2OH$
- (4) $C_6H_{11}CH_2COOH$



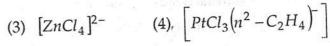


- 40. When 2-methyl propene is heated with acetyl chloride in presence of SnCl₂, th product is:
 (1) CH₃ C(Me)CH₂COCH₃
 (2) CH₃CHCH₂COCH₃
 (3) CH₃CHCH₂COCH₃
 - product is:
 (1) $CH_3 C(Me)CH_2COCH_3$ (2) $CH_3CHCH_2COCH_3$ Me

 (3) $CH_3CO_2CMe_3$ (4) $CH_3COC_2CH_2$ Me
- **41.** The rate constant for a second-order reaction is $3.33 \times 10^{-2} \, \text{dm}^3 \, \text{mol}^{-1} \, \text{s}^{-1}$. If the initial concentration of the reactant is 0.05 mol dm⁻³, then its half life period is:
 - (1) 100 minutes (2) 10 minutes (3) 300 seconds (4) 1.0 minute
- **42.** Triple point is the point where
 - (1) Three components are in equilibrium
 - (2). The number of degrees of freedom is three
 - (3) The number of degrees of freedom is zero
 - (4) Three components are not in equilibrium
- **43.** For the distribution of organic solute between water (C_1) and benzene (C_2) , partitic coefficient $k = \sqrt{C_2} / C_1$ suggest that:
 - (1) solute exist as monomer in Benzene
 - (2) solute as exist as dimer in benzene
 - (3) solute exist as dimer in water
 - (4) None of these
- 44. In the lead acid battery during charging the cathodic reaction is:
 - (1) Formation of $PbSO_4$
- (2) Formation of PbO₂
- (3) Reduction of Pb^{2+} to Pb^{+1}
- (4) Reduction of Pb^{+2} to Pb
- 45. Which of the following is not a state function?
 - (1) Work
- (2) Enthalpy
- (3) Heat
- (4) Gibbs free energy

46.	The pH of a solution obtained by mixing 25 ml of 0.2 M <i>HCl</i> with 50 ml of <i>NaOH</i> $\left(k_w = 10^{-14} \text{mol}^2 \text{dm}^{-6}\right)$ will be:
	(1) 10 (2) 1.3 (3) 13 (4) 12
47.	The emulsifiers consist of:
	(1) Ionic compound
	(2) Ionic surfactants
	(3) Ionic as well as Non-ionogenic surfactant
	(4) Non-ionic surfactants
48.	The rotational spectra of a rigid diatomic rotator consists of equally spaced lines with spacing equal to:
	(1) 2B (2) B (3) 3B (4) 3B/2
# 5 . 3	where B is the rotational constant.
40	Strong covalent bond exists between polymer chains in:
49.	(1) Thermoplasts (2) Thermosets (3) Elastomers (4) All polymers
50.	Choose the correct one:
	(1) $1 \text{ ev} = 806.56 \text{ cm}^{-1}$ (2) $1 \text{ ev} = 806506 \text{ cm}^{-1}$
	(3) $1 \text{ ev} = 80.656 \text{ cm}^{-1}$ (4) $1 \text{ ev} = 8065.6 \text{ cm}^{-1}$
51.	The ground state term symbol for d^3 is:
	(1) ${}^{4}F_{3/2}$ (2) ${}^{4}F_{9/2}$ (3) ${}^{4}D_{5/2}$ (4) ${}^{4}P_{3/2}$
52.	The pair of metal carbonyl complexes that are isoelectronic is:
	(1) $[Ni(CO)_4]$ and $V(CO)_6$ (2) $[Co(CO)_4]$ and $Ni(CO)_4$
	(3) $\left[Cr(CO)_6\right]$ and $V(CO)_6$ (4) $\left[Fe(CO)_4\right]^-$ and $Cr(CO)_6$
53.	Which one of the following is a soft acid according to Pearson's concept of hard and
	soft acids?
	(1) Ag^+ (2) I^{7+} (3) Sr^{2+} (4) Al^{3+}
54.	Which one of the following chemical species can behave both as a Bronsted-Lowry acid and a base?
	(1) H_3O^+ (2) HCO_3^- (3) NO_3^- (4) SO_4^{2-}
55.	In oxyhaemoglobin <i>Fe</i> is in state :
	(1) Low spin and diamagnetic (2) Low spin and paramagnetic
	(3) High spin and diamagnetic (4) High spin and paramagnetic
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56.	Zeise's salt is represented by:				
	(1) H_2PtCl_6	(2) $[PtCl_4]^{2-}$			
57.	The asymmetry	in the electron			



ectronic absorption spectrum in the visible region of $[Ti(H_2O)_6]^{5+}$ is caused by:

(1) charge transfer

(2) $t_2 \rightarrow e$

(3) $e \rightarrow t$

- (4) John-Teller effect
- Which of the following is correct?

(1) $[A^2, B] = \hat{A}[\hat{A}, \hat{B}] + [\hat{A}, \hat{B}] \hat{A}$

(2) $[A^2, B] = \hat{A}[\hat{B}, \hat{A}] + [\hat{A}, \hat{B}] \hat{A}$

(3) $[A^2, B] = \hat{A}[\hat{A}, \hat{B}] + \hat{A}[\hat{A}, \hat{B}]$

- (4) None of the above
- The operator for square of linear momentum, \hat{p}^2 is given by:

(1) $\hat{p}^2 = \hbar^2 \nabla^2$ (2) $h^2 \nabla^2$

(3) $\hat{p}^2 = -\hbar^2 \nabla^2 \times (4) i\hbar \nabla^2$

Eigen value is always a:

(1) zero value

(2) infinite value

- (3) positive value (4) negative value
- The Miller indices of crystal planes which cut through the crystal axis at (2a, -3b, -3c)

(1) $(\bar{2}\,\bar{2}\,3)$

 $(3) (3\overline{2}\overline{2})$

(4) (232)

62. A tetragonal crystal possesses the following axis of symmetry:

(1) two-fold

(2) six-fold

(3) four-fold

(4) three-fold

The temperature below which a gas becomes cooler on expansion is called:

(1) Boyle temperature

(2) Inversion temperature

(3) Critical temperature

(4) Boiling point

For one mole of the gaseous mixture, the entropy of mixing is given by:

(1) $\Delta S_{mix} = -R \sum_{i} r_i \ln x_i$

(2) $\Delta S_{mix} = -R \sum \ln x_i$

(3) $\Delta S_{mix} = -R \sum_{i} r_i \ln r_i$

(4) $\Delta S_{mix} = -R \sum x_i \ln x_i$

where r_i , x_i represent activity coefficient and mole fraction of components in the mixture.

Which of the followings is correct?

(1) $\left(\frac{\partial S}{\partial P}\right)_{T} = -\left(\frac{\partial V}{\partial T}\right)_{P}$

(2) $\left(\frac{\partial S}{\partial P}\right)_T = \left(\frac{\partial V}{\partial S}\right)_P$

(3) $\left(\frac{\partial S}{\partial V}\right)_{T} = -\left(\frac{\partial P}{\partial T}\right)_{T}$

(4) $\left(\frac{\partial T}{\partial V}\right)_{S} = \left(\frac{\partial P}{\partial S}\right)_{V}$

(3) tribasic

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76. Pyrophosphoric acid is:

(1) monobasic

(2) dibasic

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(4) tetrabasic

77.	The basic unit in layer and sheet silicate (1) SiO_4^{4-} (2) $Si_2O_7^{6-}$	s is: (3) $(SiO_3)_n^{2n}$ (4) $(Si_2O_5)_n^{2n-}$
78.	Which of the following bonds is the street (1) <i>F–F</i> (2) <i>Cl–Cl</i>	congest? (3) $I-I$ (4) $Br-Br$
79.	Hybridization and structure of XeF_4 is: (1) sp^3d , trigonal bipyramidal (3) sp^3d^2 , square planar	(2) sp^3 , tetrahedral (4) sp^3d^2 , hexagonal
80.	Which of the following transition eleme	
	(1) Mn (2) Fe	(3) V (4) Cr
81.	further treated with NaOH solution, wh	with HNO_2 and the product so formed is sich produces blue colouration. X can be: (3) CH_3CH_2ONO (4) $(CH_3)_2CHNO_2$
82.	The monomeric unit present in natural (1) Butadiene (3) Hexamethylenetetramine	(2) Terephthalic aid(4) Isoprene
83.	Ethylacetoacetate reacts with hydroxyl a molecule of ethanol to form: (1) Methyl phenyl pyrazolone (3) Methyl oxazolone	amine and product formed immediately loses (2) 4-methylcoumarin (4) Methyl isoxazolone
84.	In UV the following compound would (1) 280 nm (2) 259 nm	show absorption at: (3) 304 nm (4) 317 nm
85.	Which of following reaction involves re (1) Wittig reaction (3) Sommlet-Hauser rearrangement	(2) Von-Richter reaction(4) Pinacol-Pinacolone rearrangement
	СОО) НО-С-Н	
86.	Absolute configuration of $H - C - C$	
	(1) 2S, 3S (2) 2R, 3R	(3) 2S, 3R (4) 2R, 3S

Reagent used for above reaction is:

(1) $NaBH_4/CH_3OH$

(2) MnO_2

(3) SeO₂

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- (4) Br_2 followed by reaction with KOH
- **88.** In the reaction $\langle \dot{O} \rangle$ - $COCl \xrightarrow{H_2/Pd-BaSO_4} A \xrightarrow{NaOH}$ Product. The product is:
 - (1) $\langle 0 \rangle$ -COONa

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

- (4) Both $\langle O \rangle$ -COONa and $\langle O \rangle$ -CH₂OH
- 89. Heterocyclic β -ketoesters can be prepared by which one of following reactions?
 - (1) Aldol condensation
 - (2) Micheal addition followed by Dieckmann condensation
 - (3) Claisen ester condesation
 - (4) Micheal addition
- The artificial sweetner used in soft drinks is: 90.
 - (1) Glucose
- (2) Fructose
- (3) Asparatin
- (4) Glycerol
- The number of optically active isomers of $HOCH_2(CHOH)_4CHO$ is:
 - (1) 4
- (2) 8
- (3) 16
- (4) 24

- Geometry of trifluoromethyl free radical is:
 - (1) Planar

- (2) Pyramidal (3) V-shaped (4) Tetrahedral
- on treatment with aqueous KOH gives: 93.

- OH

1.5/Cine

2		
94.	Chloroform easily gets converted to p sunlight. Which of the following sub	oisonous phosgene in presence of air and stances is added to prevent formation of
	phosgene?	(2) Sodium carbonate(4) Sodium hydroxide
95.	n-Butane reacts with Br_2 at 130° to give 1 (1) $CH_3 - CH_2 - CH - CH_3$	more amount of : (2) $CH_3CH_2CH_2CH_2Br$
	Br CH ₃	
	$(3) H_3C - C - Br$ CH_3	(4) All in equal amounts
		XO.
96.	The reaction of $CH_3CH = CH - \bigcirc -OH$	with HBr gives:
	(3) CH ₃ CH-CH ₂ -O-OH	(2) $CH_3CH_2CHBr - \bigcirc -Br$ (4) $CH_3CH - CH_2 - \bigcirc -Br$
	br .	
97.	Preparation of alkyl halides in laborator(1) Halide exchange(3) Treatment of alcohols	ry is least preferred by : (2) Direct halogenation of alkanes (4) Addition of hydrogen halides to alkenes
98	1 1 1lucouol	reacts with following at 260°C: (3) Both (4) None
99	Predict the major product:	

(1) $HO - CH_2 - CH_2 - CH_2 - CH_2 - I$ (2) $HOCH_2CH_2CH_2CH_2OH$

(4) No reaction (3) $I - CH_2CH_2CH_2 - CH_2 - I$

100. Conversion of chlorobenzene into phenol of Dow's process is an example of:

(1) Free radical substitution

(2) Nucleophilic substitution

(3) Electrophilic substitution

(4) Rearrangement

S.No.	Α	В	С	D
1	3	4 /	1	3
2	2	1 ′	4	2
3	3	1 ′	2	1
4	2	1 ′ 1 ′ 4 ′ 2 ′	1	4
5	1	2 /	3	1
6	3	4.	4	2
7	2	3 /	4	3
8	3	3 /	2	4
9	3	3 ′	3	1
10	2	3/-	1	2
11	4	2 -	4	4
12	1	3 /	4	1
13	1	2 ′	4	3
14	4	3 / 3 / 3 / 2 / 3 / 2 / 4 /	4	3
15	2	1 -	3	1
16	4	4 /	2	3
17	3	3/	2	4
18	3	1 /	4	
19	3	2 /	4	4 1
20	3	4 /	3	1
21	4	3 /	3	3
22	4	2′	3	1
23	4	1	3	3
24	4	4 -	2	4
25	3	1/	1	1
26	2	3~	3	1
27	3	3 /	2	3
28	4	4 /	3	4
29	4	1 -	3	2
30	3	2 /	2	2
31	3	4 -	2	4
32	1	1 -	3	1
33	3	3 ~	2	1
34	4	3 -	4	4
35	1	1 -	1	2
36	1	3 /	4	4

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78/2 Qp D1

37	3	4 -	3	3
38	4	4	1	3
39	2	1-	2	3
40	2	1	4	3
41	1	1′ 3′	1	2
42	4	1/	2	3
43	2	3 /	1	2
44	2	4′	2	4
45	3	1-	1	1
46	4	1/	4	4
47	4	3/	4	3
48	2	4,	1	1
49	3	2 -	3	2
50	1	2 ~ 2 ~ 4 ~	4	4
51	4	4 -	3	1
52	1	4-	1	2
53	3	4 -	3	1
54	3	4^	4	2
55	1	3 ~	1	1
56	3	2 -	1	4
57	4	3 /	3	4
58	4	4 -	4	1
59	1	4-	2	3
60	1	3 /	3	4
61	1	3 / 1 /	3	3
62	2	4-	* 2	3
63	1	2~	1	2
64	2	1	4	4
65	1	3/	1	1
66	4	. 4 -	2	2
67	4	4 /	3	3
68	1	2-	4	4
69	3	3 ′	1	1
70	4	1 ′	2	2
71	3	1 -		1
72	2	2 ′	3	4
73	1	1 ′	2	2

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74 4 2 4 1 75 1 1 1 3 76 2 4 2 4 77 3 4 3 4 78 4 1 4 2 79 1 3 1 3 80 2 4 2 1 81 3 3 4 4 82 3 2 1 4 83 2 3 1 4 84 4 2 4 4 85 1 1 2 3 86 2 3 4 2 87 3 2 3 3 89 1 3 3 4 90 2 2 3 3 91 2 3 3 4 92 3 3 1 2 93 2 2 3 3 94 4<					
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92 3 3 1 2 93 2 2 3 3 94 4 4 3 2 95 1 1 1 1 96 4 2 3 3 97 3 3 4 2 98 1 4 4 3 99 2 1 1 3	90	2	2 /	3	
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