Code No. **N - 3571**

Entrance Examination for Admission to the P.G. Courses in the Teaching Departments, 2022										
	CSS									
	CHEMISTRY/CHEMISTRY (RENEWABLE ENERGY)									
				<u>Gener</u>	al Instru	<u>ctions</u>				
1.	The Question Paper is having two Parts — Part 'A' Objective type (60%) & Part 'B' Descriptive type (40%).								Part 'B'	
2.	Objective type questions which carry 1 mark each are to be (\checkmark) 'tick marked' in the response sheets against the appropriate answers provided.									
3.	8 que	estions are to b	e answe	red out o	of 12 que	estions c	arrying 5	i marks e	each in F	Part 'B'.
4.	<u>Negative marking</u> : 0.25 marks will be deducted for each wrong answer in Part 'A'.									
Time	: 2 H	ours						Ν	lax. Mar	[.] ks : 100
To b	e fille	ed in by the Car	ndidate							
Regi	ster	in Figures								
Num	ber	in words								
						·				

$\mathsf{PART} - \mathsf{A}$

(Objective Type)

Choose appropriate answer from the options in the questions. **One** mark **each**.

(60 × 1 = 60 marks)

- 1. In which case effective nuclear charge is minimum
 - a) Be⁺ b) Be²⁺
 - c) Be³⁺ d) Be

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2. The non-metallic cation is in

- a) PCI₃ b) NH₄CI
- c) VOCI d) CrO_2CI_2
- 3. Among Li₂, Be₂, B₂ and C₂ molecules, which is paramagnetic?
 - a) Li₂ b) Be₂
 - c) B₂ d) C₂

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4.	The	shape of I_{3}^{-} has		
	a)	trigonal bipyramidal	b)	tetrahedral
	c)	linear	d)	trigonal planar
5	The	bond angle of SE, molecule is/are		
0.	2)		, Ь)	100°28'
	a)	100 , 110 00°	d)	109 20
	C)	90	u)	100,90
6.	Wh	ich of the following is the weakest l	base	as per Bronsted concept?
	a)	[CIO] [−]	b)	$[CIO_2]^-$
	c)		d)	$[CIO_4]^-$
7.	The	e reactivity of 2-picoline with B(CH $_3$)₃ cai	n be explained on the basis of
	a)	B-strain	b)	F-strain
	c)	E effect	d)	l effect
8.	The dec	e solubility of carbonates decreas rease in	es d	own the magnesium group due to a
	a)	Inter ionic attraction	b)	lattice energies of solids
	c)	hydration energies of cations	d)	entropy of solution formation
9.	The	e chemical formula of red liquor is		
	a)	AI(OH) ₃	b)	(CH ₃ COO) ₃ A1
	c)	$AI_2(SO_4)_3$	d)	$AI_2(CO_3)_3$
10.	Cor	nsider the reaction:		
	The	e green precipitate is also known as	6	
	a)	Scheele's green	b)	Pair's green
	c)	Rinmann' s green	d)	Verdigris green

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11.	 Clathrates of argon, krypton and xenon in which water forms the cage are kno as 						
	a)	solid hydrates	b)	liquid hydrates			
	c)	gas hydrates	d)	coordinate hydrates			
12.	Whi	Which transition metal is present in carbonic anhydrase?					
	a)	Mn	b)	Co			
	c)	Ni	d)	Zn			
13.	Jah	n-Teller effect affects the geometry	y of				
	a)	$[Cu(NH_3)_4]^{2+}$	b)	[MnCl₄]²⁻			
	c)	$[Ni(NH_3)_6]^{2+}$	d)	None of these			
14.	The	oxy salt of which of the elements	is hig	hly stable?			
	a)	Pm	b)	Gd			
	c)	Tm	d)	Но			
15.	Pre add	resence of empty orbitals on the metal centre in order to perform oxidative ddition is generally required in					
	a)	nucleophilic substrates	b)	electrophilic substrates			
	c)	intact substrates	d)	All the above			
16.	16. Which of the following solvents has least eluting power?						
	a)	cyclohexane	b)	ethyl ether			
	c)	n-propanol	d)	ethyl acetate			
17.	Myo	oglobin is					
	a)	monomer	b)	dimer			
	c)	trimer	d)	tetramer			
18.	The	number of microstates for d3 cont	figura	tion is			
	a)	45	b)	60			

'Fat	man' relates to		
a)	uranium bomp	b)	thorium bomp
c)	plutonium bomp	d)	literary word from a book
The	half-life of ⁹⁹ Tc is 6 h. Hence, the a	avera	ige life is
a)	3.0 h	b)	4.17 h
c)	8.0 h	d)	8.66 h
The	IUPAC name of $C(C_6H_{11})_4$ is		
a)	tetraphenyl methane	b)	1,1,1,1-tetraphenyl methane
c)	1,1,1,1 -tetracyclohexyl methane	d)	All
Ster	eoisomers which rotate the plane p	oolari	zed light right to the viewer is called
a)	laevorotatory	b)	dextrorotatory
c)	Both (a) and (b) are correct	d)	None of these
Abs	ence of an S _n axis denotes		
a)	geometrical isomerism	b)	optical activity
c)	a trans isomer	d)	a tetrahedral point group
Buc	ky babies is/are		
a)	C ₃₂	b)	C ₄₄
c)	C_{50} and C_{58}	d)	All of these
Whi	ch of the following is the strongest	base	?
a)	aniline	b)	pyrolle
c)	isoquinoline	d)	cyclohexyl amine
The	reactive intermediate in a typical S	Simm	ons-Smith reaction is a
a)	carbonium ion	b)	carbanion
c)	carbene	d)	free radical
	 'Fat a) c) The a) c) The a) c) Abs a) c) Buc a) c) Buc a) c) Whi a) c) The a) c) The a) c) 	¹ Fat man' relates to a) uranium bomp c) plutonium bomp The half-life of ⁹⁹ Tc is 6 h. Hence, the a a) 3.0 h c) 8.0 h The IUPAC name of $C(C_6H_{11})_4$ is a) tetraphenyl methane c) 1,1,1,1 -tetracyclohexyl methane Stereoisomers which rotate the plane p a) laevorotatory c) Both (a) and (b) are correct Absence of an S _n axis denotes a) geometrical isomerism c) a trans isomer Bucky babies is/are a) C_{32} c) C_{50} and C_{58} Which of the following is the strongest a) aniline c) isoquinoline The reactive intermediate in a typical S a) carbonium ion c) carbene	'Fat man' relates toa)uranium bompb)c)plutonium bompd)The half-life of 99 Tc is 6 h. Hence, the averaa)3.0 hb)c)8.0 hd)C)8.0 hd)The IUPAC name of C(C ₆ H ₁₁) ₄ isa)tetraphenyl methaneb)c)1,1,1,1 -tetracyclohexyl methaned)Stereoisomers which rotate the plane polaria)laevorotatorya)laevorotatoryb)c)Both (a) and (b) are correctd)Absence of an S _n axis denotesa)a)geometrical isomerismb)c)a trans isomerd)Bucky babies is/area)a)C ₃₂ b)c)C ₅₀ and C ₅₈ d)Which of the following is the strongest basea)anilineb)c)isoquinolined)The reactive intermediate in a typical Simma)carbonium ionb)c)carbonium ionb)

- 27. A nitrene can be trapped by
 - a) CO b) CO₂
 - c) SO_2 d) SO_3
- 28. The condensation of aldehydes or ketones with α ,-haloester takes place in the presence of a base gives $\alpha \beta$ -epoxy esters. This reaction is known as
 - a) Darzen b) Dieckmann
 - c) Claisen d) Knoevenagel
- 29. The cyclopentanone in the presence of peroxytrifluoro acetic acid into
 - a) Alcohol b) Acid
 - c) Lactone d) All of these
- 30. In which of the following reaction amide is reduced to amine which has one carbon less than the starting material?
 - a) Lossen rearrangement b) Beckmann rearrangement
 - c) Dieckmann rearrangement d) Hoffmann rearrangement
- 31. Jones reagent is
 - a) CrO_3 , H_2SO_4 and CH_3COCH_3 b) CrO_3 , pyridine
 - c) Both d) None
- 32. The number of σ and π bonds in phosgene is/are
 - a) 3 and 2 b) 2 and 3
 - c) 3 and 1 d) 1 and 3
- 33. Cyclohexyl benzyl ether is converted to cyclohexanol using
 - a) 5% aq.KOFI
 - b) hydrazine hydrate
 - c) H₂-PdIC
 - d) tetrabutylammonium fluoride

34.	4. Which of the following compounds act as protecting group for alcohols?					
	a)	Ethers	b)	Acetals		
	c)	Ketals	d)	All of these		
35.	Ena	ntiomorphs can be separated by				
	a)	Fractional crystallization	b)	fractional distillation		
	c)	use of enzymes	d)	chromatography over alumina		
36.	Ene	e reaction is a				
	a)	2m electron electrocyclic	b)	4π electron electrocyclic		
	c)	6π electron electrocyclic	d)	None		
37.	Whi	ch diene and dienophile is employ	ed to	synthesize norbornadiene?		
	a)	cyclopentadiene and acetylene	b)	cyclopentadiene and ethylene		
	c)	1,3-butadiene and acetylene	d)	None		
38.	The	quantum yield of the following rea	ction	: 2HBr \rightarrow H ₂ + Br ₂		
	a)	1.0	b)	1.5		
	c)	2.0	d)	0.01		
39.	Fisc	cher's indole synthesis involves				
	a)	[2.3] sigmatropic shift	b)	[3,3] sigmatropic shift		
	c)	[3,2] sigmatropic shift	d)	[2,2] sigmatropic shift		
40.	Diffe acid	erence in isoelectric points can b Is by	e us	ed to separate the mixture of amino		
	a)	electrodialysis	b)	electrophoresis		
	c)	potentiometry	d)	polarography		
41.	The	total number of isotopomers of eth	nylen	e diradical are		
	a)	4	b)	6		
	c)	8	d)	10		

42.	What is the degeneracy of H-atom in state n = 3?							
	a)	3	b)	6				
	c)	9	d)	12				
43.	The	e radii of second orbit of the hydro	gen a	tom is (a 0.53 A°)				
	a)	2.12 A°	B)	0.53 A°				
	c)	4.77 A°	d)	8.48 A°				
44.	Pas	chen series lies in						
	a)	UV region	b)	IR region				
	c)	Visible region	d)	Microwave region				
45.	The	e delocalization energy of benzene	e is					
	a)	2 <i>β</i>	b)	4β				
	c)	6 <i>β</i>	d)	0				
46.	CO	2 belongs to the following point groups to the following point groups to the following point groups are set of the following point groups are set	oup					
	a)	C _{2v}	b)	D _{2h}				
	c)	$D_{\infty V}$	d)	$D_{\sim h}$				
47.	The	e normal modes of vibrations of N ₂	o is					
	a)	4	b)	3				
	c)	1	d)	7				
48.	Fre	quency of absorption for transitior	n from	$2 \rightarrow 3$ energy level will be				
	a)	6B	b)	5B				
	c)	4B	d)	3B				
49.	The ratio of two specific heats of a diatomic molecule is							
	a)	1.33	b)	1.40				
	c)	1.52	d)	1.66				
			8					

50. At 0 K, fluids are assumed to have

- a) minimum entropy b) maximum entropy
- c) zero entropy d) fixed value of entropy

51. Which statistics will apply to deuterons and alpha particles?

- a) B-E b) F-D
- c) M-B d) None

52. The mean activity coefficient of 0.001 molal of $NaSO_4$ solution

a) 0.246 b) 0369 c) 0.571 d) 0.879

53. The signs of ΔH and ΔS for fuel cell will be

a) -ye, ±veb) +ve, -yeb) both zero

54. A reaction was found to be second order with respect to the concentration of carbon monoxide. If the concentration of carbon dioxide is doubled with everything else kept the same, the rate of reaction will be

- a) remain unchanged b) triple
- c) increase by a factor of 4 d) double
- 55. The property of lyophilization is
 - a) scattering of light
 - b) electrolyte
 - c) purification of colloids
 - d) washing of precipitate

- 56. The tetragonal crystal possesses the following axis of symmetry
 - a) two fold
 - b) threefold
 - c) four fold
 - d) six fold
- 57. Accuracy cannot be determined by the method
 - a) Minimal
 - b) Absolute
 - c) Comparative
 - d) None of these
- 58. Antifluorite structure is for
 - a) ThO₂
 - b) Na₂O
 - c) Both
 - d) None
- 59. Piezoelectric crystals with zero dipole are said to have
 - a) ferroelectricity
 - b) antiferroelectricity
 - c) both
 - d) none
- 60. The anode and cathode of dry battery is/are
 - a) Cu, Zn
 - b) Zn, graphite
 - c) Zn, ZnO
 - d) graphite, Pt

ANSWER SHEET — PART – A



21	А	В	С	D	Е
22	А	В	С	D	Е
23	А	В	С	D	Е
24	А	В	С	D	Е
25	А	В	С	D	Е
26	А	В	С	D	Е
27	А	В	С	D	Е
28	А	В	С	D	Е
29	А	В	С	D	Е
30	А	В	С	D	Е
31	А	В	С	D	Е
32	А	В	С	D	Е
33	А	В	С	D	Е
34	А	В	С	D	Е
35	А	В	С	D	Е
36	А	В	С	D	Е
37	А	В	С	D	Е
38	А	В	С	D	Е
39	А	В	С	D	Е
40	А	В	С	D	Е



CHEMISTRY/ CHEMISTRY (RENEWABLE ENERGY)

PART – B

(Descriptive Type)

Answer any eight questions. (8 × 5 = 40 Marks)

- 1. What is hybridization? Explain the hybridization involved in SO3 and PCI5 molecules.
- 2. Sketch the structure of Dithionic acid and Peroxodisulphuric acid. Give number of σ and π bonds in it.
- 3. When do expect square planar geometry? Give suitable example in CFT.
- 4. Define EAN rule. Calculate EAN of $[Mn(CN)_6]^{4-}$ complex.
- 5. Discuss the chemistry of azulene.
- 6. Explain briefly about Birch reduction and given its mechanism.
- 7. Draw the structure of crown ethers and its applications.:
- 8. Explain the structure, synthesis and uses of citral.
- 9. Discuss the operators in quantum mechanics.
- 10. Give the sets of four quantum numbers for the valence electrons of rubidium and calculate orbital angular quantum number for rubidium with the help of suitable formula.
- 11. Compare the similarity and differences of B-E, F-D and M-B statistics.
- 12. Derive the Gibbs-Helmholtz equation from Gibbs free energy function G = H TS.