

BRAINWARE UNIVERSITY

Term End Examination 2018 - 19

Programme – B.Tech. (CSE)/ B.Tech. (ECE)

Course Name - Chemistry

Course Code - BSC(CSE)202/BSC(ECE)202

(Semester -2)

Time allotted: 3 Hours Full Marks: 70

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group -A $10 \times 1 = 10$ (Multiple Choice Type Questions) 1. Choose the correct alternative from the following (i) Which one is the angular momentum of an electron of mass m moving in a circular orbit of radius r and velocity v in a hydrogenic atom? a. $mvr > nh/2\pi$ b. $mvr = 2\pi/nh$ c. $mvr = nh/2\pi$ d. $mvr < nh/2\pi$ Δ_0 increases as the metal changes from (ii) a. 3d < 4d < 5db. 5d < 4d < 3dd. 4d < 3d < 5dc. 3d < 4d > 5dIn phenoxide the wavelength increases more than phenol due to (iii) a. Blue Shift b. Auxochrome c. Redshift d. Chromophore A process in which pressure is constant is called (iv) a. Isochoric Process b. Isobaric Process c. Isothermal Process d. Adiabatic Process The ΔG^0 of a cell reaction is negative. It means that the (v) a. Emf of the cell is negative b. Emf of the cell is positive c. Cell reaction is feasible d. Both b and c The entropy change of Carnot cycle in JK⁻¹ is (vi) b. positive a. zero

c. negative

d. unknown

(vii)	Amon	g the elements C, O, N, F which one	has	the maximum effective nuclear charge?	
	a.	C	b.	N	
	c.	0	d.	F	
(viii)	Which form is the least stable form of n-butane?				
	a.	Eclipsed	b.	Gauche	
	c.	Staggered	d.	Partial eclipsed	
(ix)	What t	type of isomerism is exhibited by pen	tan	e-1-ol and pentane-2-ol?	
	a.	Position	b.	Functional group	
	c.	Metamerism	d.	Chain	
(x)	Ethyle	ne reacts with MCPBA to form			
	a.	Epoxide	b.	Aldol	
	c.	Mesityl oxide	d.	Cannizaro	
		Group -	B		
	(Short Answer Type Questions)				
Answe	r anv <i>th</i>	aree from the following			

2. (a) What are the three postulates of Bohr's Theory of a hydrogenic atom? 3 Draw the metal's d orbital splitting pattern of a transitional metal ion in 2

presence of an octahedral field.

What is meant by van der Waals force? Discuss in brief the different types of 2+3 3. van der Waals force.

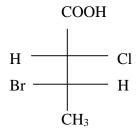
(a) What is electron affinity? How is it different from electronegativity? 3 4.

Why do the halogen atoms have a very strong electron affinity? Explain. 2

5. 5 Deduce the relation between ΔH and ΔU for a chemical reaction involving gaseous reactant and products.

What happens when tertiary butyl bromide is treated with OEt⁻? Predict the 3 6. (a) product with mechanism.

Convert the following into Newmann projection formulae? 2



2

Group - C

		(Long Answer Type Questions) 3 x	15 = 45
Ans	swer a	ny three from the following	
7.	(a)	Write down the mathematical expression of time-independent Schrödinger wave equation for a single particle.	2
	(b)	What is crystal field stabilization energy (CFSE)?	2
	(c)	Calculate the crystal field stabilization energy (CFSE) for the following metal complexes:	2+2
		(i) d ⁷ high spin, octahedral complex	
		(ii) d ⁹ octahedral complex	
	(d)	Predict the number of unpaired electrons and magnetic nature of the following complexes	2+2
		(i) $[Cr(NH_3)_6]^{2+}$ (ii) $[Ti(H_2O)_6]^{2+}$	
	(e)	Calculate the de Broglie wavelength of an electron moving with a velocity of $5x10^5 \text{ms}^{-1}$	3
8.	(a)	Define auxochrome with examples. What are the transitions possible in case of electronic or ultra violet (UV) spectroscopy? Define red shift in case of ultra violet(UV) spectroscopy	2+2+1
	(b)	Which one has higher wavelength and why?	2
		(i) cis stilbene, (ii) trans stilbene	
	(c)	What do you mean by critical temperature (T_C) , critical pressure (P_C) , critical volume (V_C) of a real gas? Using van der Waals equation show that $RT_C/P_CV_C = 8/3$.	1+1+1 +5
9.	(a)	How does atomic radius vary (i) in a period and (ii) in a group?	3
	(b)	Considering the atomic number and position in the periodic table arrange the following elements according to the increasing order of metallic character: Si, Be, Mg, Na, P.	2
	(c)	Explain the variation in first ionization potential of the second row elements in periodic table.	4
	(d)	Write down the electronic configuration of 24Cr, 9F, 19K and mention which block in the periodic table they belong to.	6
10.	(a)	Deduce the relation between ΔG and ΔH of a process.	5
	(b)	Write the principle of determining pH of a given acid solution by emf method using hydrogen electrode.	5
	(c)	The reaction in a cell is written as $Zn(s) + 2AgCl(s) \rightleftharpoons ZnCl_2(aq) + 2Ag(s)$. If the emf of the cell is 1.015 volt at 25° C, calculate ΔG of the cell reaction. (Given $F = 96500 \text{ C mol}^{-1}$)	3

(d) 10 g of ice at 0°C melts into 10 gm of water at 0°C . Calculate the entropy

change. Given latent heat of fusion of ice at 0°C is 80 cal g⁻¹?

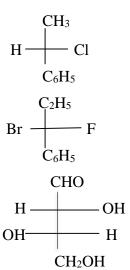
- 11. (a) Predict the reaction when benzene is treated with conc. HNO₃ and conc. 4 H₂SO₄. Write the mechanism of the reaction.
 - 3

3

(b) Predict products and which one is the major one among the products?

$$CH_3-CH_2-CH-CH_3 \xrightarrow{OH^-} A+B$$
Br

(c) Assign D/L nomenclature in all mentioned below three molecules



(d) Draw the conformations of n-butane. Arrange them in increasing order of stability with explanation.
