



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

(Multiple Choice Type Questions)

10 x 1 = 10

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. $mvr < nh/2\pi$
 - (ii) Δ_o increases as the metal changes from
 - a. $3d < 4d < 5d$
 - b. $5d < 4d < 3d$
 - c. $3d < 4d > 5d$
 - d. $4d < 3d < 5d$
 - (iii) In phenoxide the wavelength increases more than phenol due to
 - a. Blue Shift
 - b. Auxochrome
 - c. Redshift
 - d. Chromophore
 - (iv) A process in which pressure is constant is called
 - a. Isochoric Process
 - b. Isobaric Process
 - c. Isothermal Process
 - d. Adiabatic Process
 - (v) The ΔG^0 of a cell reaction is negative. It means that the
 - a. Emf of the cell is negative
 - b. Emf of the cell is positive
 - c. Cell reaction is feasible
 - d. Both b and c
 - (vi) The entropy change of Carnot cycle in JK^{-1} is
 - a. zero
 - b. positive
 - c. negative
 - d. unknown

Group – C

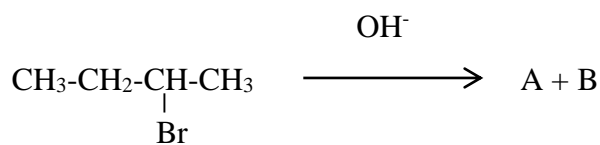
(Long Answer Type Questions)

3 x 15 = 45

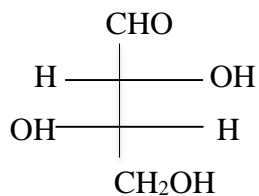
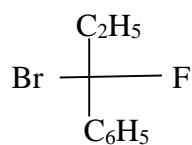
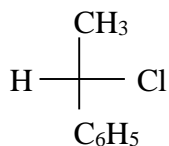
Answer any *three* from the following

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) $[\text{Cr}(\text{NH}_3)_6]^{2+}$ (ii) $[\text{Ti}(\text{H}_2\text{O})_6]^{2+}$
- (e) Calculate the de Broglie wavelength of an electron moving with a velocity of $5 \times 10^5 \text{ ms}^{-1}$ 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 $RT_C/P_C V_C = 8/3$. 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 ${}_{24}\text{Cr}$, ${}_{9}\text{F}$, ${}_{19}\text{K}$ 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 $\text{Zn}(\text{s}) + 2\text{AgCl}(\text{s}) \rightleftharpoons \text{ZnCl}_2(\text{aq}) + 2\text{Ag}(\text{s})$. 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} ? 2

11. (a) Predict the reaction when benzene is treated with conc. HNO₃ and conc. H₂SO₄. Write the mechanism of the reaction. 4
- (b) Predict products and which one is the major one among the products? 3



- (c) Assign D/L nomenclature in all mentioned below three molecules 3



- (d) Draw the conformations of n-butane. Arrange them in increasing order of stability with explanation. 5
