

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)  
BSc DEGREE EXAMINATION DECEMBER 2018  
(Fifth Semester)

Branch - CHEMISTRY

**PHYSICAL CHEMISTRY - I**

Time : Three Hours

- Maximum : 75 Marks

**SECTION-A (20 Marks)**

Answer ALL questions

ALL questions carry EQUAL marks (10 x 2 = 20)

- 1 What is specific conductance? Give its expression with unit and explain the terms involved in it.
- 2 Define ionic mobility and ionic conductance. How are they related with each other?
- 3 State and explain Ostwald dilution law.
- 4 Write Debye-Huckel Onsager equation and explain the terms involved in it.
- 5 What is leveling effect?
- 6 State the Lewis concept of an acid and a base.
- 7 What are concentration cells? Give two examples.
- 8 Sketch the potentiometric titration curve obtained for a redox reaction.
- 9 What is meant by organic coating? Give two examples.
- 10 What are the steps to be followed for corrosion control?

**SECTION - B (25 Marks)**

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 5 = 25)

- 11 a State and explain Kohlrausch Law.  
OR  
b What is meant by transport number of an ion? Show that the sum of transport numbers of cation and anion is unit.
- 12 a (i) Give any two evidences in support for the Arrhenius theory of dissociation.  
(ii) Explain: Wien effect. (2+3)  
OR  
b (i) Define the terms: Equivalent conductance and cell constant.  
(ii) Conductance of a weak electrolyte increases upon dilution. Justify the statement with plot. (2+3)
- 13 a Highlight on: (i) Ionic product of water.  
(ii) Influence of salt on the strength of a strong base. (2+3)  
OR  
b What are buffer solutions? Give any one example. Explain the importance of buffer solution in biological and industrial processes. (2+1+2)
- 14 a (i) What are reversible electrodes? Give their types.  
(ii) Draw a labeled diagram and explain the working of Ag-Cu cell. (2+3)  
OR  
b (i) What is electrochemical series? What are its applications?  
(ii) Write an expression for the EMF of an electrotype concentration cell with transference. (3+2)
- 15 a Explain the principle of electroplating.  
OR

**SECTION - C (30 Marks)**Answer any **THREE** Questions**ALL** Questions Carry **EQUAL** Marks (3 x 10 = 30)

- 16 a) Describe the Hittroff s method for the determination of transport number,  
 b) If molar conductivities at infinite dilution of NaCl, HCl and CH<sub>3</sub>COONa are 126.4, 426.1 and 91.0 ohm<sup>-1</sup>cm<sup>1</sup>mor<sup>1</sup> respectively, what will be that of acetic acid? (6+4)
- 17 a) A base has the dissociation constant value of 1.8X10<sup>-5</sup> at 298K. Calculate its degree of dissociation at a concentration of 0.1N at the same temperature.  
 b) Apply the principle of conductometric titrations to get the end point for the reaction: HCl vs NaOH.  
 c) Discuss the Debye Huckel theory of strong electrolytes in view of Asymmetric effect. (3+3+4)
- 18 a) Account on: (i) Common ion effect  
 (ii) Hydrolysis constant  
 (iii) Degree of hydrolysis (3 x 2=6)  
 b) Define the term: pH scale. Determine the pH of a solution obtained by mixing equal volumes of 0.1 N CH<sub>3</sub>COONH<sub>4</sub> and 0.02 N NH<sub>4</sub>OH. Given: K<sub>b</sub> for NH<sub>4</sub>OH is 1.8 x 10<sup>-5</sup>. (1+3=4)
- 19 a) Calculate the standard EMF of a cell which involves the following cell reaction.  
 $Zn+2Ag^+ \rightarrow Zn^{2+}+2Ag$ .  
 Given that: E°(Zn/Zn<sup>2+</sup>)=0.76 volt; E°(Ag/Ag<sup>+</sup>)=0.80 volt.  
 b) How would you calculate AG and K of a given reaction from EMF measurement?  
 c) What is liquid junction potential? How can it be eliminated? (3+3+4)
- 20 a) What do you mean by galvanization? Explain the steps followed in this method. (3+3)  
 b) Account on: (i) Electroforming (ii) Hot dip process. (2+2)

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END