

**B.TECH. (AEROSPACE ENGINEERING)
(BTAE)****Term-End Examination
December, 2013****BAS-002 : APPLIED CHEMISTRY***Time : 3 hours**Maximum Marks : 70*

Note : Attempt *any seven* questions. All the questions carry *equal* marks.

1. (a) What are transition elements ? How are the characteristic properties of transition elements explained on the basis of their electronic configuration ? 5
- (b) Write short notes on 5
 - (i) Hydrogen bonding, and
 - (ii) Isotopes of hydrogen
2. (a) Describe the important properties which make boron behave differently from the rest of the members. 5
- (b) (i) The equilibrium constant of a reaction is 2×10^{-3} at 25°C and 2×10^{-2} at 50°C . Is the reaction exothermic or endothermic? Explain why? 5
- (ii) Calculate the degree of ionization of 0.05m ammonia solution. The ionization constant of ammonia (K_b) is 1.77×10^{-5} .

3. (a) What is a primary cell ? Why a cell stops working after some time ? 3
- (b) Write Nernst equation for single electrode potential. 2
- (c) By the passage of 0.06 Faradays of electricity, 1.057gm of nickel (atomic mass 58.71) was deposited at the cathode. If hydrogen is also evolved simultaneously, what is the volume at S. T. P. of hydrogen evolved at the cathode? What are the current efficiencies for Ni deposition and hydrogen evolution? (Equivalent wt. of Ni = 58.71/2) 5
4. (a) How is the variability of oxidation states of the transition elements different from that of the non-transition elements? Name a transition element which does not exhibit variable oxidation state. 6
- (b) What are different oxidation states exhibited by lanthanids and why these elements exhibit variable oxidation states. 4
5. (a) Explain why Cu^+ ion is not stable in aqueous solution ? Why transition metals and their compounds act as good catalysts ? 5
- (b) (i) Explain why solid CO_2 is called dry ice. 2
- (ii) Describe hydrolysis of salts and the factors affecting it. 3
6. (a) What is a buffer solution ? What is the advantage of Henderson equation ? 5
- (b) Describe the principle and process of conductometric titrations. 5

7. Explain the following terms (any five) : 5x2=10
- (a) Linear independence
 - (b) Hybridization
 - (c) Co-relation diagrams
 - (d) Metallic bonding
 - (e) Energy level diagrams
 - (f) Bonding MO
 - (g) Dipola moment
8. (a) What are the critical temperatures, critical pressures and the triple point temperatures of 5
- (i) Water
 - (ii) Ammonia
 - (iii) Benzene and
 - (iv) Freon
- (b) Describe the beneficial use of nitrogen and phosphate fertilisers. Give an example for each type. 5
9. (a) In the partial oxidation process, the overall reaction : 6
- $\text{CH}_4 + 1/2\text{O}_2 \rightarrow \text{CO} + 2\text{H}_2$ is exothermic even though the reactions of CO_2 and H_2O are endothermic Explain.
- (b) Give reasons for the following : 4
- (i) Instead of electrolysing water, an aqueous solution of an alkali is electrolysed to manufacture hydrogen.
 - (ii) Dust free and dry air is used for obtaining liquid air.
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