| BAS-002 |

B.Tech. AEROSPACE ENGINEERING (BTAE)

Term-End Examination

00293   **June, 2018**

BAS-002 : APPLIED CHEMISTRY

Time : 3 hours   *Maximum Marks : 70*

*Note : Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. (a) What are the objectives of the periodic table ? Give variations of covalent radii with respect to atomic number of Li, Be, B, C, N, O and F elements.   *5*

    (b) What is electron affinity ? How does it vary in the periodic table ? Why is electron affinity of a noble gas zero ?   *5*

2. (a) Write short notes on the following :   *5*

        (i)   Ionization energy

        (ii) Ionic radius

    (b) Write Slater's rule to explain the concept of effective nuclear charge.   *5*

3. (a) Mention the shortcomings of Bohr's theory of atomic structure. Explain the influence of nuclear charge in elliptical orbits. *5*

(b) Define any *five* of the following : *5*

(i) Coordination complex

(ii) Complex ion

(iii) Chelate

(iv) Coordination number

(v) Double salt

(vi) Types of ligands

4. (a) Name any *five* of the following : *5*

(i) $[Co(NO_2)_3 (NH_3)_3]$

(ii) $[Ag(NH_3)_2]Cl$

(iii) $K_4[Fe(CN)_6]$

(iv) $[Co(NH_3)_6]Cl_3$

(v) $K[BF_4]$

(vi) $[Ag(CN)_2]^-$

(b) What is effective atomic number (EAN) ? Discuss the stability of complex ions. Show how the equilibrium exists in a solution containing silver ammonia complex ion. *5*

5. (a) Write short notes on the following :   *5*

   (i) Aufbau principle

   (ii) Poly-electron

(b) Outline the experiment to show that an electron behaves as a particle and a wave.   *5*

6. (a) What are polymers ? Write about addition polymers. Give the industrial application of ethylene and propylene.   *5*

(b) What is the cause of hardness of water and how can it be reduced ? What are the disadvantages of saline and alkaline water for industrial and domestic use ?   *5*

7. Give reasons for any *five* of the following :   *5×2=10*

(a) While an anion is bigger, a cation is always smaller than the corresponding atom.

(b) Electron affinity of fluorine is less than chlorine.

(c) Metallic radii are smaller than the van der Waals radii.

(d) The ionic radii of alkaline earth metals are smaller than alkali metals.

(e) Alkaline earth metal compounds are more extensively hydrated than those of alkali metals.

(f) Graphite conducts electricity while diamond is an insulator, though both are allotropes of carbon.

8. (a) Explain the following terms :   *2+2=4*

(i) Quantum number

(ii) Schrodinger's equation

(b) Write Hund's rule. Give the electronic configuration of Lithium and Beryllium.   *6*

9. (a) At equilibrium for the reaction

$$2SO_2 \text{ (g)} + O_2 \text{ (g)} \rightleftharpoons 2SO_3 \text{ (g)}$$
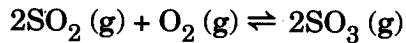
the concentration of reactants and products at 727°C were : SO_2 = 0·27 mol L^{-1}, O_2 = 0·40 mol L^{-1} and SO_3 = 0·33 mol L^{-1}. What is the value of equilibrium constant, K_c at this temperature ?   *5*

(b) Explain Le Chatelier's principle. Write the equilibrium constant expression for the reaction in general term written as   *5*

$$aA + bB \rightleftharpoons cC + dD$$