Use Separate answer Scripts for each group

B.Sc. (Honours) Examination, 2018

Semester-I

Chemistry (Allied)

Course: BACH-11

Time: Four Hours **Full Marks: 60**

Questions are of value as indicated in the margin.

Group-A (Marks: 20)

(Inorganic Chemistry)

Answer ***any two*** questions.

1. a) Define electron affinity of an element. 2
   b) What is the relation between 1st and 2nd electron affinity of any element? – Give proper reason. 3
   c) The electron affinity of chlorine is greater than that of fluorine – justify. 3
   d) How and why does ionization energy vary along a group in the periodic table? 2

2. a) Define electronegativity of an element. 2
   b) How and why does electronegativity vary along a period in the periodic table? 3
   c) What are the Bohr's postulates regarding atomic structure. 3
   d) State Hund's rule regarding electronic configuration of any element. 2

3. a) How did Rutherford conclude that the nucleus is of positive charge? 3
   b) Calculate the wavelengths of the first two lines in the Lyman series of hydrogen spectrum. 4
   c) How does wave number related with wavelength of any spectra? What are units of the above two parameters? 1+2

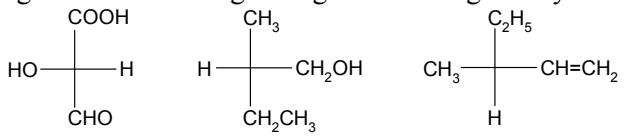
Group-B (Marks: 20)

(Organic Chemistry)

Answer ***any two*** questions.

1. a) What do you mean by the terms 'plane of symmetry' and 'inversion symmetry'? Discuss with suitable examples. 4
   b) What is the difference between the terms 'enantiomer' and 'diastereomer'? Explain with proper example. 3
   c) What are the types of structural isomerism? Discuss the term 'chain isomerism'. 3

2. a) How do you designate the following configuration using CIP system? 3



   b) Explain the chirality of compounds associated to the structure of allenes and biphenyls. 4
   c) Draw the stereoisomers
   (i) Z-2-butene (ii) R-2-butanol (iii) R-lactic acid 3

3. a) Draw some conformers of propane molecule? Explain their stability using energy profile diagram. 3
   b) Draw the chair conformation of cyclohexane molecule. How can you convert this conformer to a boat conformer? Discuss the conformers of 1,3-dimethyl cyclohexane. 4
   c) Define Huckel's rule of aromaticity. How can you differentiate an aromatic compound from a non-aromatic one? 3

P.T.O.

Group-C (Marks: 20)
(Physical Chemistry)

Answer ***any two*** questions.

1. a) Write one difference between closed and open system. 2
   b) Show that the slope in the adiabatic P-V curve will be larger than that in the isothermal one. 4
   c) Show that for finite processes, at constant volume $\Delta U = C_V \Delta T$ and at constant pressure, $\Delta H = C_P \Delta T$. 2+2

2. a) State the law of Lavoisier and Laplace of thermochemistry. 2
   b) The heat of formation of $H_2O(g)$ is – 58000 Cal at 500^oK. – Explain the statement. 2
   c) Calculate the entropy change when 0.5 mole of Neon is heated from 27^oC to 227^oC at constant volume. [C_V for monatomic Neon = 3 Cal/mole]. 3
   d) Show that the entropy-change in any reversible cyclic process is zero. 3

3. a) Show that in a spontaneous change, ΔG must be negative. 3
   b) Establish the relation $\left[\frac{\partial(\Delta H)}{\partial T}\right]_P = \frac{\Delta G - \Delta H}{T}$. 4
   c) Establish the relation
   $$\frac{dP}{dT} = \frac{L}{T(V_2 - V_1)}$$
   V_2 and V_1 being the final and initial volume of the system. L is the latent of the process. 3

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