Use separate answer script for each group

UndergraduateExamination, 2018

Semester-I (CBCS)
Chemistry
Generic Elective Course: GEC-1
(Inorganic and Organic Chemistry)

Time: Three Hours **Full Marks: 40**

Questions are of value as indicated in the margin.

Group-A (Marks: 20)
(Inorganic Chemistry)

Answer***any two***questions.

1. a) Show that de Broglie relation corroborates with Bohr's theory. 2
   b) Why do half-filled and filled orbitals attain extra stability? 2
   c) Show the order of penetrating and shielding capacity of s, p, d and f orbitals. 2
   d) What is a wave function, ψ? What is the significance of ψ^2 or $\psi\psi^*$? 2
   e) Give the angular, radial and total number of nodes with their topologies for orbitals with $n = 2$. 2

2. a) Write down the Schrödinger's time independent equation and define different involved terms. 2
   b) Mention the outcome of Frank-Hertz experiment. 2
   c) Briefly describe the genesis of variation in Rydberg constant. 2
   d) How can you calculate the limiting radius ratio in octahedral coordination number? 4

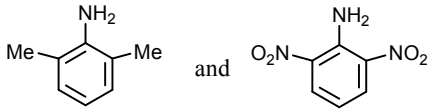
3. a) How can you compute proton affinity of water molecule from Born-Haber cycle? 4
   b) Write a note on Born-Landé equation. 3
   c) Comment on the stablest structures of PCl_3F_2 according to Bent's rule. 3

4. a) What are the shapes of the following molecules: 3
   (i) CH_4, (ii) PCl_5, (iii) H_2O, (iv) CO_2, (v) SF_4 and (vi) BF_3.
   b) What are the hybridized state of the central atoms of the following molecules: 2
   (i) SF_6, (ii) I_3^{3-}, (iii) C_2H_4 and (iv) NH_3.
   c) Comment on the stablest structure of BrF_3 according to VSEPR theory. 3
   d) Arrange the following species according to stability and explain with the help of MOT. 2
   He_2, He_2^+ and He_2^{++}.

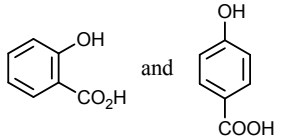
Group-B (Marks: 20)
(Organic Chemistry)

Answer***any two***questions.

1. Explain the following: 5x2
   a) Which one is more basic? Explain.



   b) Which one is more acidic? Explain.



   c) Which one has highest boiling point? – Explain:
   $CH_3CH_2CH_2CH_3$, CH_3NH_2, CH_3OH, CH_2F_2.

P.T.O.

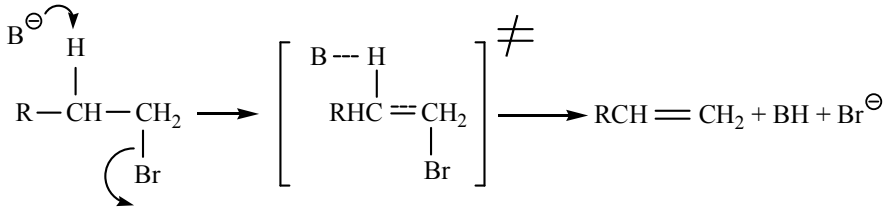
d) Which one is more stable carbocation? Explain:

$CF_3\overset{\oplus}{C}HMe$ and $Me\overset{\oplus}{C}HMe$

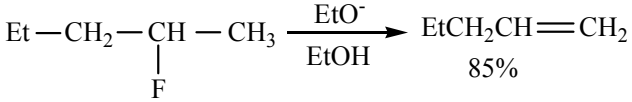
e) Which one is more stable carbanion? Explain:

$\bar{C}F_3$ and $\bar{C}H_3$

2. a) Explain the following reaction mechanism: 3

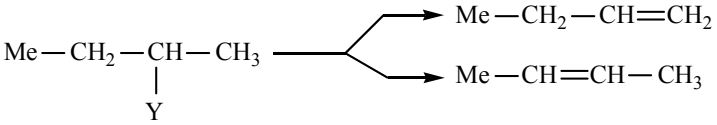


b) $EtCH_2CH(F)CH_3$ leads mainly Hoffman product although it is a neutral species



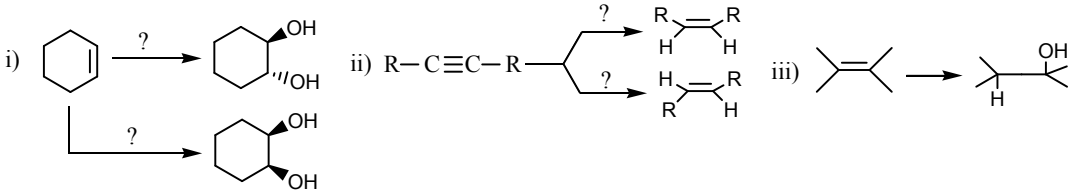
: why? 3

c) Explain the following observations: 4



Y =	Br	$\overset{\oplus}{S}Me_2$	$\overset{\oplus}{N}Me_3$
	19%	74%	95%
	81%	26%	5%

3. a) Write down the necessary reagents to accomplish the following reactions: 2



b) Write down the possible product(s) from the following reactions: