Sessional Examination 2023
North Gauhati College
Semester: I (FYUGP)
Subject: Chemistry I

Total marks: 30 Time: 1.5 hr

1. Answer the following questions (Any three) $1 \times 3 = 3$
   i. How many orientations are possible for *p* orbitals?
   ii. What is the designation of an orbital with $n = 4$ and $l = 2$?
   iii. What is the mathematical expression for Heisenberg's Uncertainty Principle?
   iv. Write down the possible values of quantum numbers n, l, m_l and m_s for an electron in *3d* orbital.
   v. What is the significance of Ψ^2 ?
2. Explain Pauli's exclusion principle. 2

   Or,

   Write down the electronic configuration of: a) Cu^{2+} b) Fe^{2+} $1 + 1 = 2$
3. What is screening or shielding effect? Using Slater's rules find out the effective nuclear charge felt by *3p* electron of chlorine atom. $2 + 3 = 5$

   Or,

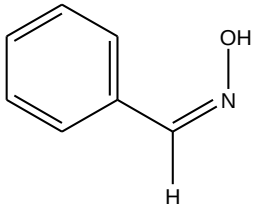
   Write down the postulates of Bohr's atomic model and discuss its failures. $2 + 3 = 5$
4. Answer the followings: $1 \times 5 = 5$
   i. Define Compressibility factor.
   ii. Write Vander Waal's equation for one mole of a real gas.
   iii. Mention the significance of Vander Waals constants a and b.
   iv. What are the causes of deviation from ideal behaviour?
   v. Define most probable velocity.
5. Answer the followings: (any three) $1 \times 3 = 3$
   i. What are cohesion and adhesion forces?
   ii. Why is the shape of a liquid drop spherical?
   iii. How does viscosity get affected on increasing pressure?
   iv. Define vapour pressure.
   v. Define coefficient of viscosity.

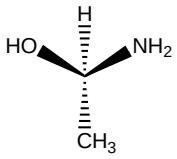
To what height will water rise in a capillary of diameter 0.50 mm at 25 °C if the surface tension of water is 71.97 dynes cm^{-1}? (Density of water 1 gcm^{-3}) 2

6. a) Draw the structure of ethane molecule from hybridisation of atomic orbital. 3

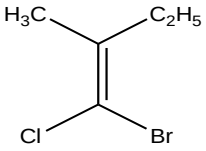
b) Select the Syn/Anti form, R/S and E/Z notation from the following structures. 2

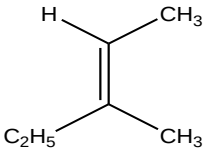
i) ii)





iii) iv)





c) Give two examples from each of nucleophile and electrophile. 2

d) Draw the resonance structure of any three of the following. 3

i) CO^{3-} ii) C_6H_6 iii) SO_4^{2-} iv) O_3

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