Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **17CH3002** | **Duration :** | **3hrs** |
| **Sub. Name :** | **CHEMICAL BONDING AND NUCLEAR CHEMISTRY** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | | **Marks** |
| 1. | a. | Arrange the following in the increasing order of electron affinity and justify your answer. Li, O, N, B, C, Be, Ne. | CO4 | | 6 |
| b. | Give the equation to calculate ΔHf0 for the formation of CaCl2 from its elements on the basis of Born Haber thermodynamic Cycle. | CO3 | | 10 |
| c | Expalin how EA varies down the group in IA group elements. | CO4 | | 4 |
| **(OR)** | | | | | |
| 2. | a. | Calculate Zeff for Li, Be, F, Ne and on this basis, explain whether the electronegativity of these elements increases or decreases. | CO3 | | 4 |
| b. | Derive Born Lande equation and give its significance. | CO1 | | 16 |
|  |  |  |  | |  |
| 3. | a. | Calculate the pH, pOH of the following solution, assuming the acid and base dissociate completely i) 0.05M of HCl, ii) 0.1M of NaOH. | CO2 | | 6 |
| b. | Brief the levelling effect with example. | CO1 | | 6 |
| c. | [What causes ammonia molecules to deviate from bond angle of 1090 to 1070](https://socratic.org/questions/what-causes-water-molecules-to-have-a-bent-shape-according-to-the-vsepr-theory)? Explain. Give the relationship between dielectric constant and solubility of a solvent with suitable example. | CO3 | | 8 |
| **(OR)** | | | | | |
| 4. | a. | The melting point of chlorides of II-A group elements are increasing down the group. Justify your answer. | | CO2 | 5 |
| b | Fill the missing entities:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Acid | Base | Conjugate Acid | Conjugate Base | Equation | | HNO2 | H2O | - | - | - | | HSO4– | PO43– | - | - | - | | - | - | - | - | S2–+ H2O → OH–+ HS– | | | CO3 | 5 |
| c. | Arrange the following in the increasing order of bond order by working out on the basis of MOT. O2, O2-, O2+ | | CO5 | 10 |
|  |  |  | |  |  |
| 5. | a. | Discuss on Berry Pseudo rotation Mechanism. | | CO1 | 10 |
| b. | Account on the basis of dipole moment - Boiling point (0K) of Propane, dimethyl ether, methyl chloride and acetaldehyde are 231, 248, 249, 294. | | CO2 | 10 |
| **(OR)** | | | | | |
| 6. | a. | Identify the polar molecules and give reason for your answer.  CCl4, HCl, CH3Cl, BF3. | CO2 | | 5 |
| b. | The melting point of chlorides of II A group elements are increasing down the group. Justify your answer. | CO2 | | 9 |
| c. | Compare and contrast chemical properties of solvent ammoia with HF (any three). | CO2 | | 6 |
|  |  |  |  | |  |
| 7. | a. | Classify the following nuclides as examples of  isotopes, isobars and isotones. | CO1 | | 6 |
| b. | 19F NMR of PF5 show one peak at room temperature but at low temperature it shows two peaks. Why? | CO4 | | 6 |
| c. | Thermal stability of carbonates of IA group metal ions increasing down the group. Justify. | CO2 | | 8 |
| **(OR)** | | | | | |
| 8. | a. | List the differences between atom and hydrogen bomb. | CO1 | | 6 |
| b. | Fill up the missing entities\  92U235 + 0n1 🡪? Kr? + ? + ? | CO3 | | 4 |
| c. | Calculate the mass defect of oxygen atom 7 N14 which has a mass of 15.994910 amu. Given that mass of a neutron is 1.008665 amu, mass of a proton is 1.007277 amu and of an electron is 0.0005486 amu. | CO2 | | 10 |
|  | | **Compulsory:** |  | |  |
| 9. | a. | Calculate the packing fraction of Argon isotope, 40Ar18. Mass is 39.96 amu. What does the value of packing fraction imply? | CO5 | | 5 |
| b. | Write a note on nuclear stability on n/p ratio with examples. | CO1 | | 8 |
| c. | What is binding energy per nucleon? Calculate the binding energy per nuleon in 2He 4 which has a mass of 4.00260 amu. Mass of 1 neutron is 1.008665 amu and mass of 1 H atom = 1.007825 amu. Express the result in Joules as well. | CO5 | | 7 |