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

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**End Semester Examination – Nov/Dec – 2017**

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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. | Give Reason. IE2 of sodium is higher than IE1. | CO2 | 2 |
| b. | Define effective nuclear charge with example. | CO1 | 4 |
| c. | Arrange the following in the increasing order of electron affinity and justify your answer. Li, O, N, B, C, Be,F, Ne | CO2 | 4 |
| d. | Give the equation to calculate ΔHf0 for the formation of MgCl2 from its elements on the basis of Born Haber thermodynamic Cycle. | CO3 | 10 |
| (OR) | | | | |
| 2. | a. | BCl3 is a Lewis acid whereas CCl4 is not. Explain | CO4 | 4 |
| b. | Calculate Zeff for Li, Be, F, Ne and comment on their electronegativity. | CO2 | 4 |
| c. | Derive Born Lande equation and mention its significance | CO1 | 12 |
|  |  |  |  |  |
| 3. | a. | Define differentiating solvent with example. | CO1 | 5 |
|  | b. | Discuss the factors affecting solubility. | CO2 | 5 |
|  | c. | Brief the levelling Effect with example. | CO1 | 5 |
|  | d. | [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. | CO3 | 5 |
| (OR) | | | | |
| 4. | a. | The melting point of chlorides of II-A group elements are increasing down the group. Justify your answer. | CO4 | 4 |
|  | b. | Arrange the following in the increasing order of bond order by working out on the basis of MOT. N2, O2-, N2+ | CO5 | 9 |
|  | c. | Can the bond length of CO+ (1.115A0), CO (1.128A0) be explained by MOT? Give reason. | CO2 | 7 |
|  |  |  |  |  |
| 5. | a. | What do you mean by fluxionality? | CO1 | 4 |
|  | b. | Explain Berry Pseudo rotation Mechanism. | CO1 | 10 |
|  | c. | Account on the basis of dipole moment - Boiling point (K) of propane, dimethyl ether, methyl chloride and acetaldehyde are 231, 248, 249, 294. | CO3 | 6 |
| (OR) | | | | |
| 6. | a. | [What causes hydrogen bonding interactions?](https://socratic.org/questions/what-causes-dipole-dipole-interactions) Give your answer with example. | CO1 | 4 |
|  | b. | Identify the polar molecules and give reason for your answer CCl4, HCl, CH3Cl, BF3 | CO4 | 4 |
|  | c. | Discuss the advantages of MO theory. | CO2 | 8 |
|  | d | Can octet rule be applied to all molecules? Justify. | CO2 | 4 |
| 7. | a. | Classify the following nuclides as examples of  isotopes, isobars and isotones | CO1 | 4 |
|  | b. | Predict the geometry of the following moleculesusing the VSEPR model.  i. PCl5 ii. IF5 iii. TeF4 iv. XeF2 v. BF3 | CO5 | 10 |
|  | c. | Thermal stability of carbonates of IA group metal ions increasing down the group. Justify. | CO4 | 6 |
| (OR) | | | | |
| 8. | a. | Identify the missing particle in the following reaction  13Al27 + 2He4  → 15P30 + \_\_\_\_\_ | CO1 | 2 |
|  | b. | Write a note on n/p ratio on nuclear stability. | CO1 | 5 |
|  | c. | Fill up the missing entities  92U235 + 0n1 🡪 ? Kr? + ? + ? | CO2 | 3 |
|  | d. | Calculate the mass defect of carbon atom 6C12 which has a mass of 11.994910 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. | CO4 | 10 |
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|  | | **Compulsory:** |  |  |
| 9. | a. | Calculate the packing fraction of Argon isotope, , 40 Ar18. Mass is 39.96amu. What does the value of packing fraction imply? | CO4 | 7 |
|  | b. | Write a note on mass defect on nuclear stability. | CO1 | 6 |
|  | c. | What is binding energy per nucleon? Calculate the binding energy per nucleon in 7N14 which has a mass of 14.00260 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. | CO4 | 7 |

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