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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April / May – 2017**

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| **Code :** | **15CH3002** | **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. O2- is larger than that of O- | CO1 | 2 |
| b. | Calculate the pH of a 2.0 x 10-4 M solution of NaOH. | CO2 | 4 |
| c. | Arrange the following in the increasing order ofelectron affinity and justify your answer.  Li, O, N, B, C, Be, Ne | CO2 | 4 |
| d. | Give the equation to calculate ΔHf0 for the formation of CaCl2 from its elements on the basis of Born Haber thermodynamic Cycle. | CO3 | 10 |
| (OR) | | | | |
| 2. | a. | BCl3 is a stronger acid than BF3,. Explain. | CO2 | 4 |
| b. | Calculate Zeff for Li, Be, F, Ne and on this basis explain the electronegativity of these elements whether it increases or decreases? | CO2 | 4 |
| c. | Derive Born Lande equation and give its significance. | CO1 | 12 |
|  |  |  |  |
| 3. | a. | Write the self ionization reactions of H2O, H2SO4, SO2, NH3 and HF. | CO1 | 5 |
|  | b. | At 60 ◦C, the ion product of water is 9.6 x 10-14. What is the pH of a neutral solution at this temperature? | CO2 | 5 |
|  | c. | Brief the levelling Effect with example. | CO1 | 5 |
|  | d. | [What causes water molecules to have a bent shape according to the VSEPR theory?](https://socratic.org/questions/what-causes-water-molecules-to-have-a-bent-shape-according-to-the-vsepr-theory)Explain. |  | 5 |
| (OR) | | | | |
| 4. | a. | The melting point of chlorides of II-A group elements are increasing down the group. Justify your answer. | CO2 | 4 |
|  | b. | Arrange the following in the increasing order of bond order by working out on the basis of MOT.  N2, N2-, N2+ | CO2 | 9 |
|  | c. | Can the bond length of CO+ (1.115A0), CO (1.128A0) be explained by MOT? Give reason. | CO2 | 7 |
| 5. | a. | Define fluxionality. | CO1 | 3 |
|  | b. | Discuss on 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. | CO2 | 7 |
| (OR) | | | | |
| 6. | a. | [What causes dipole-dipole 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. | CO2 | 4 |
|  | c. | The boiling point of HF, HCl, HBr, HI are (K) 293, 188, 206, 238. Explain why the boiling points increase from HCl through HBr to HI. | CO2 | 8 |
|  | d. | AgCl is white, but AgI is yellow in color, give reason. | CO2 | 4 |
| 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? | CO2 | 6 |
|  | c. | Thermal stability of carbonates of IA group metal inos increasing down the group. Justify. | CO2 | 8 |
| (OR) | | | | |
| 8. | a. | Identify the missing particle in the following reaction  13Al27 + 2He4  → 15P30 + \_\_\_\_\_ | CO2 | 2 |
|  | b. | List the differences between atom and hydrogen bomb. | CO1 | 5 |
|  | c. | Fill up the missing entities\  92U235 + 0n1 🡪? Kr? + ? + ? | CO1 | 3 |
|  | d. | Calculate the mass defect of oxygen atom 8O16 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, 40 Ar18. Mass is 39.96 amu. What does the value of packing fraction imply? | CO2 | 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. | CO2 | 7 |