

M.Sc.Examination, 2018
Semester-III
Chemistry(Elective)
Course: CH-915
Optional (Inorganic Chemistry)

Time: Three Hours

Full Marks: 40

Questions are of value as indicated in the margin.
Answer *any four* questions.

1. a) Write the criteria to act as a Mössbauer active nucleus. 2.5
b) Derive an expression for the recoil energy of γ -ray emitter. 2.5
c) What do you mean by chemical shift in Mössbauer spectroscopy? Write its significance in Mössbauer spectroscopy. 2.5
d) Sketch the nature of Mössbauer spectral pattern of the following compounds with justification: 2.5
 $K_3[Fe(CN)_6]$ and $Na_2[Fe(CN)_5(NO)]$
2. a) "The Nuclear hyperfine coupling constant of 'N' is greater than 'H' – Justify the statement with suitable example. 2.5
b) How can you identify radical type intermediate generated in an organic reaction through EPR spectroscopic study? 2.5
c) Write the significance of statistical probability factor for the determination of EPR spectral output of $\cdot CH_3$ radical. 2.5
d) What is the significance of first derivative plot in EPR spectroscopy? 2.5
3. a) Write the concept of 'UMPOLUNG' in the aspect of organometallic chemistry. 2.5
b) Compare between CO insertion and olefin insertion. 2.5
c) Briefly discuss about oxidative addition reaction with suitable example. 2.5
d) What is WGS? Mention the types of catalyst involved and their advantage and disadvantage. 2.5
4. a) Explore the EPR spectral pattern of $[Cu(NH_3)_4]^{2+}$. 2.5
b) Justify the phosphine modification of cobalt-catalyst in hydroformylation. 2.5
c) Write a catalytic cycle for the production of acetone from propylene. 2.5
d) Write the significance of the 'g' value of 'dpph' in EPR spectroscopy. 2.5
5. a) Explain the selection rule of EPR spectroscopy with proper example. 2.5
b) Write a short note on nuclear magnetic moment. 2.5
c) Why does $[Cr(Cp)_2]$ show an anomalous magnetic moment? 2.5
d) Write about the conditions for the productions of metallacyclopentene from coordinated alkyne. 2.5
6. a) Show the mode of bonding in allyl complex in terms of MOT. 2.5
b) Comment on the basic character of $[(\eta^6-C_6H_5NH_2)Cr(CO)_3]$. 2.5
c) Discuss the sequence of affinity of COt^{2-} towards transition metals, actinides and lanthanides. 2.5
d) Comment on the stability of $\eta^6-C_7H_8$ and $\eta^7-C_7H_7^+$. 2.5