AE-762

M. Sc. (Final)
Term End Examination, 2016-17

CHEMISTRY

Optional

Group - A

Paper - III

Organotransition Metal and
Photo-Inorganic Chemistry

Time : Three Hours] [*Maximum Marks* : 100
[*Minimum Pass Marks* : 36

Note : Answer **five** questions in all, selecting at least **two** questions from each Section. All questions carry equal marks.

Section-A

1. (*a*) What are homoleptic alkyl and aryl complexes ? Give two examples. Write notes on instability of alkyl transition metal complexes.

(*b*) Explain stereochemistry and application of organocopper in organic synthesis.

2. Describe the preparation and bonding of transition metal-carbene complexes. Also explain M–C double bond in Fischer and Schrock type complexes.

3. Discuss on :

(*a*) Sandwich complexes

(*b*) Wilkinson's catalyst and Tolman catalytic loop

4. What is precatalyst ? Give one example. Describe stereospecificity of Ziegler–Natta catalyst. Also discuss 'oxo' process.

5. Write notes on the following :

(*a*) Fluxional organometallic compounds

(*b*) Agostic interaction of M—H bond and its evidence by ^{1}H NMR spectroscopy

Section-B

6. Write notes on the following :

(*a*) Flash Photolysis

(*b*) Franck-Condon Principle

7. Describe the following :

(*a*) Acid-base properties of electronically excited states

(*b*) Calculation of rates of radioactive processes

8. Explain the following :

(*a*) Charge transfer spectra

(*b*) Lability and selectivity in photochemical reactions

9. Describe the $[Ru(bpy)_3]^{2+}$ based on following properties (bpy = 2, 2′–bipyridine)

(*i*) Photochemistry

(*ii*) Photoredox property

(*iii*) Its role as photosensitizer in the photolysis of water.

10. Writes notes on the following :

(*a*) Metal complex sensitizer in nitrogen fixation

(*b*) Photosensitizer in carbon dioxide reduction

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