

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)

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 ^1H 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

(3)

8. Explain the following :
- (a) Charge transfer spectra
 - (b) Lability and selectivity in photochemical reactions
9. Describe the $[\text{Ru}(\text{bpy})_3]^{2+}$ 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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