(2½ Hours) **(Total Marks : 60)**

Please check whether you have got the right question paper.

N.B.: 1) All questions are compulsory.
2) Figure to the right indicate full marks.

1. a) Answer **any two** of the following.

i) With respect to octahedral complexes, explain the following factors affecting the rate of reaction. **04**
   i) Effect of ionic strength
   ii) Influence of solvent

ii) What are redox reactions? Explain the mechanism of outer-sphere electron transfer reaction with a suitable example. **04**

iii) Explain the mechanism of substitution reaction of octahedral complexes without breaking mental-ligand bond. **04**

iv) Explain use of flow methods for determination of rate of very fast reactions. **04**

b) Answer any one of the following.

i) What is trans effect? Explain its Pi-bond theory. **04**

ii) What are complementary and non-complementary reactions? Classify the following as complimentary or non-complimentary.
$Ce(IV)+Fe(II) \rightarrow Fe(III) + Ce(III)$
$Cr(VI)+3Fe(II) \rightarrow Cr(III) + 3\,Fe(III)$

2. Answer **any two** of the following.

i) Write any one method of preparation of Zieses's salt. Draw its structure and discuss the bonding. **04**

ii) How is ferrocene prepared using cyclopentadienyl Grignard reagent? Write the following chemical reaction of ferrocene. **04**
   1) Acylation 2) Sulphonation

iii) Assuming the following complexes obey 16 electron rule, with the help of electron count identify the metal M in the following complexes. **04**
   1) $M(\mu^5\text{-}C_5H_5)(CO)Cl_2$
   2) $M(\mu^2\text{-}C_2H_2)CO_4)$
   3) $M(\mu^6\text{-}C_6H_6)(CO)Cl_3$
   4) $M(\mu^2\text{-}C_2H_4)(PPh_3)Cl_2$

b) Answer **any one** of the following.

i) Differentiate between Fischer and Schrock Carbenes **04**

ii) How is dibenzene chromium prepared? Discuss its structure and bonding on the basis of valence bond theory. **04**

3. A) Answer **any two** of the following.

i) Explain the speciation by chromium and why hexavalent chromium is more toxic. **04**

ii) Write note on case study of arsenic poisoning in Indo-Bangladesh region. **04**

iii) Discuss the genetic effects of radiation pollution. **04**

iv) Describe use of technetium and cobalt radioisotopes in diagnostic aid. **04**

B) Answer **any one** of the following.

i) Explain bio-amplification of mercury and its reactions. **04**

ii) Discuss the sources of radioactive materials in context with the environment. **04**

4. A) Answer **any two** of the following.

i) Explain role of hemo-cyanine in the living system. **04**

ii) Write note on "differences between haemoglobin and myoglobin". **04**

iii) Discuss the various steps involved in the reaction catalyzed by cytochrome P-450. **04**

iv) What are ionospheres? Explain the structure and function of Nonactin? **04**

B) Answer **any one** of the following.

i) Explain the mechanism of action of Cis-platin as an anticancer drug. **04**

ii) Explain the conversion of atmospheric nitrogen into ammonia by Nitrogenese. **04**

5) Answer **any four** of the following

With respect to trans effect, explain the effect of the following factors.

a) i) Nature of the leaving group. **03**

ii) Nature of the solvent.

b) Describe the inner sphere mechanism of redox reaction. **03**

c) Explain the half sandwich complex with suitable examples. **03**

d) How is transition metal alkyl prepared? (Give any one method). Give its any two chemical reactions. **03**

e) Give the impact of toxic chemicals on enzymes. **03**

f) Explain the remedial measures of Hg poisoning. **03**

g) Give types of Hydrogenase **03**

h) Write note on Tyrosinase. **03**