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.  
   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.  
iii) Explain the mechanism of substitution reaction of octahedral complexes without breaking mental-ligand bond.  
iv) Explain use of flow methods for determination of rate of very fast reactions.  
b) Answer any one of the following.  
i) What is trans effect? Explain its Pi-bond theory.  
ii) What are complementary and non-complementary reactions? Classify the following as complimentary or non-complimentary.  
   Ce(IV)+Fe(II) → Fe(III) + Ce(III)  
   Cr(VI)+3Fe(II) → 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.  
ii) How is ferrocene prepared using cyclopentadienyl Grignard reagent? Write the following chemical reaction of ferrocene.  
   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.  
   1) M(µ²-C₅H₅)(CO)Cl₂  
   2) M(µ²-C₅H₅)CO₄  
   3) M(µ²-C₅H₅)(CO)Cl₃  
   4) M(µ²-C₅H₅)(PPh₃)Cl₂  
b) Answer any one of the following.  
i) Differentiate between Fischer and Schrock Carbenes  
ii) How is dibenzene chromium prepared? Discuss its structure and bonding on the basis of valence bond theory.

3. A) Answer any two of the following.  
i) Explain the speciation by chromium and why hexavalent chromium is more toxic.  
ii) Write note on case study of arsenic poisoning in Indo-Bangladesh region.  
iii) Discuss the genetic effects of radiation pollution.  
iv) Describe use of technetium and cobalt radioisotopes in diagnostic aid.
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.
   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 Nitrogenase. 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 any two chemical reactions.
   e) Give the impact of toxic chemicals on enzymes. 03
   f) Explain the remedial measures of Hg poisoning. 03
   g) Give types of Hydrogenase
   h) Write note on Tyrosinase. 03