NATIONAL OPEN UNIVERSITY OF NIGERIA
14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS
SEPTEMBER/OCTOBER 2015 EXAMINATION
SCHOOL OF SCIENCE AND TECHNOLOGY

COURSE CODE: CHM 423

COURSE TITLE: Coordination Chemistry

Answer question one and any other four questions
Time: 2½ hours
QUESTION 1 (compulsory) 22marks

1ai.What do you understand by the term: Coordination number? Explain briefly (4 marks)
ii. Discuss briefly the coordination numbers 1, 2 and 3. (7marks)
b. Explain these terms and give examples where necessary:
i. Isomerism (2marks)
ii Direct reaction (2marks)
iii. Substitution reaction (2marks)
iv. Redox reaction (3marks)

c. Why is Co (III) not used in the preparation of its complexes? (2marks)

Question 2(12 marks)
a. Using the Valence Bond Theory as a guide, outline five ways in which coordination complexes can be formed. (10 marks)
b. List the factors that determine stereochemistry in complexes. (2 marks)

Question 3 (12 marks)

Fill in the missing items in the table below:

Coordination number	Hybridization type	Structure
2		
3		
4		
4		
5		
5		

(1mk for each correct point)

Question 4 (12 marks)

a. Discuss succinctly the term " Effective Atomic Number" (EAN) (10marks)
b. b. Mention two limitations of the Valence bond theory. (2marks)

Question 5 (12 marks)

Write short notes on the following:

i. The Spectrochemical series. (6 marks)
ii. The Metal ion series. (6 marks)

Question 6 (12 marks)

(a) Explain the reason that the metal d-orbital splitting pattern in a tetrahedral ligand field is an inversion of that in an octahedral ligand field. (6marks)
(b) Why is the splitting parameter $\Delta_t$in a tetrahedral field muchsmaller than that in an octahedral field Δ_o. (6marks)

Question 7 (12 marks)

a. Explain briefly the factors that affect crystal field splitting in coordination complexes. (4marks)

bi State two limitations of the crystal field theory. (2marks)
ii. Outline any six deductions that could be made from bond theories in coordination chemistry. (6marks)