Eastern University, Sri Lanka

Second Year First Semester Examination in Science

2008/2009 (April/May 2010)

External Degree (2004/2005)

EXTCH201: Coordination Chemistry and Main Group Chemistry

(Proper & Repeat)

Answer **all** questions **Time: 01 hour**

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[1]

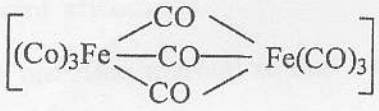
(a) Write the IUPAC name of the following compounds..

i) $[Al(OH)(H_2O)_5]^+$

ii) $NH_4[Cr(NCS)_4(NH_3)_2]$

iii) $Na[CoCl_4(NH_3)_2]$

iv)



(40 marks)

(b) Give an example of each of the following:

i) Binuclear Complex

ii) Low spin complex

iii) High spin complex

(30 marks)

(c) i). Calculate the spin only magnetic moment for a d^8 ion in octahedral and tetrahedral ligands fields.

(20 marks)

ii) Explain why the $Co(NH_3)_6^{3+}$ ion is a diamagnetic, low spin complex, where as the CoF_6^{3-} ion is a paramagnetic, high spin complex.

(10 marks)

Cont..

to produce q grams of a chemical, per day. The company can sell any amoun chemical at \$4 per gram. Find how much of chemical the company must per day in order to have neither a profit nor a loss (give the answer to the gram).

3. (a) Assume that $x_0, x_1, \ldots, x_n$ are distinct points in the interval $[a, b]$ and p degree polynomial which approximates the function $f(x)$ such that

$$p(x_i) = f(x_i), \quad \forall\, i = 0, 1, \ldots, n.$$

Does it mean the nature of "uniqueness" can be made on the polynomial p? your answer.

(b) Let $f(x)$ be a function defined on $[x_0, x_2]$ and the second derivative of $f(x)$ is uous and bounded on the sub-intervals $[x_0, x_1]$ and $[x_1, x_2]$, where $x_1 = x_0$ $x_2 = x_0 + 2h$. If a quadratic Lagrange's polynomial $p_2(x)$ is used to appr $f(x)$, show that the bound of the error in approximation is given by

$$\frac{h^3}{9\sqrt{3}} \max|f'''(\xi)|, \quad x_0 < \xi < x_2.$$

(c) Show that an n^{th}-order divided difference of a function $f \in C^n[a, b]$ mad distinct points $x_0, x_1, \ldots, x_n$ in $[a, b]$ is given by

$$\frac{1}{n!} f^{(n)}(\xi), \quad a < \xi < b.$$

4. (a) Write down the divided difference table for e^x using the values

x	e^x
0.0	1.00000
0.4	1.49182
0.9	2.45960
1.5	4.48169
1.8	6.04965

and estimate $e^{1.2}$.

(b) Estimate

$$\int_1^2 e^x \, dx$$

using the Composite Trapezium and Simpson's rules with two sub interval

(c) Apply the

i. Jacobi method and

ii. Gauss Seidel method

to solve the following system of equations by carrying two iterations for x_1, x_2 and x_3 correct to 4 decimal places:

$$\begin{aligned} x_1 &= \frac{1}{16}(24 + 4x_2 - 4x_3), \\ x_2 &= \frac{1}{5}(-6 + 4x_1 - 3x_3), \\ x_3 &= \frac{1}{14}(15 - 4x_1 - 3x_2). \end{aligned}$$