

سامية محمد مصطفى



شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم



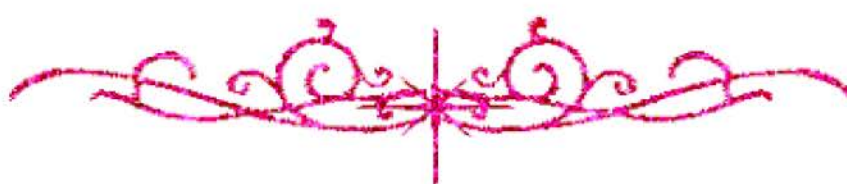
سامية محمد مصطفى



شبكة المعلومات الجامعية



شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



سامية محمد مصطفى



شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

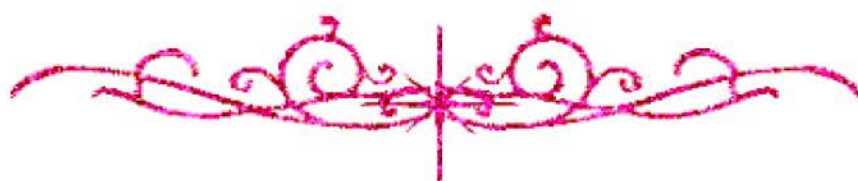
قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



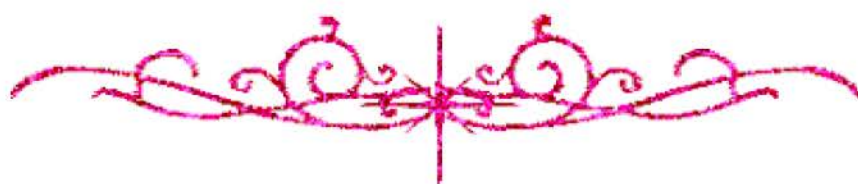
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بعض الوثائق الأصلية تالفة



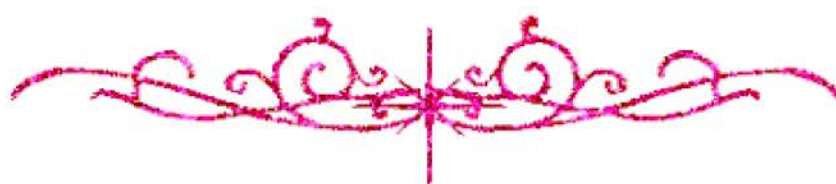
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شبكة المعلومات الجامعية



بالرسالة صفحات لم ترد بالأصل



**Study of Water Quality Control of
Rosetta Branch**

By

Noha Samir Mohamed Donia

B.Sc.(Engineering), Ain Shams University, 1993.

Master in Irrigation and Hydraulics, 1998.

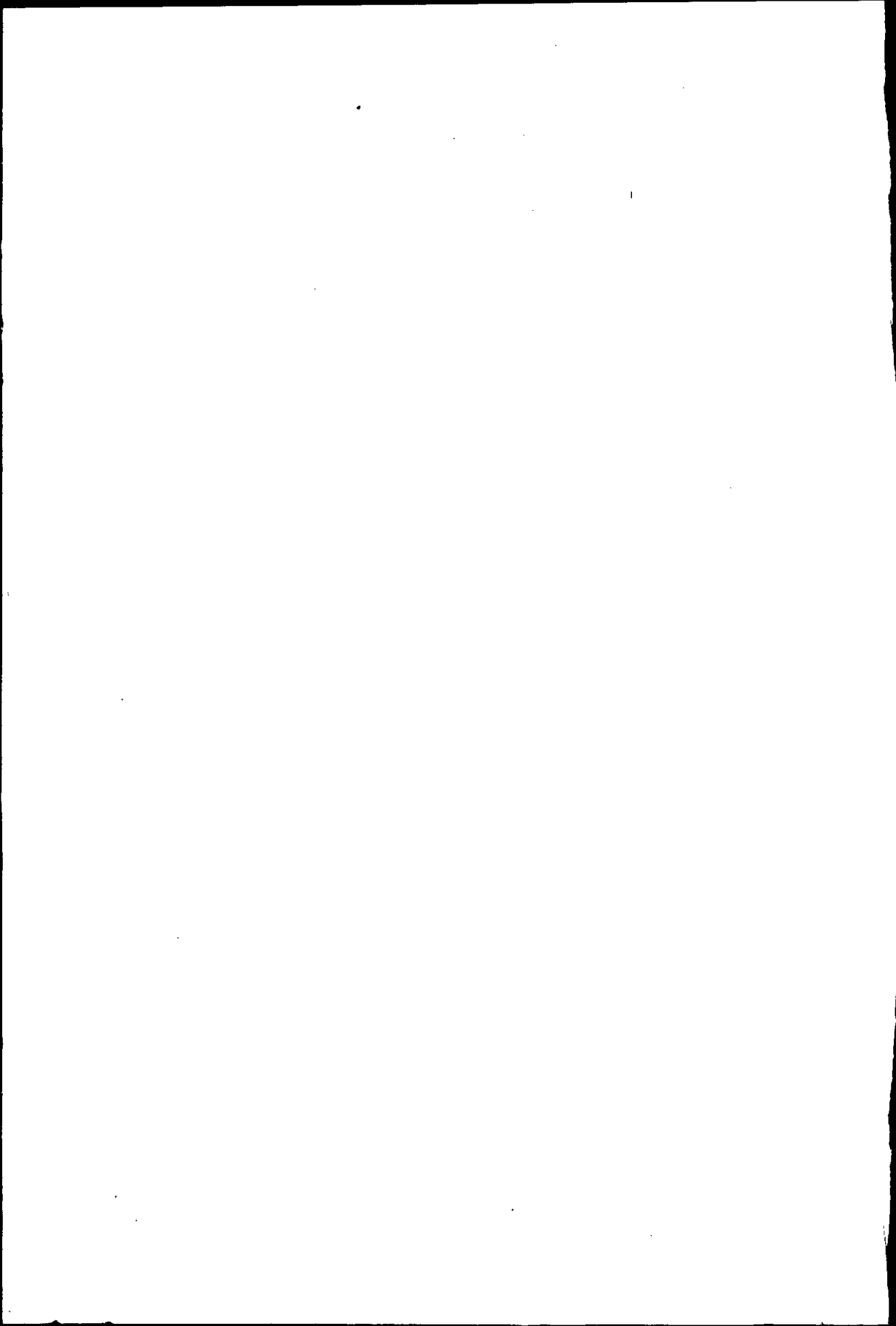
A thesis submitted
for the Degree of Doctor of Philosophy
in
Environmental Science

Engineering Department
Institute of Environmental Studies and Researches
Ain Shams University

2002

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APPROVAL SHEET

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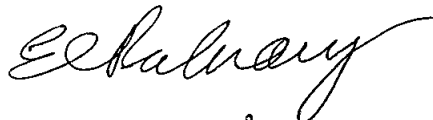
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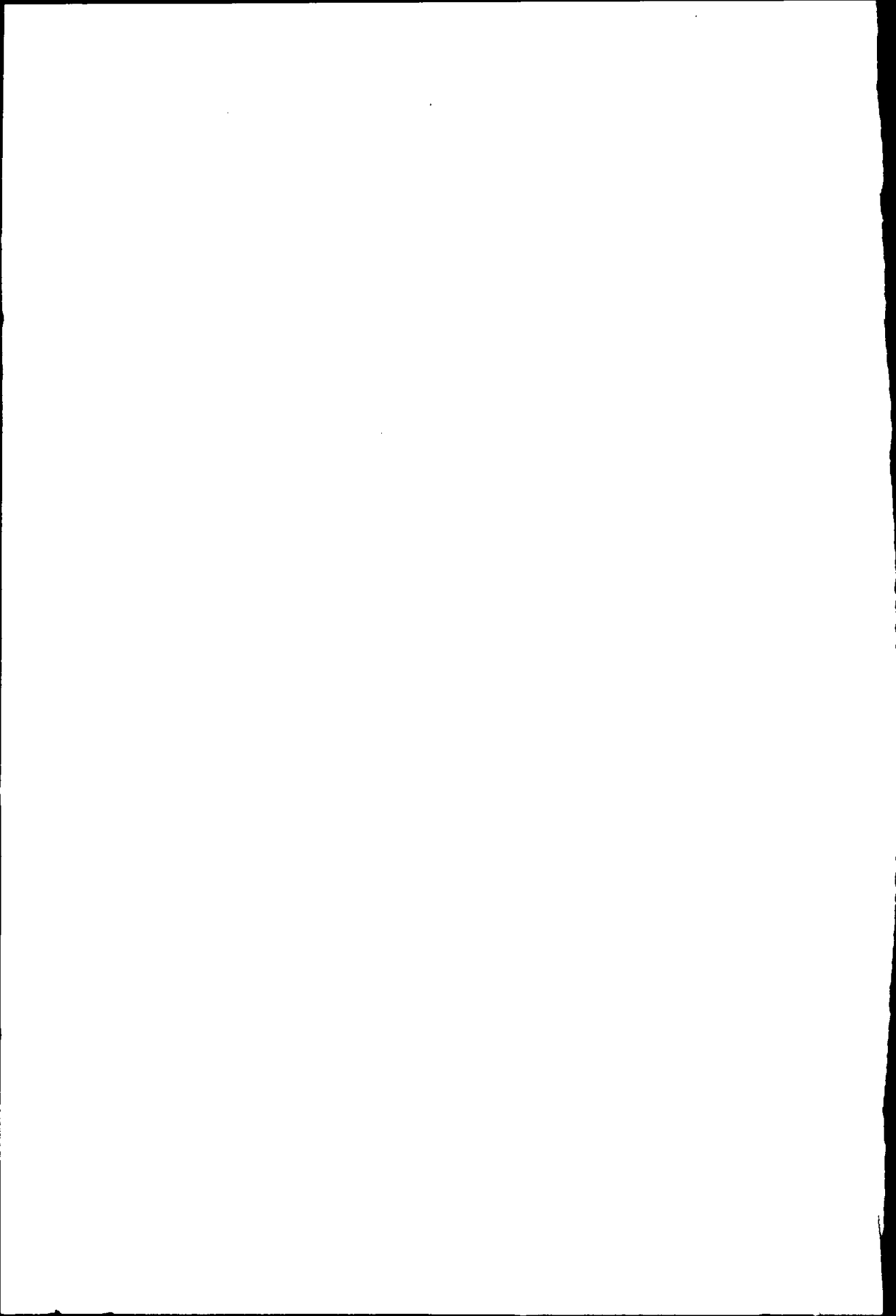
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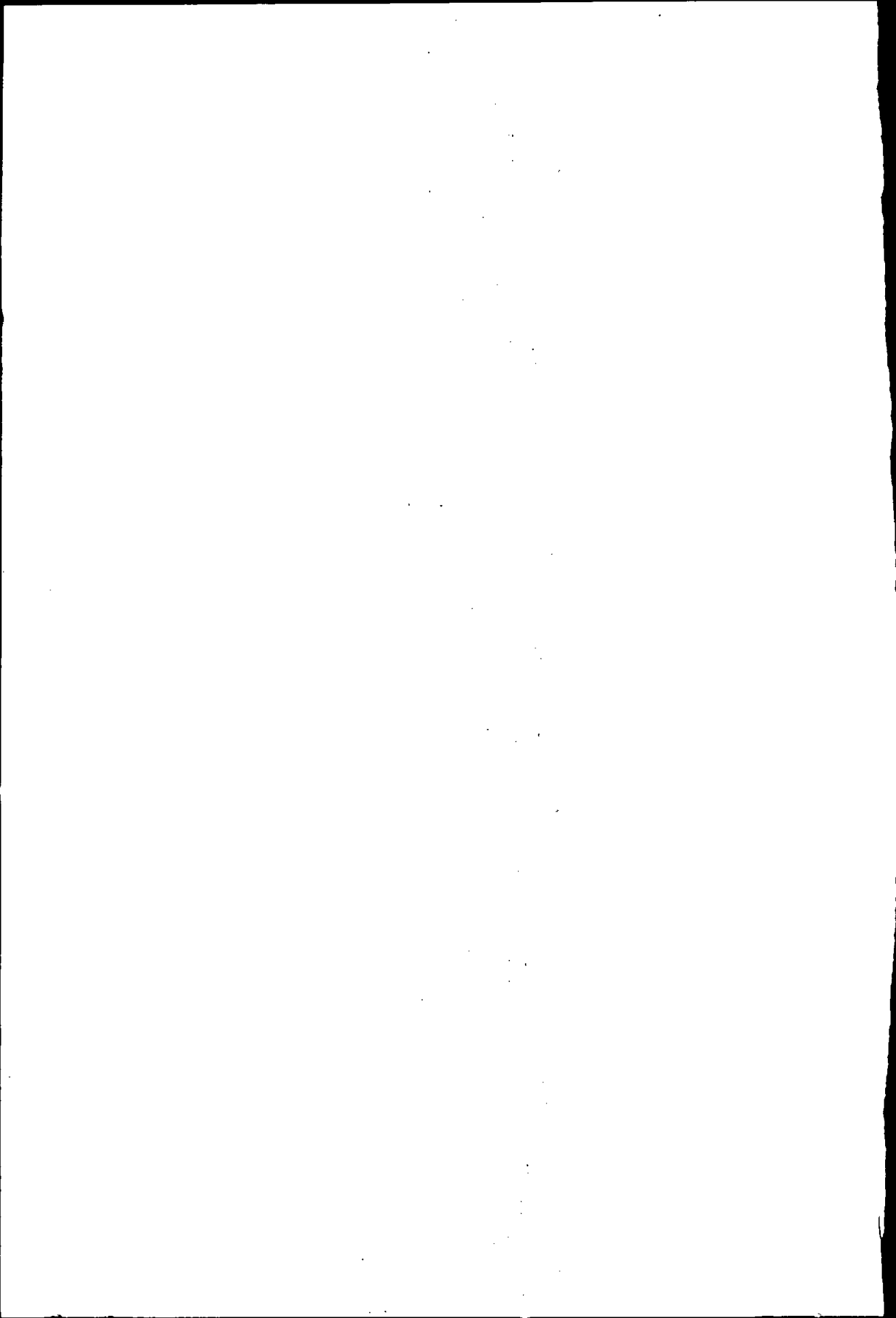
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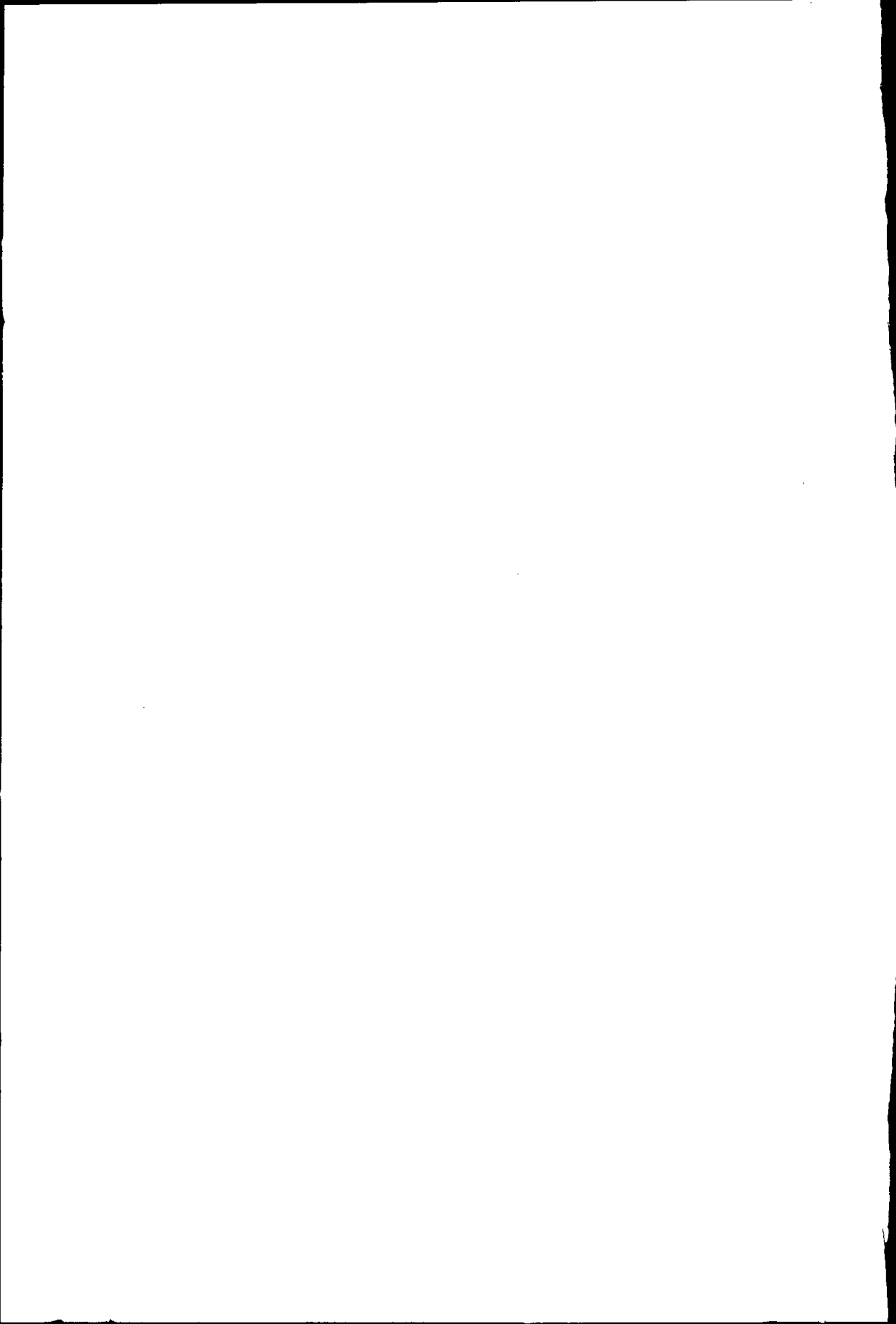
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ABSTRACT

Research on the modeling and control of water quality in rivers and streams has been reported widely. The reason for this is that with the extension of civilization, water in streams is used for industrial purposes and effluents are discharged again in rivers. This of course disturbs the ecological balance in the system that may affect life. What is essentially required in a river, which is used either for potable supply or for recreation, is to maintain pollution levels in polluted reaches within reasonable bounds consistent for both the community needs and for maintaining a satisfactory ecological balance as well as standards of water quality.

In Egypt, Rosetta branch, one of the two main branches of the Nile River, is the main concern of the study. It flows downstream Delta Barrage to the North-West where it ends with Edfina Barrage that releases excess water to the Mediterranean Sea. The Rosetta Branch is impacted by several industrial companies at Kafr El-Zayat city and agricultural drains located along the branch. These two sources of pollution potentially affect and deteriorate its quality of water.

The main objective of this study is to develop a system that can formulate alternative strategies to improve the Rosetta Branch water quality in order to allow its safe usage for drinking, fishing and recreation.

To identify the major pollution problems of Rosetta Branch, two activities have been carried out. The first is identification of the water quality characteristics through a water quality survey which has been carried out in high and low flow seasons. The second is to compare and evaluate the Rosetta Branch characteristics based on the relevant standards and guidelines.

To clarify cause-effect relationships between pollutant loads and environmental conditions and to simulate the impact of remedial actions on water quality parameters; a water quality control software was successfully developed. It integrates the water quality modeling and the water quality control policy using a database in which the key elements are defined and a control model that consists of three major

models: a water quantity and quality simulation model, an economic model; and an optimization model.

The DUFLOW package (Version 2.05) was used for the simulation model. It simulates the one-dimensional unsteady flow in open channel. A dissolved oxygen module was built within the DUFLOW package to simulate the water quality. The model was evaluated and was calibrated based on field and historical data. Then by sensitivity analysis, those factors which have the most significant effect upon the quality characteristics of the water were identified.

The developed economic model evaluates the cost associated with each treatment alternative. It is the sum of the capital cost and the operation and maintenance (OMR) costs. The capital cost was compounded to present value over the period of construction. The costs were updated to current values using construction and labor cost indexes.

The optimization model was developed to decide the optimum degree of treatment to the wastes needed before discharging them into the water. This optimum treatment alternative must comply with the objective function of cost minimization and must comply with the input water quality objectives or standards. The treatment alternatives of each pollution source were identified and the treatment efficiency and cost were calculated.

Finally some control scenarios were conducted using the developed water quality model in order to indicate the optimal treatment of the effluents before its discharge from the polluted sources into the river to maintain water quality within specification, and to predict the effect of a proposed waste effluents on the downstream quality especially at the abstraction points of drinking water plants.

Based on the results of this study, the developed model can be used as an aid to quality management decision-making and resource allocation, to achieve designated water quality objectives.