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Metabolites of Plant Growth-Promoting Rhizobacteria for the Management of Soilborne Pathogenic Fungi in Crops

15

M. Jayaprakashvel, C. Chitra, and N. Mathivanan

15.1 Introduction

Soilborne pathogenic organisms are those pathogenic organisms which inhabit and partly or fully complete their life cycle in the soil environment by causing various diseases in plants and cause extensive damage. These diseases caused by soilborne pathogens are collectively known as soilborne diseases. Soilborne diseases occur in a wide variety of plants such as fruits and vegetables, ornamental plants, trees, and shrubs. Fungi, oomycetes, nematodes, viruses, and few parasitic plants have been considered as causative agents for the soilborne diseases. Diseases caused by soil-borne pathogens are one among the most significant biological stress to the plants. Soilborne fungi such as *Rhizoctonia*, *Fusarium*, *Macrophomina*, *Sclerotiana*, *Sclerotium*, *Gaeumannomyces graminis* including oomycetes *Pythium* and Phytophthora are the major causal agents of significant soilborne plant diseases (Mathivanan et al. 2006; Jayaprakashvel and Mathivanan 2011). Hence, soilborne pathogenic fungi (SBPF) are considered as one of the major limiting factors for the growth and yield of crop plants world over. These SBPF may cause severe damage to crop plants and could incite rot diseases in seedlings and vascular systems and roots of crop plants (Mishra et al. 2015).

Rhizosphere of plants is one of the most dynamic and competitive ecosystems. Both beneficial and harmful microorganisms constantly compete with each other in the rhizosphere region because of the root exudates and other

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CHAPTER 1

INDIGENOUS LIVE FEED AND ITS IMPORTANCE IN AQUA-HATCHERIES

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INTRODUCTION

For the past three decades many marine and estuarine cultivable species of finfish and shellfish have been domesticated and their captive development of broodstock, breeding and spawning technology has been well established. As a result of this biotechnological development, commercial scale production of seeds of many fish and shellfish in the hatcheries is practiced all over the world. Large quantum of larvae of molluscs, shrimps and fish are reared and farmed leading to production of the animal protein. The larval cultivation is generally carried out under controlled hatchery conditions with specific culture techniques which are different from nursery and grow-out procedures. The difference in larval rearing techniques are mainly due to their small size, small gabe, fragile nature, not fully developed receptors and digestive system which necessitate research and adoption of appropriate husbandry techniques like feeding strategies, maintenance of water quality and microbial control. In this regard the larval nutrition in general and that of the sensitive first-feeding larvae in particular, has become one of the major bottleneck preventing the full commercialization of many farmed fish and shellfish species.

Feeding habit of fishes in natural water bodies is varied among the different species but all the fishes require protein rich live food for their better growth, efficient breeding and survival. The larval development of finfish and shellfish shows species-specific variations for example, in the case of shrimp species one of the problem is the developing larvae have to pass through different larval stages, first as a herbivorous filter feeding larva and then to a carnivorous larva with predatory behaviour. Mouth size of the larvae at first feeding stage is another factor which mechanically restricts the size of the food particles which can be ingested. The mouth size is correlated with body size, which in turn is influenced by egg diameter and the period of endogenous feeding. The developmental status of the digestive system of the first feeding larvae also indicates the possibility of the larvae to digest the food ingested. For example, first- feeding salmon alevins already have a well-developed digestive tract with functioning enzyme system which allows the digestion of feed crumbles on first-feeding. By contrast, Gilthead sea bream larvae do not have a functional stomach, but only a short digestive tract with few functional enzyme systems at the onset of first-feeding. These fish larvae rely on a food source that is easily digestible, contains enzyme systems which allow autolysis and supplies all the essential nutrients required by the larval predator. Compared to live feed, formulated feeds do not generally meet all these requirements and usually result in poor growth and survival in small fish larvae such as the Gilthead seabream (Lavens and Sorgeloos, 1996).

It is well established that the live food organisms meet all the necessary criteria for the small larvae of all commercially important fishes. Further, for food to be ingested by a larva, it first has to be detected, and hence

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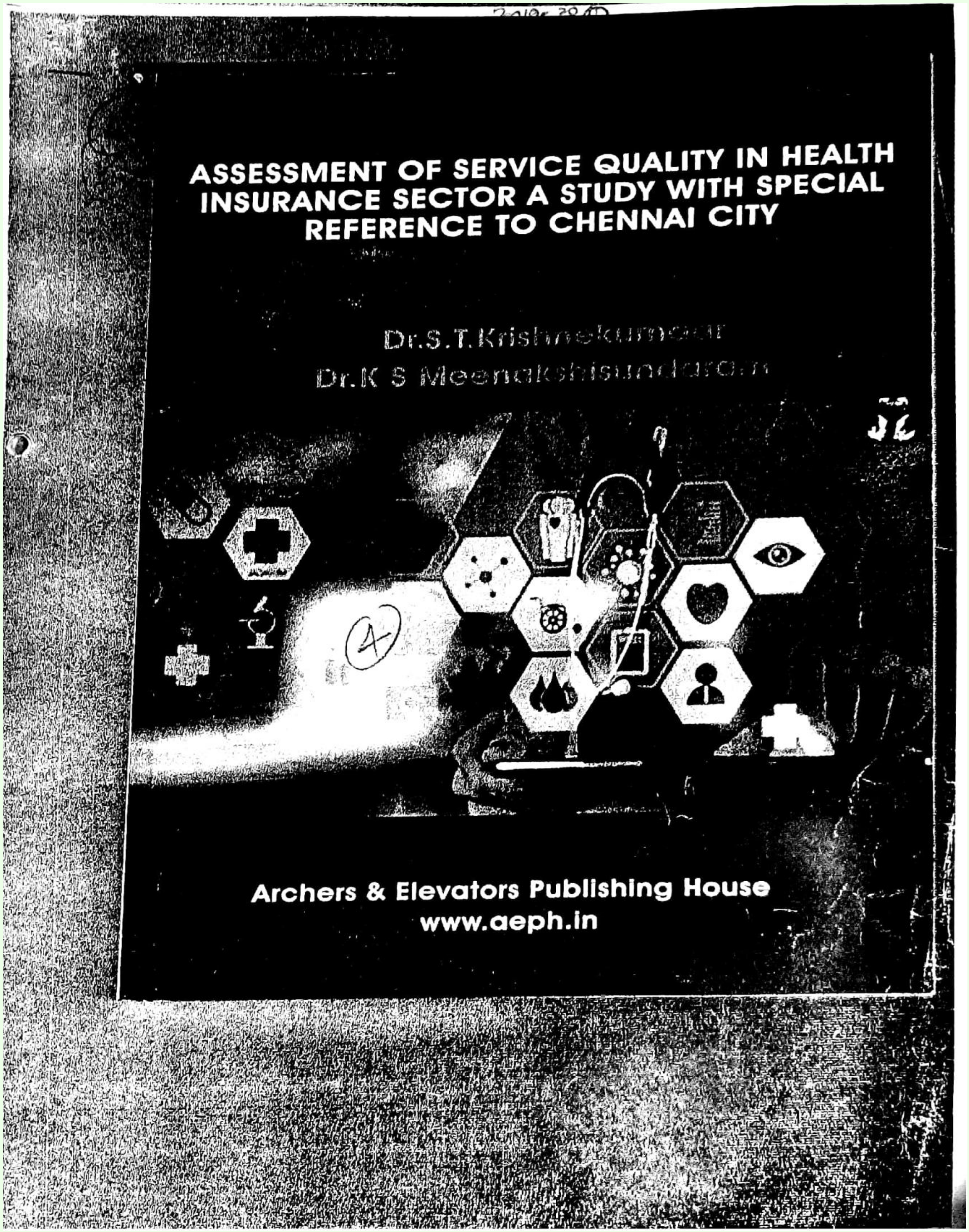
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1. DATA MINING

1.1 Introduction

Data mining is the process of discovering patterns in large data sets involving methods at the intersection of machine learning, statistics, and database systems. Data mining is an interdisciplinary subfield of computer science with an overall goal to extract information (with intelligent method) from a data set and transform the information into a comprehensible structure for further use. Data mining is the analysis step of the "knowledge discovery in databases" process, or KDD. Aside from the raw analysis step, it also involves database and data management aspects, data pre-processing, model and inference considerations, interestingness metrics, complexity considerations, post-processing of discovered structures, visualization, and online updating.

The term "data mining" is in fact a misnomer, because the goal is the extraction of patterns and knowledge from large amounts of data, not the extraction (mining) of data itself.

It also is a buzzword and is frequently applied to any form of large-scale data or information processing (collection, extraction, warehousing, analysis, and statistics) as well as any application of computer decision support system, including artificial intelligence (e.g., machine learning) and business intelligence.

The actual data mining task is the semi-automatic or automatic analysis of large quantities of data to extract previously unknown, interesting patterns such as groups of data records (cluster analysis), unusual records (anomaly detection), and dependencies (association rule mining, sequential pattern mining). This usually involves using database techniques such as spatial indices. These patterns can then be seen as a kind of summary of the input data, and may be used in further analysis or, for example, in machine learning and predictive analytics. Data mining steps might identify multiple groups in the data, which can then be used to obtain more accurate prediction results by a decision support system. Neither the data collection, data preparation, nor result interpretation and reporting is part of the data mining step, but do belong to the overall KDD process as additional steps.

The related terms data dredging, data fishing, and data snooping refer to the use of data mining methods to sample parts of a larger population data set that are (

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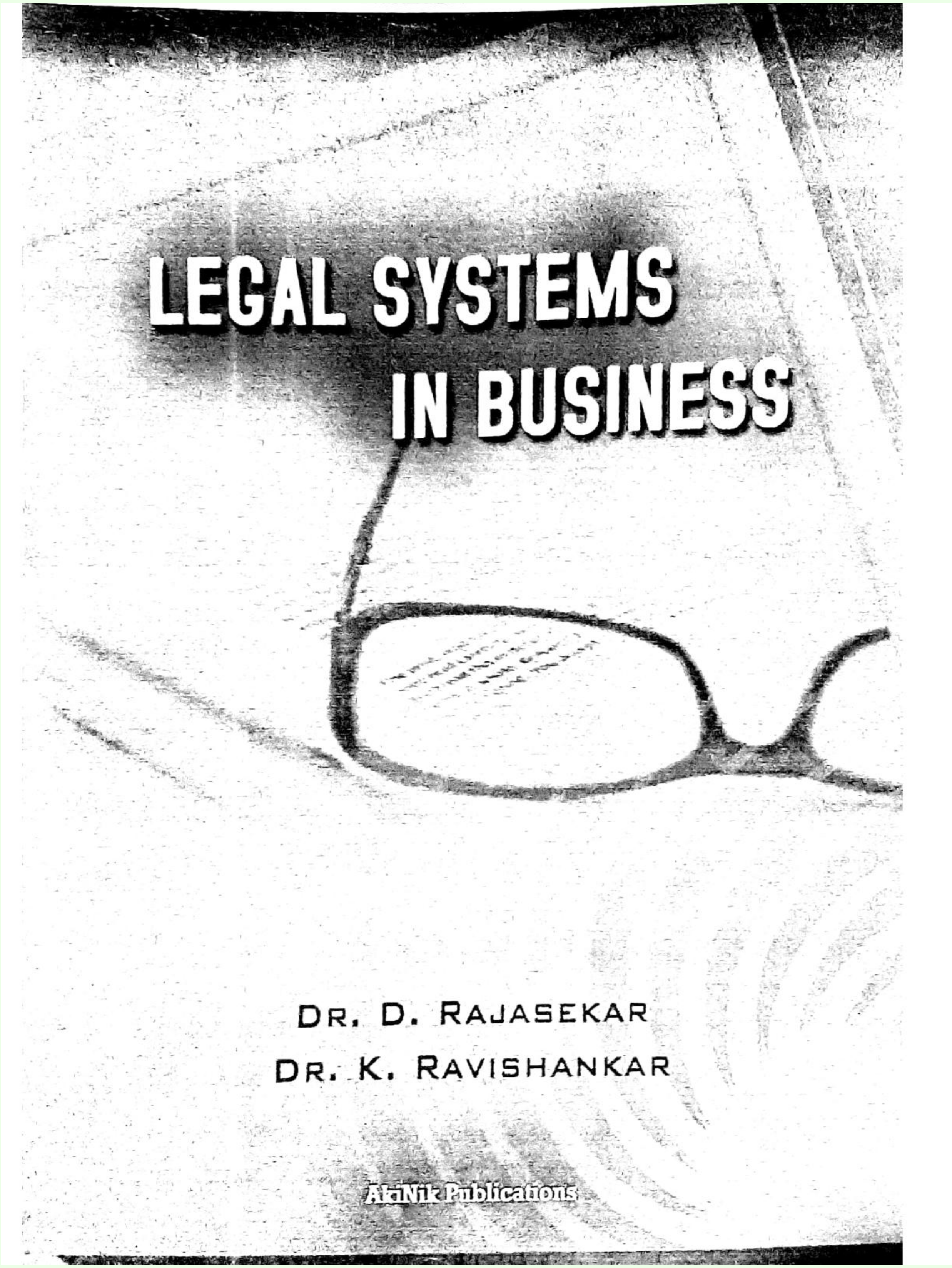
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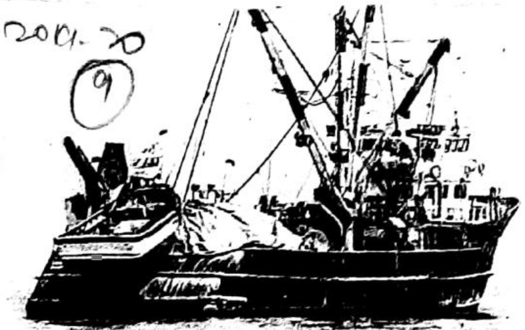

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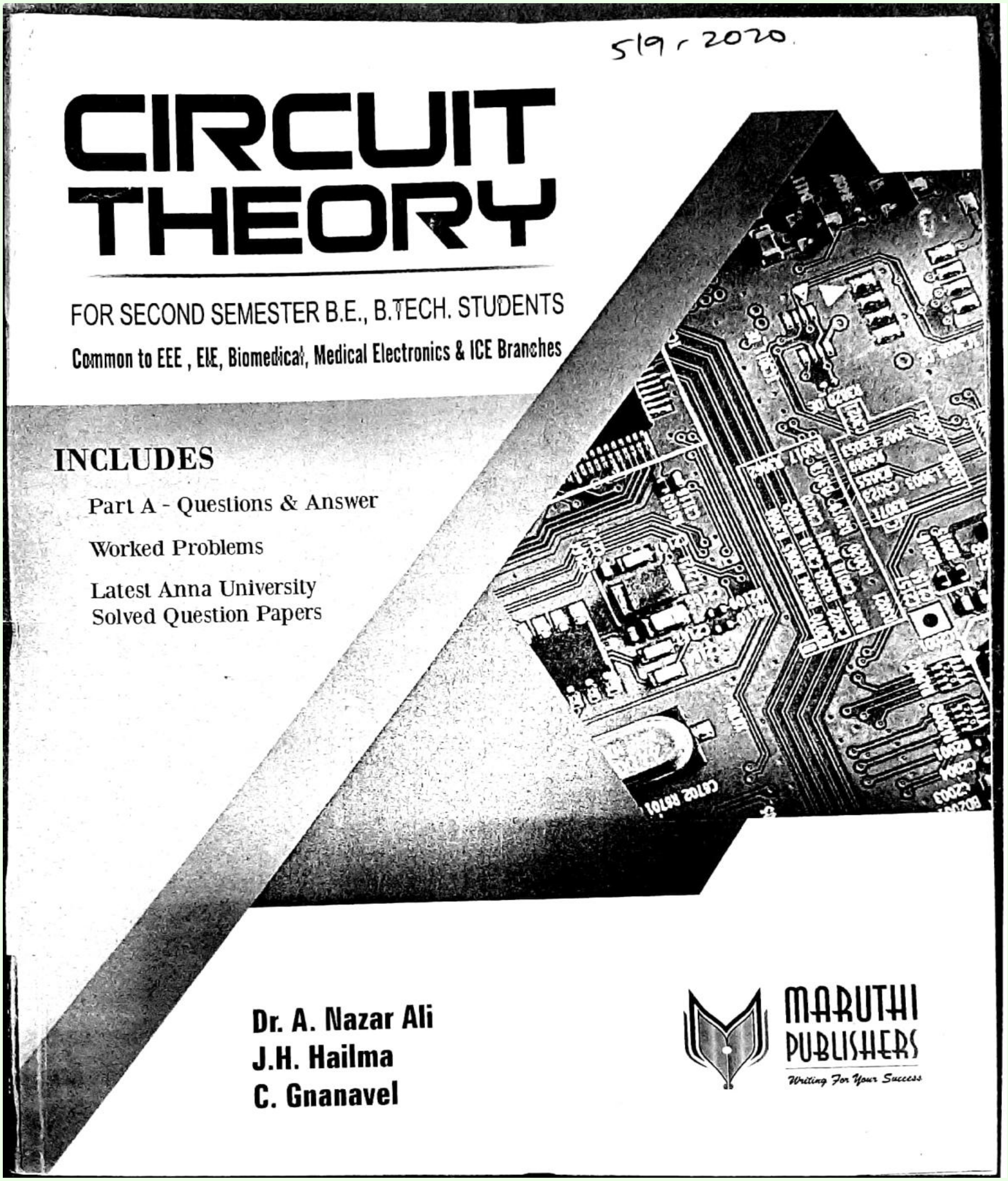
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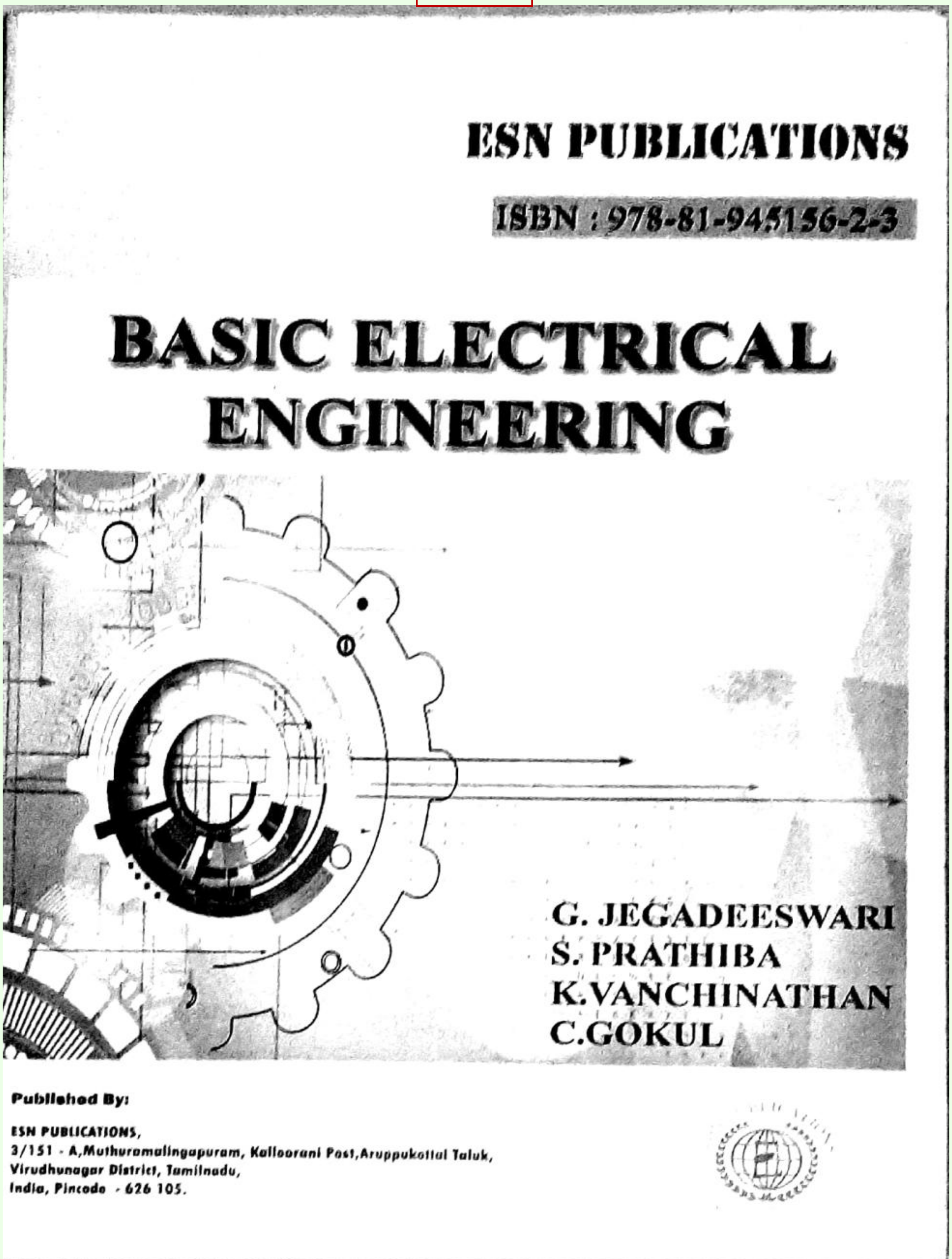

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HYDRODYNAMIC ANALYSIS OF SPAR PLATFORM TO SUPPORT A 6 MW WIND TURBINE

P P Vijith
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Abstract:
A detailed study on offshore floating wind turbines, the working principle of SPAR floater and the conceptual design of SPAR floating platform used for floating wind turbines are presented. This work discusses the preliminary design methodology of SPAR floating structure for the DOWEC 6MW offshore wind turbine.Structural design and stability is done analytically as per the API RP 2A.Buckling Stress analysis is examined with ANSYS software.Heave and pitch motions have been chosen as the critical design parameter. And the hydrodynamic numerical simulations have been performed using Panel method.

1. INTRODUCTION

Nowadays the demand for renewable energy has increased significantly. Onshore wind farms are currently reaching their capability limits, and the trend is to move offshore. Earlier periods, offshore wind farms adopt fixed structures as support. These are not suitable to exploit sites with deep water depth. In the past, the oil and gas industry answered to this challenge by adopting floating structures, and today they are common in use.

Compared to fixed structures, floating support structures must provide enough buoyancy to sustain the wind turbine weight plus its own weight. Enough rotational stability also has to provide to prevent the system from capsizing, and good wave response motion to prevent the structures from experiencing large dynamic loads or compromise the performance of the wind turbine.

This thesis describes only the conceptual and preliminary stages of the floating support structure design process.

1.1 Spar-type floating wind turbine

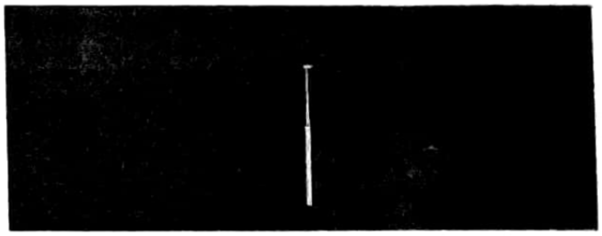

Fig.1Spar-type floating wind turbine

The spar-type wind turbine consists the floating foundation which is referred as the floater, the tower and the rotor-nacelle assembly (RNA). The floater may be towed in the horizontal position to calm waters near the deployment site. It is then upended, stabilized, and the tower and the RNA mounted by a derrick crane barge-type before finally being towed by escort tugs in the vertical position to the deployment site for connection to the mooring system . The floating foundation consist a steel and/or concrete cylinder filled with a ballast of water and gravels to keep the centre of gravity well below the centre of buoyancy which ensures the wind turbine floats in the sea and stays upright since

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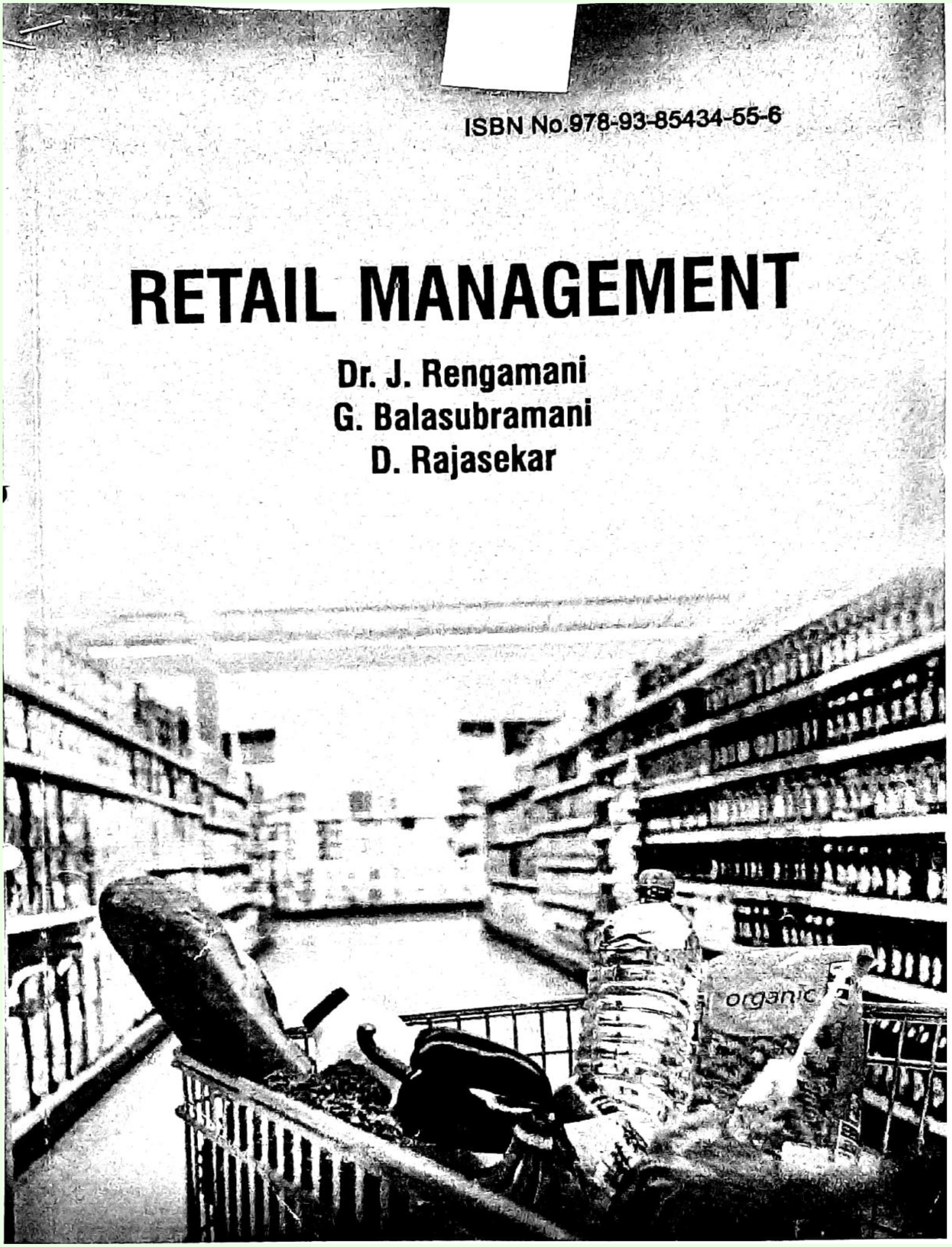
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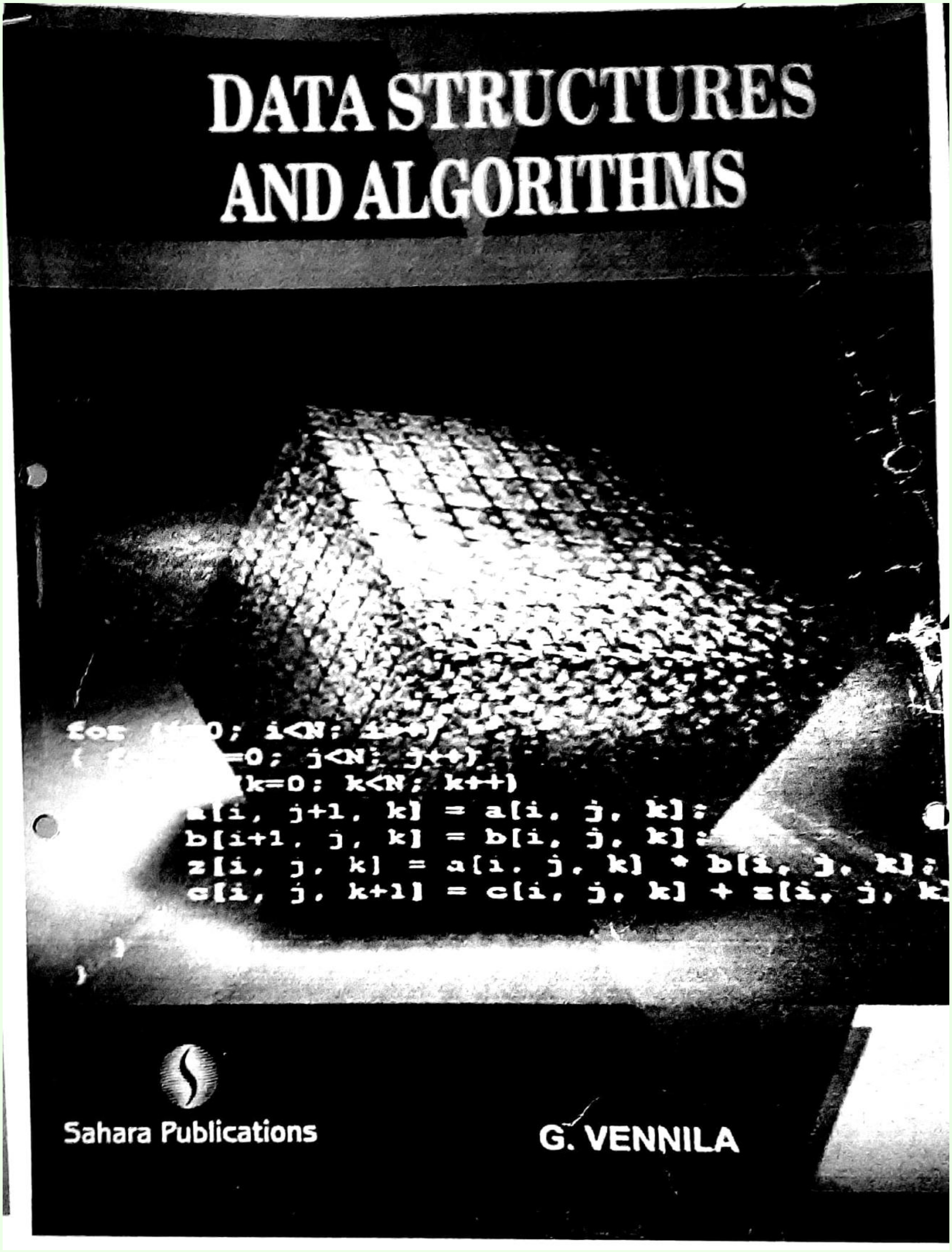
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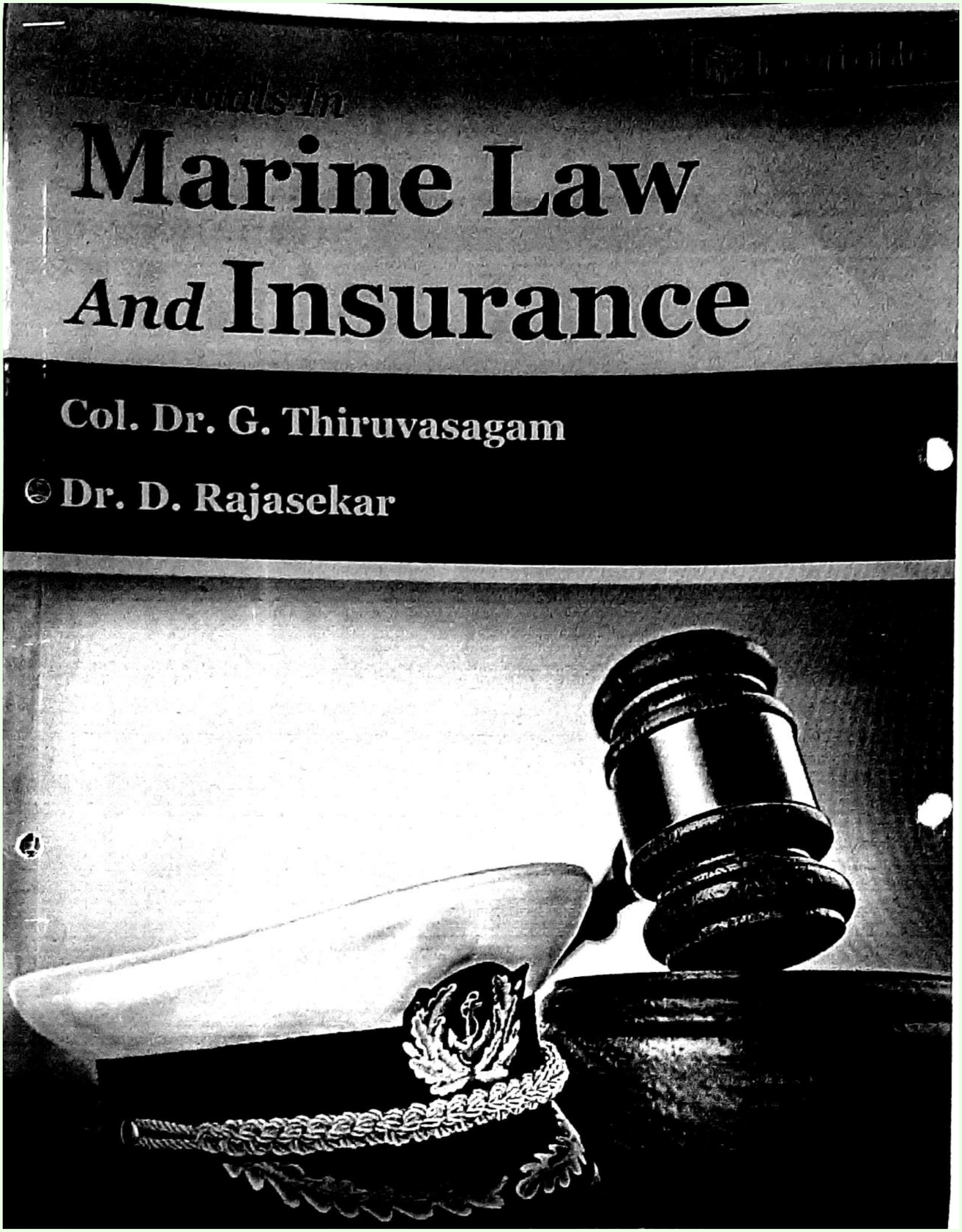
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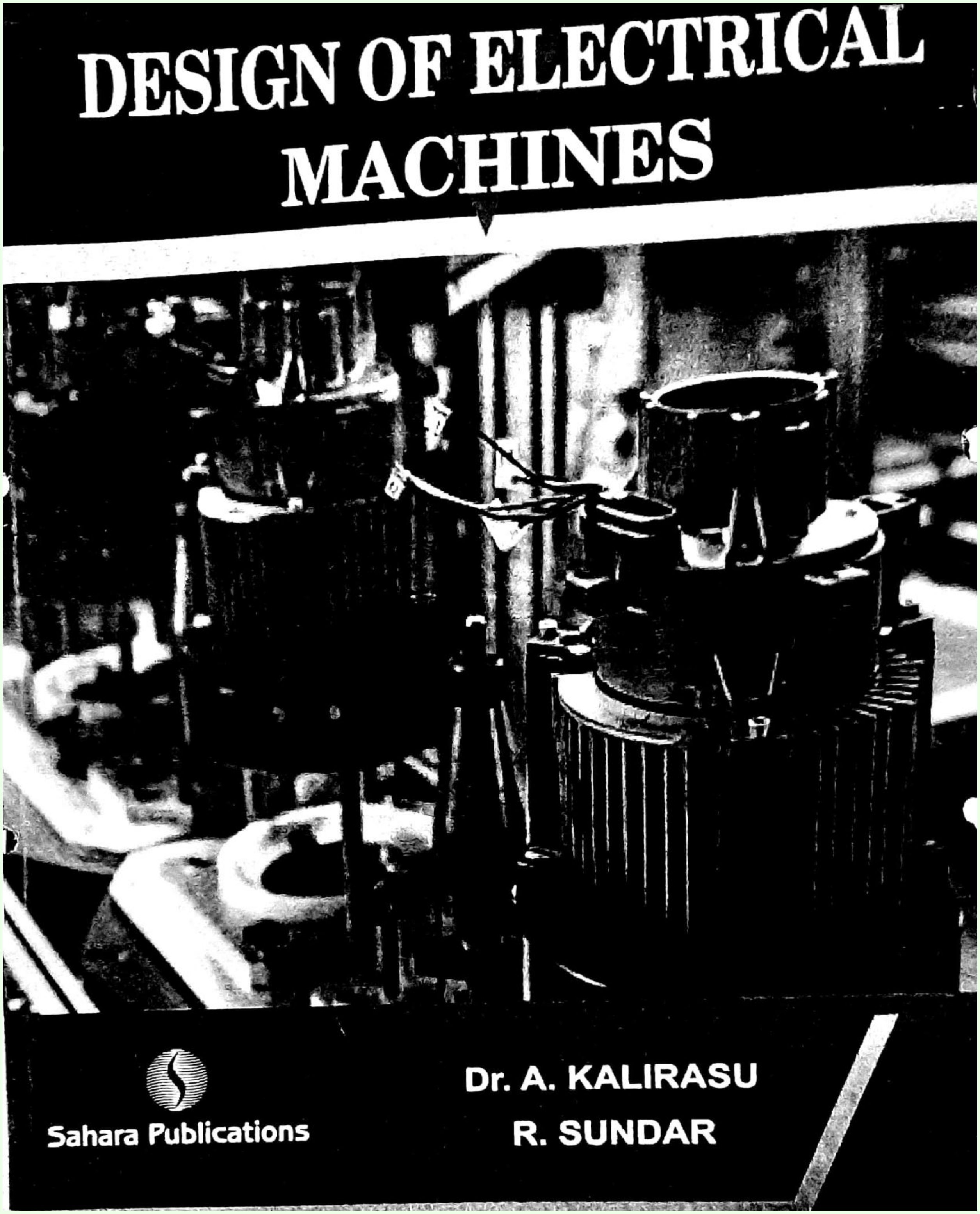
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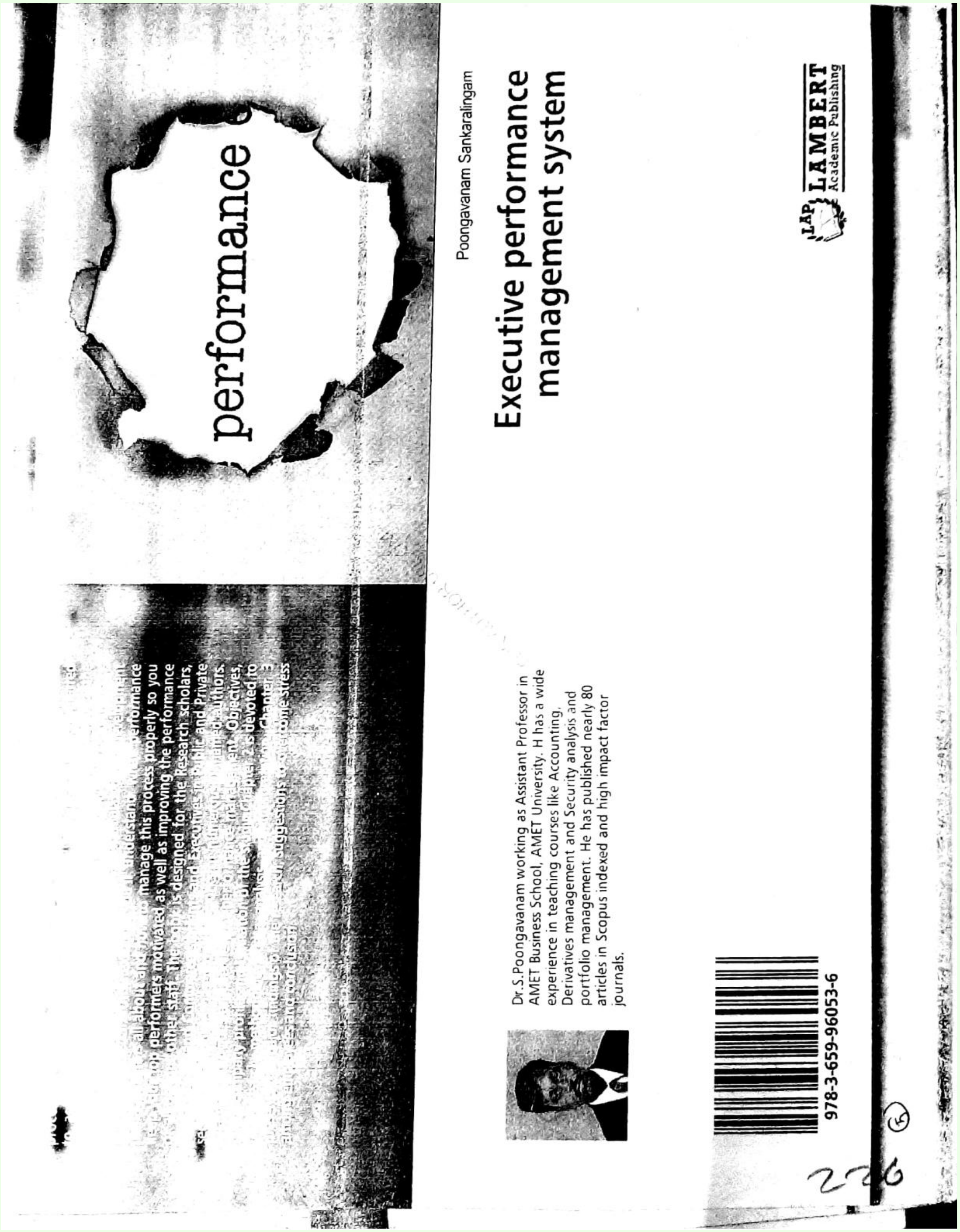
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