Sequencing and Scheduling: An Introduction to the Mathematics of the Job-Shop
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Over the years the journal literature on job-shop scheduling has proliferated. New approaches for standard problems have been presented, and many slight variations have been discussed and analysed. A number of monographs have also been published, aimed primarily at research workers. A straightforward text which sorts out the wood from all these trees has long been overdue. This book, based on a course for final year numerate undergraduates at the University of Manchester, achieves that object.

All the different approaches that have been suggested for use in deterministic job-shops and flow-shops (where all the jobs have the same processing order) are discussed. These include constructive algorithms such as Johnson's, dynamic programming, branch and bound, integer programming and heuristic algorithms. There are discussions on criteria for judging the value of a schedule, and what might be meant by an efficient schedule. However it is not so much the thoroughness, though that gains my admiration, but the style and clarity of the exposition that delights. This book is a good read, right from the moment when we are introduced to Digby and his friends trying to schedule their Saturday morning newspaper reading. How Digby manages to take 90 minutes to read the Sun, I do not know!

In view of the thoroughness of the discussion, it is surprising that no mention is made of the research programme of Bonney and his colleagues at the University of Nottingham. They have developed a number of heuristic algorithms for flow-shop scheduling, which they reported at the O.R.S. Loughborough Conference in 1975 and published in the O.R.Q. in 1976.

This book is not only an introduction to job-shop scheduling, but Simon French also uses his material to illustrate the ideas behind combinatorial optimisation in chapters on "Hard Problems and NP-Completeness" and "Heuristic Methods: Worst Case Bounds". These have become important aspects of scheduling theory as attempts are made to discover for which problems it may be possible to develop algorithms with polynomial time complexity, and to determine, when heuristic algorithms are used, just how bad the solution might be. Unfortunately an over-emphasis on these analyses would lead to a very negative outlook on scheduling, as most problems are 'hard' and most algorithms 'bad'. Nevertheless these chapters give a very clear introduction to a burgeoning literature.

It will be apparent from this description of the book that it is primarily an undergraduate text book on scheduling theory. There is no discussion of applications, and no case studies are presented. At the end of each chapter there are problems, with outline answers given in an appendix. An extensive bibliography is provided. It should also be apparent that it is warmly recommended to all those, whether students, teachers or practitioners, who are interested in scheduling and sequencing. It is an excellent book.

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