BOOK REVIEWS

Space shuttle—Dawn of an era Vol. 41 in Advances in Astronautical Sciences Series, Parts I and II, 1980, American Astronautical Society, San Diego, Calif., U.S.A., Part I: pp. 452, $ 35. Part II: pp. 528, $ 40. Orders to Univelt Inc., P.O. Box 28130, San Diego, Ca. 92128, USA.

Conceptually space shuttle occupies an order of magnitude different position compared to the other space vehicles till now. It is designed with the basic intention of minimising the cost per kg payload carried to a specific orbit in space. One of the other important operational differences between the other man rated vehicles and space shuttle is that the space shuttle can carry not only trained astronauts but scientists with more of professional quality than of physical quality. In fact, the vehicle and its trajectory are so designed as not to cause heavy strains on the physique of a normal man—it will perhaps be a little more strenuous than a jet commercial aircraft travel.

These two volumes on 'Space Shuttle—Dawn of an Era' comprise the sixty-nine papers presented in a pre-launch conference by specialists under fourteen different sessions, each session referring to a particular theme. It covers a wide range of subjects from finance through technology to future vehicle configurations. It is rather unfortunate that out of the sixty-nine papers, only fifty-nine are detailed and for the remaining ten only abstracts appear. These ten for which full length papers are not printep include the important technology areas like shuttle's flying characteristics and space shuttle main engine development apart from others. While it is cited that these papers would be available in microfische, it would have been very useful to the readers if as many as of these had been included in the volume.

Part I of the work considers the four papers of the 'Department of Defence applications' and five papers in 'Man in the Shuttle'. The article on astronaut crew selection is excellent and is very readable even for the uninitiated. An interesting conclusion of the paper 'Shuttle payload, Manual *vs* Automated functions' is that allowing for manual operations through extra-vehicular activity reduces complexity in design and reduction in costs by about 1% ($ 64 Millions). The part on 'Industry in Space' has a very interesting article on the financing concepts for space industrialisation more particularly for the space power system which relies on establishing a large solar array, acquiring energy from sun and bringing it in microwave to earth. The part on large platforms in space has some very useful articles on system interfaces for large platforms and demonstrations. Unfortunately, this last article does not appear fully.

The next part on Space Transportation System (I) has five papers, for four of which full papers are available. This part has many technological points of interest for

specialist readers. It has papers on space shuttle system capability, space shuttle orbiter, external tank and solid rocket booster. These pages are well spent and will be read by many. The part on Space Transportation System (II), also having five papers, has technology content on the Kennedy Space Centre activities, satellite launching operations at the Vaudenberg Air Force Base, tracking and data relay satellite system. Like the previous part, this part is also of great interest to specialist readers. They give an insight into the variety of work to be acoomplished before the vehicle matures for flight.

The first volume ends with four more papers, principal amongst them are those on possible enhancement to the performance of the shuttle, extension to the capability of the shuttle through the use of strap on rockets, converting the orbiter to transport 74 passengers (!) to low-earth orbit and support future missions. The paper does not, however, clarify the purpose of carrying such a large number of passengers.

Volume II is largely on the description of payloads and experiments possible on board, The first part is devoted to gateway special, on small self-contained payloads. In an effort to generate new, novel experiments and also allow the participation of universities, a small amount of space for such experiments is reserved in the space shuttle. The first is concerned with the influence of zero gravity on fertilisation in frogs (!) and a number of other experiments on science. One of them on chemical oscillations does not seem well justified for test in space shuttle. It looks as though many experiments on earth are intended to be studied under zero gravity simply because the facility is available. This, however, becomes a criticism on the management than on the book itself.

Amongst the number of other useful experiments is the one on geodynamics from satellites (p. 627), using ranging, radio interferometry, radar altimetry and satellite-to-satellite doppler. This is greatly useful to many earthquake-prone countries since advance detection is possible with these techniques.

On the whole, the volumes contain a whole range of useful information on many topics. Readers will certainly gain a glimpse of the technology and future possibilities in these volumes. The get-up of the books is quite good.

H. S. MUKUNDA

IC array cook book by Walter G. Jung. Hayden Book Co., New Jersey, 1980, pp. 200, $ 8.85.

Here comes another book by Jung as a successor to his earlier series of cook books. This book deals in detail the applications of IC arrays consisting of transistors, diodes, zener diodes, etc,

— Ch. 1 deals with basic characteristics of transistors and diodes.

— Ch. 2 gives a brief description of IC arrays as circuit elements as current sources, voltage references, level shift circuits, etc. The matter covered is quite adequate to understand these circuits.

— Ch. 3 focusses the attention on some available IC arrays mainly from RCA. There is a supplementary useful information in Appendix 'B', where additional sources of IC arrays are listed.

— Ch. 4 discusses the application of IC arrays with respect to power supply applications. While this treatment is illustrative, the easy availability of IC regulator chips like 723, 7805, etc., will render these arrays rather limited in use in this field.

— Ch. 5 deals with the amplifier circuit techniques. While there is a good amount of coverage of various types of circuits using arrays, there is very little design information available. This information at least to a limited extent would have been welcome.

— Ch. 6 covers oscillators and triangle to sine wave converters.

— Ch. 7 deals with logic circuits using IC arrays. As the IC logic circuits are available so freely and at throwaway price, it is highly unlikely that arrays will ever be used in such logic circuits except perhaps at an experimental level.

— Ch. 8 gives an exposure to miscellaneous applications.

A good attempt is done in this book to cover the IC array topic, which so far was only available in bits and pieces in various data books, magazines, etc. While there is a broad coverage of array applications, it could have been updated with the information in the following areas:

(i) Use of arrays as output elements to enhance the current capability of operational amplifiers.

(ii) Some application information on IC arrays consisting of SCR's and PUTS (Ch. 3 only mentions the arrays of this type).

(iii) High frequency tuned amplifier application of arrays.

On the whole, this cook book can be useful as a good reference book. It can also be useful in an undergraduate course offering transistor circuits and linear IC fundamentals. For those who are working in new circuit design of various linear (analog) circuits, arrays seem to be quite useful elements, due to inherent matching characteristics available in these arrays.

S. R. BHAT

Introduction to microprocessors by Aditya P. Mathur. Tata McGraw-Hill, New Delhi, 1980, pp. 377, Rs. 30.

The stated objective of this book is to teach the basic principles and techniques underlying the design of microprocessor-based systems. The emphasis is on presenting in an integrated manner the general principles and techniques. In order to have a coherent presentation, Intel 8085-A has been chosen as a vehicle to carry various concepts to the mind of readers.

Chapter 1 provides a general introduction on microcomputers to readers with some familiarity with computer programming and organization. Chapter 2 provides some introduction to data representation and the rudiments of binary arithmetic. The microprocessor is introduced in Chapter 3 to the reader through the machine language of 8085. A PASCAL like assembly language with simple constructs is introduced for facilitating writing of simple programs. It may have been more convenient to postpone the introduction of this language to a later stage. Some introduction to flowcharting and structured programming would have better suited the needs of the reader.

Semiconductor memories are considered briefly in Chapter 4. Technology aspects of semiconductor memories are satisfactorily discussed. But timing considerations (Read and Write cycle timing), design of a memory unit and loading considerations which are essential to microcomputer design are not adequately dealt with. The organization and instruction execution timing for 8085 is well presented in Chapter 5.

Interfacing and various modes of data exchange are presented in Chapter 6. Chapter 7 attempts to introduce a large number of peripheral interface devices, without an attempt to get into their detailed application aspects. It would have been more useful, in the opinion of the reviewer, if this chapter was limited to the detailed presentation of 8255, 8253, 8251 and 8279 devices which are the most common peripheral devices.

A number of applications have been briefly mentioned in Chapter 8 with the temperature monitoring system selected for detailed presentation. This example should give an opportunity to the reader to get an insight into the design of a microprocessor-based system. Some more examples, presented in detail, covering various facets of microcomputer system design would have substantially enhanced the value of this chapter.

Chapter 9 presents the developmental aids. The main accent in this chapter remains on the developmental system. A brief introduction to Intel 8086 has been provided in Chapter 10.

This book provides an excellent introduction to microprocessors through Intel 8085 and meets the needs of a large number of graduate and undergraduate students and practising engineers. With some additions and modification, especially on the topic of peripheral hardware, this book should be able to meet the instructional requirements at the introductory level for quite a few years to come.

N. J. RAO

Prestressed concrete by N. Krishna Raju. Tata McGraw-Hill Publishing Co., Ltd., New Delhi, 1981, pp. 517, Rs. 39.

The present book covers the subject of theory and design of prestressed concrete to the extent required by senior undergraduate and post-graduate students of Indian Universities. It also partially fulfils the requirements of practising structural design engineers.

The book contains 20 chapters, an author index and a subject index. The first two chapters deal with the basic concepts of prestressing and the salient properties of the materials for prestressed concrete. Chapter 3 deals with the various prestressing systems. Analysis of stresses, losses of prestress and deflection characteristics of prestressed members under serviceability limit states are discussed in Chapters 4 to 6. The flexural, shear and torsional strength are covered in Chapters 7 and 8. Problems of transmission of prestresses in pre-tensioned and post-tensioned members are dealt with in Chapters 9 and 10. Chapters 11 to 15 deal with the development and application of limit state design concepts, design of prestressed concrete sections, pre-tensioned and post-tensioned flexural members, composite construction, continuous beams and portal frames. Special structures like prestressed concrete pipes and tanks, slabs and grid floors, shell and folded plate structures, poles, files, sleepers, pressure vessels and pavements are covered in Chapters 16 to 19. The last chapter gives an introduction to optimum design of prestressed concrete structures.

The subject matter covered in the book has been explained by several numerical examples and each chapter contains a good list of references for further study. It is gratifying to note that references to research work carried out in India find their due place in this book. The book can be profitably used as a text. Design engineers also will find useful information. The presentation of the material and get-up of the book are good.

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