

of the initial phase, and the feasibility studies will determine the direction of what happens in eight or ten years' time. Eventually a much wider range of subjects should be susceptible to automation. The report also suggests links with the Open University (see below).

## OPEN UNIVERSITY

### Off at Last

PROSPECTIVE student activists at the Open University may not have been too happy when the inauguration ceremony on July 23 began to the sound of a Coronation March, but all were no doubt glad to hear the project finally making some noise at the presentation of the Royal Charter and the installation of Lord Crowther as chancellor. Neither Lord Crowther nor Mr Harold Wilson, who also addressed the gathering, revealed any startling new developments of the university's plans, although it was hinted that broadcasting may eventually constitute only a small part of its output. There is also much enthusiasm for helping underdeveloped countries by providing recorded material, and Mr Wilson spoke of potential invisible exports as a result of education over the air.

The scientific courses are now being worked out in greater detail. Both staff and students will need laboratory facilities, and there has been doubt about how far the Open University will be able to match up to conventional universities in providing them. It now seems that the first year intake for the "Foundations of Science" course will be reasonably well looked after when they begin work in 1971. Assuming a total of 20,000 students for the course and a two-week summer practical session repeated five times, the university needs about eight centres to accommodate 500 students at a time and is negotiating for suitable premises. It has turned out to be impossible to make arrangements for week-end courses by 1971, mainly because of the difficulty of knowing the distribution of students through the country far enough in advance, although the eternal struggle for finance has made it necessary to be selective among possible lines of development. At higher levels, there will obviously have to be more practical work than can be crammed into an annual fortnight. Here there is less urgency, and by the time the first foundation courses have been completed, home experimental kits (for distribution by post) may also have been developed. A research building at Milton Keynes will be ready to accommodate all staff activities from the beginning of the 1973 academic year. Until then, those who are working in other universities may have to commute between the laboratories there and the Open University. The alternatives are either to hire space in an established university or to build a small temporary laboratory on site—this would require up to £40,000.

Research students will be taken on at Milton Keynes from 1973, some of them possibly transferring from elsewhere in mid-course, which may be the explanation of a slightly surprising remark in Lord Crowther's inaugural address to the effect that the university's first degrees will probably be awarded to postgraduates. In normal circumstances, an undergraduate will take at least five years to get his degree, so that anyone starting in 1973, just a year short of his PhD, looks like qualifying first.

Questions of content have yet to be settled. Certainly the aim is to avoid the fragmentation of subjects typical of many traditional undergraduate science courses: according to Professor M. J. Pentz, director of studies in science, there will be just a single integrated course. What provides the main challenge to the staff is that the course is intended as a foundation course for students in all disciplines, so that it must offer breadth to non-scientists as well as depth to future specialists. Consequently, "Is it useful?" and "Is it good?" are questions that the course will raise just as much as simply "What is it?" Techniques of teaching this material will be as advanced as possible—for instance, programmed texts in conjunction with correspondence courses will save much time otherwise wasted in postal delays—but the problem here is educating the staff themselves, who will probably be put through a crash course by educational technologists before the first session.

## BRIDGE DESIGN

### Picking Computer Brains

FEW bridges are built nowadays without the use of a computer at some stage in the progress from conception to construction. Many of the programs used in this work, however, have no application beyond the specialized scheme for which they are designed, so that a little rationalization might save much labour, and in this context a series of programs sponsored by the Ministry of Transport for the design and analysis of bridges is likely to find a general welcome. The idea is to make available widely tested and successful programs (on terms so far unspecified) to engineers throughout Britain, by placing contracts with consultants who will develop the required techniques into a format readily accessible to suitably skilled people. As a result of a research contract with the Construction Industry Research and Information Association, the first of these is now complete.

This "Finite Element Package for Reinforced Concrete Slab Bridge Decks" originated in a program for the elastic bending of thin plates and beams devised by Professor O. C. Zienkiewicz of the University of Wales, Swansea, some time ago. To this were added an input program, simplifying the preparation of data, and an output program speeding up assessment of the detailed design. Basically it is a way of checking and elaborating an outline design—it offers no easy substitute for a creative engineer, but does give him considerable help in evaluating his ideas. This deals only with the bridge deck: future additions to the series will be concerned with other problems such as column spacing. The program will, however, allow the analysis of any shape of slab with any support system, and the finite element method itself is apparently something in which Britain has a lead over the rest of the world.

The testing was carried out by R. Travers Morgan and Partners in connexion with the approach flyovers to the Clifton road bridge at Nottingham, and was exhaustive enough for the program to be considered one of the best validated of its kind. The firm of consultants subsequently prepared a manual for users which also has strong claims to superiority both in scope and in approach. Nobody knows precisely how such programs will be taken up but some results should be seen within six months.