

POWER ENGINEERING EDUCATION IN PRESENT SCENARIO

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Abstract: Power engineering is perhaps the oldest branch of electrical engineering. However, during the decades of 1970 and 1980 there was a decline of interest among the students of electrical engineering to opt for power engineering. Now the big question is what new courses may be introduced to attract the students to power engineering. If many new courses are introduced then some old courses will have to be dropped. In this paper an attempt has been made to devise a balanced curriculum taking care of all important courses basic to power engineering keeping intact and adding few new courses .

I. INTRODUCTION

A large number of power engineers are retiring every year . However, not many bright students are enthusiastic about specializing in power and energy engineering [1-5]. The enrollment in power engineering course is not uniform in all the countries. It is a function of population , job opportunities, hiring rates and of course the interest of students. In developing countries like India the enrollment in power courses is not that low compared to some of the developed countries. However, the first choice of students is still towards the IT or communication courses. If the trend has to change now the power engineering curriculum must offer something new to attract students

With the advent of deregulation of the electric power industry and lure of high paying jobs in information technology sector, the revision in power engineering curriculum is necessary to attract bright and best students to power and energy engineering. The power engineering education committee of IEEE is taking active steps in modifying the curriculum so that new attractive courses may be introduced at the under graduate level. The main problem in introducing new courses at UG level is the slots to accommodate these courses. The basic

courses that are the part of the curriculum can not be ignored , otherwise it may result in production of engineers lacking basic knowledge of present day power systems.

In this paper an attempt has been made to introduce few new courses only , while putting some of the new material in the old courses.

II. COURSE STRUCTURE

In all Indian universities , the academic year is divided into two semesters. The bachelors degree of engineering requires four years of education, after twelve years of schooling. In first year of the Electrical engineering a student is required to study one course on basic electrical science, and rest of the courses are from basic sciences and other courses like computer programming , engineering drawing etc. In second year , the courses generally offered at various colleges include one course each on electrical machines, power system, instrumentation, circuits and fields, Digital and analog electronics etc. These courses are basic for any electrical engineer and can not be replaced. Thus we are left with third and fourth year where few new courses can be introduced. At third year generally second course of machines, second and third course in power system, microprocessor system power electronics, and few electives are available.

The electives generally include two open electives, and one elective from the department. In fourth year apart from core courses such as control system, electric drives, electric power utilization, switchgear and protection , there are two to four departmental electives, and two open electives. A student also undertakes one project at the final year . It is very important to provide projects involving computer simulation as well as fabrication circuits. In many universities a student is advised to take a short project and a detailed project. Thus the new courses can be accommodated among the

departmental electives. However, if the student takes the electives from the courses that are now introduced (list follows) , then he has to sacrifice some of the courses considered important from the point of view of energy industry. In this paper therefore , it is suggested that instead of introducing all the new courses at the undergraduate level, their introduction may be provided in the courses already taught. Few courses may be introduced as optional courses at fourth year level, and some courses may be taught at graduate level.

III. PROPOSED CURRICULUM

Due to the changes happening in the power industry as a result of deregulation, and quest for effective and environmental friendly solutions to energy problems, the power engineering education needs introduction of few new courses not taught earlier. Also the syllabi of the courses taught earlier have to be revamped to make it computer oriented . The importance of following courses can not be over emphasized. However it will be very difficult to include all these courses without dropping some of the conventional ones. The course that have become important now are listed below:

- 1 Deregulation in Energy sector
2. Alternative Energy Sources
3. Applications of IT in power industry
4. Application of Power Electronics in Power Transmission and Distribution
5. Power Quality
6. Asset management
7. Distribution system management

The distribution system is almost as important as generation and transmission , but many universities do not teach it at all. It is getting increasingly clear that electric distribution systems are undergoing rapid changes due to deregulation, the penetration of distributed generation and power electronics technologies, and the adoption of efficient computation, communications, and control mechanisms [6]. It is therefore proposed that this course may be introduced if it is not available . The course material of the above six course(1-6) may be introduced in the courses already taught as suggested below..

The introduction to alternative energy sources may be taught along with the conventional power generation course. Power quality may be introduced in utilization of electrical energy. The

course on asset management may be offered as open elective. The idea of deregulation may be given in power system operation and control or power system protection. Applications of IT in power industry may be offered as open elective. The courses on power electronics may have to be increased in order to include many applications in power industry.

However , the courses as listed above may be offered as electives and may be grouped together so that a student may take only two courses out of six as listed above. Another option is to introduce integrated five year program in which bachelor and master degree both are given at the end of five years . Such a course is being offered in few Indian Institute of Technologies in India. The student then can select optional subjects to graduate in Power System Engineering with specialization mentioned . It is also important that the universities start interacting with power industries and the projects shall be more and more industry oriented [7]. The industries may sponsor some of these projects and the students are given fellowship at the end of four years . It must be emphasized here that unless the power industry is serious about their requirements of power engineers by providing funding to the universities and giving proper salaries to the engineers comparable to IT industry , the universities shall not go for more enrolments.

IV. CONCLUSIONS

The deregulation and restructuring of power industry along with computer applications and use of power electronics in power industry requires major changes in power curriculum However it is not possible to do away with basic courses so important for understanding the basic electrical engineering. It is therefore , proposed to have new structure introducing recent trends in the curriculum along with more optional courses. The main emphasis should be on projects that must be supported by the industries. Tutorial course may also be given by people from industries and senior teachers to introduce the trends in power industry. The possibility of giving the bachelor and masters degree at the end of five years is an option that can also be considered . The solutions may be different for different countries depending on the local conditions.

V. REFERENCES

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