# Power Engineering Through Continuing Education

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*Abstract- -* **The rapid pace of advancements in information technology is changing the people around the world in their every walk of life. This changing technology is bringing forth the new challenges for institutions, corporations and individuals. The effective understanding of the new technologies and to put them in use requires new skills and knowledge. As a result, technology is changing education. There is a new body of knowledge influencing course work and curricula. These new methods to retrieve and deliver the information are transferring the traditional role of the teacher and student.**

**There are massive needs of continuing and further education in the area of POWER ENGINEERING. The continuing education in this field, right from masses to the specialized personals needs to be restructured which is the area so far ignored. There is a communication gap between institutions, power producers, field experts and consumers which is hampering the productivity and hence the economy of the country.**

**The power scenario of the country can be improved to a great extent by providing adequate education of appropriate level to all the agencies involved in this sector, i.e., from Research and Development level to the small domestic consumers. Since all power personals know that the machinery at most of the generating stations are not that efficient and needs renovation and modernization, high percentage of Transmission & Distribution losses, lack of knowledge among consumers about energy conservation techniques, poor quality and reliability of electric supply thus needs to be tackled at priority. This can be achieved by providing power education through continuing education.**

## I. INTRODUCTION

Continuing education is an educational process through which an individual updates and enhances his already gained knowledge in any particular field of specialization, profession, or vocation so as to make improvement in performance and efficiency in one's own profession. According to Stone, continuing education is defined as, " all activities and efforts by individual to upgrade his knowledge, abilities, competencies and understanding in his field of work or specialization so that he can become a more effective professional". The term continuing education has different connotations in its broad spectrum while it includes long term programmes leading to certificates/ diplomas / degrees on one hand, it contains short duration courses of a few days on other. In order to improve efficiency and effectiveness of the working professional, continuing education is must and is a life long learning activity [1].

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Power Engineering Education through continuing education programmes acquires significance on the account of its importance in national productivity and economy. By educating masses, even 1% of conserved electrical Power means an additional capacity of 1000 MW, which means saving in investment worth rupees 6000 of Crores. But in country presently people with paying capacity don't bother much for power conservation and hence their bent of mind needs to be changed.

Similarly by running power generating stations on improved plant load factor and by constructing matched Transmission and distribution networks etc., situation of power sector will definitely improve upon which is possible through continuing education. Also the knowledge explosion-taking place in the power-engineering field, a person leaving a portal of college/institution after acquiring a formal education ranging from 2 to 4 years of duration will be deeply affected by the effect of obsolescence within 4 to 5 years. Continuing Education programme needs therefore be launched.

## II. OBJECTIVES

Keeping in view the tremendous changes being brought about in the contemporary society due to the technological advances made in the world, there is a constant danger of a man's getting outdated, in terms of the knowledge and skill related to his profession/occupation. The education system should be such that it makes the learner more responsive to the needs of the people around them and in its own term it is imperative for the system to provide for the educational needs of adult learners [2].

Presently, when the country is faced with grim power situations, this power engineering education is a matter of concern to the power personals because no plan for economic development would succeed without adequate power back up. In the present day industrialized society, utilization of electricity is considered as an yardstick for the progress of a nation. Though, India has managed to increase its power production by about 50 times in a span of last half a century, still it is reeling under the shortage of electric power. This is firstly because of considerable increase in standard of an average Indian and secondly
Because of country's huge population base. It is worth consideration that in India per capita energy consumption is only a meager 360 KWh per annum in comparison to 5000 KWh per annum for European Community and 12000 KWh per annum for USA. This indicates a fairly low level of industrialization in the country.

A young Electrical Engineer cannot be expected to assimilate all the knowledge and skills required for his future working life during his normal degree/diploma programme. The duration of these programmes is not sufficient to cater to all his probable needs that may arise in his future life as a

practicing engineer. So objective of the continuing education is to extend his knowledge and expertise into emerging and latest technologies. In addition, such educational programme will avoid sickness of power industry, will improve competence of power professionals, and create job satisfaction. Also, it will fill gap between formal education and practical industrial needs.

## III. COURSE LEVELS

Courses offered in power engineering education should be of four types, i.e., Certificate level with minimum duration of two years, diploma courses with three years duration plus six months project period, under graduate level with three years duration with six months project period, this entry should be only for those holding diploma. Also post graduate and programmes leading to the level of doctorate degree may be launched. There must be a statutory body at national level to keep watch on such programmes. With the break through of information technology and internet, post graduate and doctorate programmes can be made on line learning programmes. These courses will be for the aspirants willing to improve their qualifications by adopting the related programmes. In addition to these, there must be short courses of one or two-week duration for those professionals who are satisfied with the qualification they have attained, but to keep tuned with latest information/technology in the field [3].

## IV. CURRICULUM DEVELOPMENT

Curriculum for providing power engineering education through continuing education should be need based and should include all components of power industry. Curriculum should be structured such that it should meet the expectations /requirements of power sector by bringing forth the improvements, and latest state of the art technology in this field. The curriculum committee must therefore comprise of academicians from the institutes of repute, industrial personals and of course field engineers.

Thus the approach should be to design flexible and modular curricula in Power Engineering Education so that aspirations of those willing to improve their qualifications and update their knowledge after their formal education are fulfilled. Therefore these modular programmes should be sequentially designed from the level of certificate course to diploma, degree (UG), master degree and up to Ph.D. level.

In addition to this there must be provision for mass contact programmes for efficient use of power through efficient devices and equipments. The areas, which are to face tremendous shift, are distribution sector, power system operation and control, regulation of tariffs etc. With the increase in information technology use, power quality has acquired much significance, i.e., the power must not contain fluctuations and harmonics beyond certain prespecified value so as to ensure the proper functioning of automation devices/equipments [4].

## V. LABORATORY COURSES

In the field of engineering and technology laboratory play an important role to understand the complex natural phenomena and very often are the only source of scientific knowledge in solving complex field problems. For clear and better understanding of theory, the laboratory part occupies very important status in the engineering curriculum.

The present continuing education programmes in engineering has neglected this portion of education. Lack of practical knowledge makes one handicap and feel oneself incompetent in the world of work. Therefore laboratory courses be made compulsory and as for as possible may be structured field oriented. These practicals can be conducted in nearby technical institutes.

Thus laboratory forms an integral part of the power engineering education. Proper evaluation system for the laboratory course be evolved and there must be a residential term for every student for conducting practical, preparing records and viva etc. [5].

The laboratory courses may be broadly classified in five groups, i.e., Machine Laboratory, Power System Laboratory, High voltage Laboratory and Measurements Laboratory.

In machine Laboratory contents may be D.C. motor and generator characteristics, efficiency and various tests on d.c. motors, static speed control, synchronous generator characteristics, regulation and efficiency of synchronous machines, synchronization of an alternator, parallel operation of alternators, synchronous motor characteristics, voltage control using synchronous condenser, Circle diagram of induction motor, losses and efficiency of an induction motor, induction regulator, and single phase induction motor characteristic.

In High Voltage Laboratory contents can be according to the available facilities, and may be study of impulse wave generator circuit and waveshaping, calibration of electrostatic voltmeter by sphere gap method, transformer oil testing etc., similarly in power system laboratory may be experiments with varios types of relays, simulation of AGC on analogue computer, optimal load flows etc.

In measurement laboratory facilities for testing of C.T.'s, P.T.'s, calibration of voltmeter, ammeter, wattmeter, energymeter, balancing of bridges and earth testing must be there.

## VI. PROJECTS

The objective of the project is to help the student develop ability to apply the engineering and technological concepts, tools and techniques to study and attempt to solve any engineering or system problem. Particularly, these projects should revolve around areas of the latest state of the art technology in power system engineering. The project may be any of the following types:

a) Comprehensive case study comprising of any big power system.
b) Field oriented analysis and/ or design problem making use of latest tools of analysis like fuzzy set

theory, digital signal processing, neural network techniques etc.

c) Repair and maintenance type projects, which can help in keeping the equipment in working condition after analyzing the cause of damage and repairing the same.

There can be two projects guide / supervisors- one from the institution offering course and other from the industry and field [6].

## VII. INDUSTRY INSTITUTE INTERACTION

Human resource is a vital input to the industry. Institutes like I.I.T.'s, N.I.T.'s and other Engineering Colleges train this human resource and supply much needed technical manpower to industry. The success of these institutes lie in the fact that how useful is their product to the user industry and the extent to which the industry can serve the nation and people depends upon the efficiency and competence of the product they get from these institutes. The fact that the many reputed industrial houses like Telco, Bajaj etc. have their in plant training schemes for their fresh recruits on extensive scale which clearly indicates that the product they get from technical institutes is wanting in something and therefore effort should be to supply a product such that the in plant training be reduced to minimum if not altogether eliminated. Some of the measures required to bring institutes and industry together are given as below:

1. Technology watching and manpower forecasting.
2. Adoption of institutes by industries.
3. Making academic programmes relevant and responsive.
4. Continuing education for industrial personnel.

## VIII. STUDENT SUPPORT SERVICES

The student support services are to be provided by the IIT's, Engineering Colleges through a network of study centers to be made all over the country. These study centers will act as focal points to enable the students to receive regular information and learning support. Each study center has to be provided with library, audio and visual facilities and experienced academicians available for face to face counseling. In power engineering education the support services should include work centers also established in collaboration with engineering institutions, power industries and field experts.

## IX. CONCLUSIONS

The world is experiencing the information technology revolution, which in turn has offered continuing education as a new learning method and cost effective technology for flexible, open learning system which are consistent with exponentially increasing human resource development requirements of
modern industrial and developing societies, influenced by the unprecedented rate of technology modernization However, such continuing education technologies have to be so designed that these are able to respond to pedagogic challenges of engineering content to be so taught.

The area of power engineering is being recognized as an important and distinct areas of study in IIT's, Engineering Colleges and various technical institutions and is slowly acquiring the academic stature and significance that it so rightly deserves. The students as well as public have come to the realization that without a sound power sector development, no country can hope for industrial development. Even the standard of living of countrymen and level of industrialization is decided by power consumption level. But lot remains to be done in this sector by providing education to all levels of personals attatched to the sector.

The power engineering education for working professionals in the power sector through continuing education is important from the point of view that, power sector of the country is plagued by disappointingly scheduled and unscheduled power cuts for almost all types of consumers and peak power shortages. The education and training to the workforce for the efficient generation, transmission and distributions and of course in consumption needs to be imparted through continuing education programme. For running the power system of future intelligently, i.e., with software, and using minds rather than hands, the front-line engineers/ managers are required who can exercise more and more the decision-making authority. To meet this challenge, the institutes responsible for technological advancements and the reputed industrial houses have to take lead by actively participating in curriculum formation and effective implementation thereof so that power-engineering education through continuing education becomes a reality.

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