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INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI

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CHAIRMAN, ATOMIC ENERGY COMMISSION

His Excellency Lt. Gen. Sinha, Chairman of the Board of Governors, Prof. Buragohain, Director, Members of the Senate, Distinguished Alumni, students graduating today and friends.

I am indeed very happy to be here today to participate in the Convocation function of this Institute, the youngest in the IIT system of which we are all so proud of. IITs have distinguished themselves for their high level of excellence in engineering and technological education and research. The strong emphasis on research in an education institute is perhaps the most important factor that distinguishes IITs from most other institutions engaged in engineering education. This is particularly important in the present day world when the technological scene is changing very fast and it is only through an environment that nurtures research culture that one can assure exposure of our students to the latest state-of-the-art knowledge. IIT Guwahati, being a young Institute, is naturally placed in a situation full of opportunities. There is no past baggage to be carried and the research and academic programmes can be moulded to be in tune with the present day technological foresight. In this respect, the students here must be particularly fortunate and I wish to compliment all those graduating today. My special congratulations to students who have been recognized today for their excellence. I do wish all of you more success in your future professional careers.

Higher education seems to be at cross roads today. While on one hand there is a problem of having to cope up with large numbers, there is the question of empowering young students to be able to take up challenges in the modern technology dominated world on the other. Inculcating a sense of belonging to our society and to the country and the will and the courage to make a success of engineering and technological endeavours here in spite of the several difficulties that are involved, is in my view an integral part of this empowerment process. Interactive working with mutual benefits between academic and technological activities with industry and the society also playing its role is thus of crucial importance.

In the current fast changing liberalized economy era, it has become inevitable that all of us recognize our respective strong points and special capabilities and use them to maximize value addition activities within the country. This is necessary for our national development, which we have to realize in the globally competitive environment that now prevails around us. Achieving success in the competitive world around us is also necessary for our very survival as a society and as a nation. Well educated, well trained, highly skilled and socially conscious human resource thus becomes one of the most important factors in developing India into a strong and well developed nation. It is in this context that I have always looked at the IIT system with a great degree of admiration.

Research, technology development, demonstration of technology on a scale that can be extrapolated to commercial scale and finally deployment of technology in the prevailing business environment together represent a chain of interlinked activities that need to be sustained to see success of translation of our research for national benefit. Unfortunately this aspect has not been recognized to a level that is necessary. Today, as I see it, there is a gap between our research activities and technological activities. While our technological activities are largely based on similar developments abroad, our basic research work which does contribute to the global knowledge pool is inadequately linked with national technology development effort. I have no doubt that this is inevitable and even important to being with. However as we improve our technological base, we should now search pathways to enhance research technology interface within the country. In absence of such an effort, I am afraid, we would always remain followers in all or most of the areas, a situation which a large country like India can ill afford in the current day competitive world. Through well nurtured basic research-technology linkages, it should be possible for us to come out with innovative technologies that can have high global impact ahead of others at least in some areas and that in my view will make a large difference to our country. Given the S & T strength in our country, I think, this is possible and I am saying this here because I am convinced that institutions like IITs have a central role in this endeavour.

One very crucial factor in facilitating translation of basic research to commercially robust technologies is the value system for judgment of excellence in our R & D environment. Parameters for judging excellence in basic research have to be necessarily different from those for technology demonstration or for technology deployment. We need excellence at the highest level in all areas but that should not mean use of only one yardstick for the purpose. To be able to sustain all round excellence in an environment of interactive working between researchers, technologists and engineers and sustain high motivation level across the spectrum is a challenge that we should not under estimate and find appropriate strategies to cope with it.

In the Department of Atomic Energy we have considerable advantage in translation of research to actual technology deployment arising out of the comprehensive range of activities undertaken under a single umbrella. DAE institutions include organisations dedicated to basic research, technology development as well as industrial scale operations

covering various aspects of applications of atomic energy. The seamless interaction that is possible between these organisations has been a crucial factor in the success of DAE. Today, while DAE laboratories place a very high emphasis on basic research and fundamental research, the output for use of society as a result of indigenous development effort is indeed very impressive. Our nuclear reactors, most of which are based on self-reliant indigenous effort produce electricity worth around Rs. 3500 crores annually. The groundnut and black gram mutant varieties developed in Bhabha Atomic Research Centre constitute around 30% and 45% respectively of the national breeder seed indent for these varieties. The service to industry by way of use of radioisotopes and radiation technologies contributes to roughly around Rs. 2500 crores annually in GDP terms besides the number of patients benefiting from radiation diagnostic and therapeutic procedures runs into millions.

While we are today in the consolidation and further acceleration phase in terms of development of applications of atomic energy for the benefit of our society, there is a renewed emphasis on further enhancement of research technology synergy and we wish to achieve this through support and nurturing of interactive activities between different groups within atomic energy and outside in areas of complimentary interests. There is also a renewed awareness of the global dimensions of the environmental impact arising out of carbon dioxide emissions from various energy technologies. Rapid increase in the share of nuclear power has assumed significant importance in this context since this technology is environmentally one of the most benign technologies with minimum emission of carbon dioxide per unit of electricity produced. It is in this context that in addition to the Pressurised Heavy Water Reactor technology that is now being commercially deployed after its successful indigenous development, we are now pursuing development of Fast Breeder Reactor technologies and technologies for getting energy out of thorium on very high priority.

Another area of high importance to our socio economic development where atomic energy can play a valuable role, relates to processing of food using radiation. This is an upcoming technology. For products with limited shelf life this technology through its ability to enhance shelf life can facilitate greater market access thereby enabling price stability, higher production and good remuneration to the cultivators. Hygienisation is another aspect, which can be realized through radiation and is important from the point of view of health security as well as realisation of higher quantum of export. These technologies have been fully developed at BARC and are now available through Board of Radiation and Isotope Technology. I feel this technology is also important in the context of North-East India.

In areas of specialised multidisciplinary training, it is important that there is an assured placement even before a student opts for such a training programme. This has been the basic premise of our human resource-training programme in the Department of Atomic Energy at the induction stage. By broad-basing the input channels to various levels of education in science and engineering, we have been able to derive the full

benefit of the facilities and the expertise available in our academic system. Through the Board of Research in Nuclear Sciences we have established a fairly large network of research activities in areas of interest to DAE programmes. Many of these activities particularly in engineering are collaborative in nature and have brought in considerable degree of synergy between the research work in DAE laboratories and the University system. We are now moving forward in further strengthening of this synergy to more intense links for collaborative efforts. A number of centres dedicated to DAE programmes have already been established. These centres not only enable the DAE programmes to benefit from the expertise of faculty in our Universities but also provide a very valuable training ground to our engineering students in areas of our interest. Recently we have also initiated a new programme with a number of IITs' wherein we sponsor students for M. Tech. programme with assured placement in one of our units. The programme would concentrate on research activities in areas of interest to DAE and would further contribute to synergy between DAE and IITs' in carrying forward the atomic energy programme of our country.

I have dwelt at length on the DAE-Universities interface with the intention to emphasize the importance all of us, who benefit from the Universities, should attach in involving ourselves with the higher education activities. As a matter of fact a model which enables coexistence of an academic framework and national laboratory/industry set up in geographic proximity with opportunities of adjunct positions for members on both sides would go a long way in enriching our higher education system. Most importantly such a system enables students to develop full familiarity with the available technological tools and the ability to use them and to improve upon them. Interaction between national laboratories and educational institutions is a source of strength for both and we on our part have immensely benefited through such interactions.

My best compliments to the young students graduating today. May all your dreams be realized on the basis of your hard work and the capabilities you have acquired in this institution. I do hope that in the existing highly competitive environment, you would come out successful and make all of us, your parents, your teachers, your friends, your Institute and above all your country proud of your achievements. I also do hope that you would maintain in you a spirit of trusteeship and while you rise higher and contribute in whatever way you can, to your roots, the society and the country where you grew up and the Institutions that prepared you to rise higher. Thank you once again for this opportunity to speak to you on this very auspicious occasion.