PRESIDENTIAL-ADDRESS 1953

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Brothers, Colleagues & Friends,

I take the very first opportunity to thank you for your choice to put on my humble self the honour of the august position of the President of the Association of Engineers, which was previously occupied by many notable personalities. When I look back to the list of my predecessors, I feel very much hesitant because I know well that it is neither easy nor safe to tread into the paths of great men. However I hope with your co-operation, help and active support, I may be able to shoulder the responsibilities, attached to this chair.

Technical Education

With respect to technical education in the country, my views are definite and clear and I wish to reiterate them once again to you. To put them in short, I wish to divide them under four categories namely—

1. Post graduate and Research study.
2. Degree course.
3. Diploma course.
4. Certificate and other courses.

As regards Post graduate and research study in Engineering and Technological subjects, there exist poor facilities at present in the country.

The table No. 1 will show you the meagre existing arrangement for post-graduate study in Engineering & Technology and that also is not of high standard. Table (i) further shows the limited number of subjects such as Geology, Metallurgy, Chemical Engineering, Power Engineering, Chemical Technology, etc. in which facilities in post graduate teaching exist. The third column gives the poor annual intake. From these it is clear that there exists a meagre arrangement at present for post-graduate and research teaching. Governments on which all responsibility rests, should be adequately acquainted with the exact state of affairs in this respect and should take measures to make up deficiencies as early as possible. Unless we can develop in this direction, we

have to depend always on foreign experts to formulate or guide our engineering requirements. The historical defect in training first grade Indian engineers who can be entrusted with the offices of Administrators and Executives of high responsibilities or with design, development and research in engineering projects and schemes, cannot be eradicated, and unless adequate facilities are offered to the young engineers and scientists to engage themselves in post graduate study and research. Consequently arrangements for research and post-graduate study in engineering and technology are of vital importance to us.

TABLE 1

Post-Graduate Training in Engineering and Technology in India

Name of Institution.	*Subjects*	*Annual Intake.*	*Remarks and course of study with duration.*
1. Benares Hindu University Benares.	1. Pharmaceutics	18	1 year course.
	2. Industrial Chemistry	70	2 years course.
	3. Geology	15	2 years course.
	4. Glass & Ceramics	31	
2. Indian Institute of Sugar Technology, Kanpur.	1. Sugar Engineering	—	-do-
	2. Sugar Technology	—	-do-
3. Jaypur Vikram Das College of Science and Technology, Waltair, Madras.	1. Foods and drugs	—	
	2. General Chemical Technology	6	2 years course.
4. Erskin College of Natural Science, Waltair, Madras.	1. Geology	6	-do-
5. Indian Institute of Science Bangalore.	1. Power Engineering	15	
	2. Aeronautical Engineering	4	
	3. Internal Combustion Engineering	8	2 years course.
	4. Metallurgy	12	
	5. Communication Engineering	15	
	6. Chemical Engineering	15	
6. University College of Science and Tchnology, Calcutta University, Calcutta.	1. Applied Chemistry and Chemical Tech.	18	
	2. Applied Physics	20	3 years course.
	3. Electronics		
7. College of Engineering and Technology, Bengal, Jadavpur.	1. Mech. Engineering	5	
	2. Elec. Engineering	5	
	3. Chem. Engineering	5	
8. Department of Chemical Technology, Bombay, University, Bombay.	1. Chemical Engineering	60	1 year course.
	2. Pharmacy	12	
	3. Plastics and paints	6	
	4. Oils, Fats and Soaps	8	
	5. Food and drugs	10	
9. Luxminarayan Institute of Technology, Nagpur.	1. Chem. Engineering	12	2 years course.
	2. Oils and Fats	12	

We have traditional defect in India with respect to our outlook in connection with engineering profession in the country. It is largely due to the fact, that we were for long years under the care of foreigners; the engineering training was looked upon to produce only men who could run and maintain engineering works and it was never to produce grade, one engineer, namely, Engineer-Scientists or Design and Development Engineers in this country who can prepare not only plans and formulate schemes with respect to engineering project, but also to execute them successfully with confidence. But due to change in Government, a change in outlook regarding technical education is to be introduced and is to be given effect to as early as possible. I hope you all agree with me that during the short time we are independent, we are all convinced that it is neither desirable nor prudent to plan and execute the engineering work, that are necessitated to be undertaken for our benefit, entirely depending on the services of the foreign experts. We have to educate and create our experts and I believe the heritage we have, however humble it may be in this respect, is quite encouraging and convincing. Training in Research and post-graduate study in engineering and technological subjects is to be considered as a first step in this direction. We should not fail to realise that research is to be developed more by tradition and systematic and strenous effort. Arrangements should be made to offer facilities for research to young graduates in different engineering and technological subjects in the various research laboratories, managed by the Govt. of India or maintained by the industries or public bodies, as well as engineering colleges. Traditions should be built up to induce young graduates to engage themselves in research both fundamental and applied and research tendencies should be developed in the young graduates.

LIST OF RESEARCH INSTITUTIONS UNDER GOVT. OF INDIA

1. Central Research Institute, Kasauli.
2. Forest Research Laboratory, Bangalore.
3. Central Drug Laboratory, Calcutta.
4. Irrigation Research Station, Poondi, Madras.
5. River Research Institute, Cuttack, Orissa.
6. Indian Institute of Sugar Technology, Kanpur.
7. Forest Research Institute (New Forest), Dehra Dun.
8. Indian Dairy Research Institute, Bangalore.
9. Research and Development Section, All India Radio, New Delhi

10. Nutrition Research Laboratories, Coonoor.
11. Indian Institute of Science, Bangalore.
12. National Fuel Research Laboratory, Digwadi, Dhanbad.
13. National Electro-Chemical Laboratory, Karai Kudi.

UNDER PUBLIC ORGANISATION AND SEMI GOVERNMENT

14. Central Cotton Technological Laboratory, Bombay.
15. Coconut Research Station, Kayam Kulam, Travancore.
16. Department of Research, University of Andhra, Waltair.
17. Indian Agricultural Research Institute, Pussa, New Delhi.
18. Jute Research Laboratory (Indian Central Jute Committee) Calcutta.
19. Lac Research Institute, Nankum, Ranchi.
20. Royal Institute of Sciences, Bombay.
21. Sugarcane Research Institute, Coimbatore, (South India);
22. Tokali Tea Research Laboratory, Experimental Section, Cinnamara, Assam.
23. Tobacco Research Station, Guntur, South India.
24. National Physical Laboratory, Delhi.
25. National Chemical Laboratories, Poona-5.
26. Central Glass and Ceramic Research Institute, Jadavpur, Calcutta-32.
27. Road Research Institute, New Delhi.
28. Building Research Station, Roorkee.
29. Leather Research Institute, Madras.
30. Central Waterpower, Irrigation & Navigation Research Station, Poona.
31. Drug Research Institute, New Delhi.
32. Tata Institute of Fundamental Research, Bombay.
33. River Research Laboratory, Alipore, Calcutta.
34. Physical Research Laboratory, Ahmedabad.
35. Central Laboratory for Scientific & Industrial Research, Hyderabad.
36. Maharashtrian Association for the Cultivation of Sciences, Poona.
37. Raman Institute of Science, Bangalore.
38. Sorabhai Institute of Physics, Ahmedabad.
39. Sri Ram Institute for Industrial Research, Delhi.
40. Bose Institute, Calcutta.
41. Indian Association for Cultivation of Science, Jadavpur, Calcutta.
42. Engineering Research Laboratory, Hyderabad.

UNDER INDUSTRY

43. Metallurgy Research Laboratory (Tata Iron and Steel Co. Ltd. Jamshedpur).
44. Sir Profulla Chandra Roy Research Laboratory (Bengal Chemical and Pharmaceutical Works Ltd.)
45. Oils and Fats Research Laboratory (Tata Oil Mills Ltd.).

In addition to the above each University with post graduate teaching courses and several Colleges have facilities to carry on Research work.

We should not feel complacent to think that these institutions will be in a position to meet our requirements. Additional arrangements are to be definitely made to fill-up the vast deficiency in this respect.

(2) DEGREE COURSE

Regarding Training of graduate engineers, we have at present nearly 45 institutions, where about 4000 students are admitted into different courses in engineering and technological subjects. The degree or its equivalent is awarded to successful candidates who complete the course of instructions on the following subjects offered by these institutions (a) Mechanical Engineering (b) Electrical Engineering (c) Civil Engineering (d) Chemical Engineering (e) Internal Combustion Engineering (f) Highway Engineering (g) Aeronautical Engineering (h) Architecture (i) Tele-communication (j) Mining (k) Metallurgy (l) Geology (m) Applied Physics (n) Chemical Technology (o) Power Engineering (p) Textile (q) Pharmacy (r) Sugar technology (s) Food and drugs.

Some of these institutions are managed by the states, (previously provincial Govts.), some are aided by the Central Govt.; some are run by the Universities and other by public bodies. In consequence thereof, there exists no standard on all-India basis. For instance it can be stated that in certain colleges the graduates training period is four years, in others it is three years and in some others it is 3½ years. Some terms the final award as degree, others as diploma; the School of Mines Dhanbad awards its graduates a diploma which is equivalent to a degree. Hence it is desirable to fix up certain conventions on all India basis, with respect to the following as early as possible, else the divergence in the system of technical training of graduates in different engineering and technological colleges becomes too wide to be bridged :—

(a) Admission qualifications. I fully agree with the views expressed by the University Education Commission in this respect ; that is, I.Sc. or its equivalent with mathematics, physics and chemistry, should be the minimum qualifications for admission into degree course.

(b) Period of study should also be four years after I.Sc. and one year of factory training. We very often overlook the importance of industrial training which is to be considered as a part and parcel of technical training along with academical training.

(c) The courses of instruction are, no doubt, highly technical and academic, and laying down a fixed standard is a ticklish matter. The authorities of the technological colleges may feel that their independence is interfered with. Keeping all diversing views in mind, I would dare suggest the following which I hope will probably meet all different views in this connection. It will, I believe, meet with the aspirations of different institutions and shall maintain a particular standard.

The courses should be divided into two groups :—

(I) Fundamental or Primary (II) Secondary and elective.

The fundamental subjects should be fixed ; though their detailed syllabus is to be formed by the College or University authorities. These primary subjects should consist of (a) General science (physics, chemistry and mathematics) (b) English and humanities (c) General studies including Engineering Economics (d) Fundamentals of industrial administration (e) Drawing (f) Workshop practice (g) Mechanics (h) Study of materials and a few other subjects according to different sections of engineering ; for mechanical engineering, it can be stated, Higher Mechanics including Hydraulics, Heat Engineering, and Electrical Engineering ; for other groups of engineers similarly different primary subjects are to be fixed.

For secondary and elective subjects, the technological Colleges should be given the freedom of choosing the number of subjects both compulsory and optional or elective as well as to fix the extent of the courses in the curriculum, after making adequate provision for the fundamental subjects, keeping in view the equipments, staff, traditions and courses of the individual colleges and Universities.

With respect to the subjects of General Studies which may be put under the broad heading "Humanities", Engineering Economics and Industrial Administration, there are, no doubt, controversies. But the importance of these subjects is not to be judged by individual opinions or by time honoured practice or tradition, but by the defi-

ciencies of the past products of engineers as well as by the necessities for the requirements of the future engineers. Engineers should not be considered as mechanical beings only capable of tackling some technical problems, but they should be taken to become good citizens, good nationals and good administrators as well as well-integrated individuals. From this point of view, the inclusion of the subjects of general studies and business administration including human relation, and industrial finance is considered absolutely necessary. Knowledge of these subjects to the design and development engineers and technologists is as essential as competency in any technical subject. Very often, it is stated that the engineering courses are too much crowded, leaving no room for addition of subjects. But once we are convinced of the essential character of these primary subjects, the objection cannot stand. In this connection I would like to point out that most of the engineering and technological colleges in the West (U.S.A., U.K., Germany, France etc.,) have found them essential for engineers and have already introduced them in their curriculum, to the extent of 25% of the total course.

(3) TRAINING IN DIPLOMA COURSES

For this course, there is no uniformity on all-India basis with respect (a) admission requirements (b) periods of study, (c) Courses of instructions and (d) the final award viz., diploma, certificate etc. I appeal to the Ministry of Education, Govt. of India to fix up certain standards on all-India basis on the line of National Diploma or National Certificate, as awarded in the United Kingdom.

(4) CERTIFICATE AND OTHER COURSES

It is equally necessary to fix up standards for certificate and other courses. It is found that the facility of training in diploma and certificate and other courses, compared to that of degree course is much less, that is only 4.5, which should be nearly 16. So to keep the balance of training of different cadres of technical personnel, facilities of training in diploma, certificate and other courses should be enhanced.

ENGINEERING SERVICES IN STATE ADMINISTRATION

Now-a-days engineering services are playing an important roll not only in social and economical life of a nation but also in the Military and other Governmental administration. The present military operation consists mainly of engineering and technological skills. The largest portion of military training comprises the

acquirement of engineering techniques. The military operation in recent times can be successfully and efficiently carried out only with the through knowledge of engineering and technology. Many of our social and economical problems are solved with the help of technological techniques. In our daily activities, in our attempts to tide our social and economic difficulties, and to solve minor or major problems of national importance we have to resort to various methods entailing principles of science, engineering and technology and their applications. Consequently Governments, both Central and State, who are considered to be the custodians of the interest of the Nations and the promoters of the welfare of the nation should have to take recourse to the various methods involving engineering and technology to fulfil their obligations.

Reference is made here only to engineering works and scheme undertaken by the West Bengal Government.

In the Budget, of 1952-53, the following engineering works are included at a cost of Rs. 27·07 crores.

TABLE No. 2

1.	Irrigation and water ways	Rs.	1,77,10,000/-
2.	River Valley Projects—		
	(i) Damodar Valley Project ..	,,	11,19,64,000/-
	(ii) Mayurakshi Project ..	,,	4,14,74,000/-
3.	Civil Works—		
	(a) Civil Works	,,	4,37,94,000/-
	(b) Civil Works under different services	,,	2,40,17,000/-
4.	Engineering services under intensive food production	,,	71,70,000/-
5.	Electric supply	,,	42,73,000/-
6.	Road Transport	,,	47,17,000/-
7.	Deep Sea Fishing by Trawler ..	,,	2,01,000/-
8.	Printing and Stationary	,,	7,34,000/-
9.	Industrial Development	,,	36,20,000/-
10.	Planning community projects and new town development	,,	1,10,29,000/-
		Rs.	27,07,09,000/-

This does not include the expenses for technical education. The total expenditure provided in the budget is 41·11 crores. In the same year the revenue is estimated to be 35·91 crores.

From this it is clear that the expenses under the engineering services in West Bengal Government is 27·07|35·91 i.e. 75% of the revenue of the state and 27·07|41·11 i.e. 66% of the total expenditure of the state.

So it should be evident that the engineers of the country should feel much interested in the affairs of the State out of their professional necessity even though not actuated by other objectives such as national, social or economic services. But when I look to the structure of the West Bengal State Legislative Assembly, which is considered to be the institution with authority not only to enact legislation but also to formulate working policies to administer the State along with improvement of its social and economic structure, I am astonished to find a very poor representation of engineers therein. In the house of the West Bengal Legislative Assembly, which consists of 240 members, there are only 2 engineers that is only 0·835% For such a state of affairs I should accuse myself, my colleague-engineers and our predecessors who for some reasons or other do not like to trade into this field of activities, though the activities entails much engineering works necessitating engineering techniques to be greatly exercised. I wish the engineers of the country will be enlightened with the sense of responsibility to fulfill their obligations with respect to the betterment of the social and economic life of the nation.

The five-year plan is before us; much is talked thereof in various circles. On analysis of expenses provided therein engineering services I find the following :

1.	Irrigation	Rs.	168 crores.
2.	Multipurpose Irrigation and power projects	,,	266 crores.
3.	Power	,,	127 crores.
4.	Transport and communication ..	,,	497 crores.
5.	Industry	,,	173 crores.
6.	25% of the expenses under Agriculture and community (361) social services (340) and Rehabilitation (85) ..	,,	200 crores.
			1431 crores.

Total expenditure is 2069 crores.

Therefore the engineering services will be 1431|2069 i.e. 69 per cent of the total expenditure.

Lastly, I wish to draw your attention to the following finding as incorporated in the Report of the University Education Commission under the Chairmanship of Dr. S. Radhakrishnan, "with a few notable exceptions the engineer (Indian) is not prepared to take a broader and inclusive view of affairs, not to take significant part in the determination of state policy, even relating to large engineering projects. The engineer tends to carry out other men's purposes, rather than to be a determiner of purpose". I would like to request my colleagues to pause for a while and think how this defect in us can be removed. How we can rise to the occasion to feel that we shall turn out to be a determiner of purpose as well, and for that how we are to alter our angle of vision, to change our mode of activities, to modify our education, to bring home to the young engineers the new pattern of the profession they are to adopt themselves to.

In conclusion I wish to appeal to my brother-engineers not to look upon our profession from a very narrow angle of vision, only from money earning capability or earn simply from professional efficiency, but from a broader outlook to make our services available for the uplift of the society in which we live and for the uplift of the nation to which we belong. I thank you once again.

'JAI HIND'