

PROCEEDINGS OF THE ELEVENTH MEETING

OF THE

ALL-INDIA COUNCIL FOR TECHNICAL EDUCATION

held at

NEW DELHI

on

24th MARCH, 1958

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OF SCIENTIFIC RESEARCH & CULTURAL AFFAIRS
GOVERNMENT OF INDIA

1959

Department of Educational Planning and
1955

ALL-INDIA COUNCIL FOR TECHNICAL EDUCATION

The 11th meeting of the All-India Council for Technical Education was held at New Delhi on 24th March, 1958 at 10.30 A.M. Dr. M.M. Das, Deputy Minister of Education & Scientific Research, Government of India presided over the deliberations.

The following were present :—

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| 1. Prof. M.S. Thacker | Educational Adviser (Tech.) to
the Government of India |
| <i>Members of Parliament</i> | |
| 2. Shri Ganapati Ram | |
| 3. Shri Jaspat Roy Kapoor | |
| <i>Ministries of Government of India</i> | |
| 4. Dr. A. Nagarajarao | Ministry of Commerce & In-
dustry |
| 5. Shri A. Krishnaswamy Aiyangar | Ministry of Defence |
| 6. Maj. Gen. R.E. Aserappa | ” |
| 7. Capt. L.V. Ramakrishna | ” |
| 8. Shri Abdul Qadir | Ministry of Labour |
| 9. Shri Rajnath | ” |
| 10. Shri Prem Narain | Ministry of Finance |
| 11. Dr. J.C. Ghosh | Planning Commission |
| 12. Shri Pitamber Pant | ” |
| 13. Shri K.L. Joshi | ” |
| <i>State Governments</i> | |
| 14. Shri C.V.D. Murthy | Andhra Pradesh |
| 15. Dr. R.P. Verma | Bihar |
| 16. Shri T.N. Tolani | Bombay |
| 17. Dr. A.N. Banerjee | Delhi |
| 18. Shri G.A. Mukhtar | Jammu & Kashmir |
| 19. Shri P.K. Nambiar | Kerala |
| 20. Shri L.O. Joshi | Madhya Pradesh |
| 21. Shri S.K. Das | ” |
| 22. Shri R.A. Gopaldaswami | Madras |
| 23. Shri K. Channabasaviah | Mysore |
| 24. Shri H.B. Mohanti | Orissa. |
| 25. Shri V.G. Garde | Rajasthan |
| 26. Dr. D.R. Dhingra | Uttar Pradesh |
| 27. Dr. D.M. Sen | West Bengal |
| <i>Industry and Commerce</i> | |
| 28. Shri M.P. Gandhi | Federation of Indian Chambers
of Commerce & Industry |
| 29. Shri B. Maitra | ” |

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| 30. Shri B.F. Goodchild | Associated Chamber of Commerce of India |
| 31. Shri Bharat Ram | |
| 32. Shri G.Y. Mangrulkar | Employers' Federation of India |
| 33. Dr. G.M. Nabar | „ |

Central Advisory Board of Education

34. Col. B.H. Zaidi

Chairman, University Grants Commission—Ex-Officio

35. Shri C.D. Deshmukh

Chairmen of Regional Committees—Ex-Officio

36. Lala Shri Ram
 37. Shri Kasturbhai Lalbhai
 38. Shri J.J. Ghandy

Chairmen of All-India Boards of Technical Studies—Ex-Officio

39. Shri S.H. Parelkar
 40. Shri N.K. Mitra

Professional Bodies

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| 41. Dr. H.L. Roy | Indian Institute of Chemical Engineers |
| 42. Shri P.M. Reddy | Institution of Engineers (India) |
| 43. Shri G.K. Chandiramani | Secretary |

Dr. A.N. Khosla, Vice-Chancellor, University of Roorkee and Shri Laxminarayanan, Principal, College of Engineering, Pilani attended by special invitation.

Shri L.S. Chandrakant and other Officers of the Technical Education Division of the Ministry were unable to attend.

The following members were also present

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| 1. Shri K.G. Saiyidain | Educational Adviser to the Government of India |
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Ministries of Government of India

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| 2. Shri S.S. Khera | Secretary, Department of Mines & Fuel, Ministry of Steel, Mines and Fuel |
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Lok Sabha

3. Shri P.R. Ramakrishnan

State Governments

4. Minister for Education	Assam
5. Minister for Industries	Bihar
6. Minister for Education	Madras
7. Minister for Finance & Industries	Punjab
8. Minister for Industries	Uttar Pradesh
9. Minister for Education	West Bengal
10. Minister for Education	Mysore
11. Dr. John Mathai	Kerala
12. Shri P.C. Saxena	Himachal Pradesh
13. Shri P.K. Bhargava	Tripura

Industry and Commerce

14. Shri J.K. Srivastava	All-India Organisation. of Industrial Employers
15. Shri Nanddas Haridas	„

Labour

16. Shri Michael John	Indian National Trade “Union Congress”
17. Shri B.K. Nair	„
18. Shri A.P. Sharma	National Federation of Indian Railwaymen
19. Shri Anthoni Pillai	Hind Mazdoor Sahba

Association of Principals of Technical Institutions

20. Shri M. Sen Gupta	
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Nominees of Government of India

21. Shri F.I. Rahimtoola	
22. Dr. S.R. Sen Gupta	

Chairmen of the Regional Committees—Ex-Office

23. Dr. A.L. Mudaliar	Southern Regional Committee
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Chairmen of All India Boards of Technical Studies—Ex-Officio

24. Dr. V.K.R.V. Rao	Commerce
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Dr. Das spoke in moving terms about the national loss suffered by the country in the death of Maulana Abul Kalam Azad. Members stood in silence for a minute in memory of the late Maulana Sahib and passed the following condolence resolution :

“The All-India Council for Technical Education places on record its deep sense of loss and profound sorrow at the passing away of Maulana Abul Kalam Azad. Since January, 1947, Maulana Azad was closely associated with the activities of the Council, first as the Union Minister of Education and later on, as the Chairman of the Council. His advice and guidance to the

Council on all occasions was most valuable in the promotion of Technical Education in the country. With his passing away the Council has lost a great leader of scholarship, wisdom and humanism."

Dr. Das then welcomed the members of the Council to the meeting and reviewed the work done by it since the last meeting. A copy of his speech is appended. (Annexure-- I)

Professor M.S. Thacker referred to the death of Shri M.P.G. Nair, a member of the All-India Board of Technical Studies in Textile Technology and members stood in silence for a minute in memory of the deceased. The Council passed the following condolence resolution :

"The Council has heard with deep regret of the death of Shri M.P.G. Nair, a member of the All-India Board of Technical Studies in Textile Technology. The late Shri Nair was associated with the Board for a number of years and his untimely death has deprived the Board and the Council of the services of a person devoted to the cause of Technical Education. The Council places on record, appreciation of the services rendered by the late Shri Nair and conveys its heart-felt condolences to the members of the bereaved family."

The Council proceeded thereafter with the consideration of the items on the Agenda. (Annexure-II).

Item No. 1. To report that the minutes of the 10th meeting of the Council were confirmed by circulation

It was reported that the minutes of the 10th meeting held at New Delhi on the 22nd February, 1957 had been circulated to the members and in the absence of any comments, they were deemed to have been confirmed.

Item No. 2. To consider the recommendations/decisions of the All-India Boards of Technical Studies

Board of Chemical Engineering and Chemical Technology

The Council endorsed the view of the Board that the proposal for starting a degree course in Chemical Engineering at Trichur Engineering College should be considered after the college had established and developed fully for the degree courses in basic engineering subjects.

The Council accepted the recommendation of the Board that for those States that had no Chemical Engineering training facilities of their own, a certain number of seats should be reserved in institutions in other States. The State Governments concerned should make scholarships available to their students when deputed for training outside. The Council further recommended that provision should be made for hostel accommodation for such students in order that the seats reserved should be utilized.

The Council noted the decision of the Board to undertake a survey of the educational facilities available in each State for training in Chemical

Engineering and the general development of engineering courses and, on the basis of this review, to formulate a scheme for organising Chemical Engineering courses wherever conditions are found to be suitable for the purpose.

The Council recommended that teaching fellowships be instituted at the Indian Institute of Technology, Kharagpur and at the A. C. College of Engineering, Madras for the training of teachers in Chemical Engineering.

The Council approved in principle the proposal to start Summer Schools for teachers in Chemical Engineering, and decided that a scheme be formulated for the purpose.

The Council accepted in principle the scheme of establishment of Practice Schools and suggested that Lala Shri Ram be included as a member of the Expert Committee appointed by the Board for this purpose.

Item No. 3. To consider (i) A Memorandum from the Government of Madras regarding the future of Pre-Professional (Engineering) Course and the Admission qualifications for Degree Courses in Engineering, (ii) The recommendations of the Coordinating Committee of the Council on this question

The Council did not favour the acceptance of the proposal of the Madras Government and reiterated its view that in the best interests of reorganisation of Technical Education on right lines and maintenance of proper standards, a five-year integrated course should be adopted for the first degree in Engineering and Technology after the Higher Secondary stage.

Item No. 4. To consider a note on the selection of students for admission to the Engineering Colleges in the country

The Council was of the view that admissions to Engineering Colleges should be made on the basis of results of a competitive test held for the purpose and commended this method for adoption by all the institutions in the country. The Council noted that such tests were being held at present by only a small number of institutions and that independently by the institutions concerned. The candidates wishing to be considered by more than one institutions were therefore subjected to the hardship of appearing for tests and interviews held by the colleges concerned.

The Council considered it important, both from the point of view of avoiding the hardship caused to candidates and of ensuring that the right calibre of students entered the Engineering Colleges, that the candidates should be required to appear for a single admission test. The test should be conducted regionally by separate Boards for the purpose according to the standards to be laid by a Central Coordinating Board, that should periodically carry out a sample check of the standards maintained by the Regional Boards.

The Council recommended that a beginning be made with a common test for admissions to the first degree courses in Higher Technological Institutions, other Central Institutions and the State Institutions which are at present holding independent examinations. The Council expressed

the hope that other State institutions (both Government and non-Government) would also join in the scheme and suggested that the Central Government should take up the question with the authorities of various institutions.

Item No. 5. To consider the question of replacement of English as the medium of instruction in Technical Institutions

The Council was of the view that until textbooks for scientific and technological subjects were available in Hindi and regional languages, English should continue to be the medium of instruction at technical institutions.

Item No. 6. To consider the report of the Sub-Committee appointed by the Council to examine the provisions of and suggest modifications, if any, in the draft Bill for registration of Architects

The Council accepted the suggestions made by its special sub-committee in regard to the modifications in the draft bill for the Registration of Architects.

The Council recommended that entry to the profession of architecture be regulated by the provisions of an Act and that for this purpose, the draft Bill prepared by the Ministry of Works, Housing and Supply as modified by the Architecture Board be accepted subject to the following further modifications :—

- (i) That any building, the value of which is less than Rs. 40,000/- should be exempted from the operation of the provisions of the proposed Act.
- ii) That the period of practice as an architect specified for an engineer to be eligible for registration under the provisions of the proposed Act be reduced from ten years to seven years.

Item No. 7. To receive a note from the Planning Commission on Correlation between Post-Graduate Courses in Engineering, Technology and General Sciences and Employment possibilities under the Second Five-Year Plan

The Council endorsed the suggestions made in the note.

Item No. 8. To consider the suggestion made by Shri V.G. Garde to enhance grants to Institutions to enable them to meet the rise in cost of equipment

The Council noted with satisfaction that the Central Government had already authorised institutions in receipt of grant-in-aid to procure approved items of equipment under a scheme up to a limit of 25% increase in the prices of individual items without further reference to Government. The question of revising the final estimates to implement the scheme should be considered by the respective Regional Committees after the amount already sanctioned for the scheme is fully utilised by the institutions concerned.

Item No. 9. To consider the request of the Rajasthan Government regarding the liberalisation of the policy with regard to issue of Import Licences.

The Council recommended that the Central Government should take necessary steps for ensuring expeditious grant of licences for the import of equipment for technical institutions. The institutions should on the other hand make every effort to find indigenous substitutes for imported equipment. A list of scientific and technical equipment manufactured in the country should be supplied to the institutions for this purpose.

Item No. 10. To consider the proposal of the Rajasthan Government for grant of interest-free loans for construction of Hostels for the additional intake contemplated under the Special Expansion Scheme

The Council was informed that owing to lack of adequate Plan provision and scarcity of building materials, Government sanction in 1957-58 had been limited to hostels for 50% of the additional student population in the case of residential institutions only. Government hoped that it would be in a position to sanction further amounts soon.

The Council emphasised the necessity of providing adequate hostel accommodation to make the Scheme of Special Expansion a success and recommended that Government should sanction without delay interest free loans to the Institutions concerned for construction of hostels as envisaged originally in the Scheme, namely 100% for residential institutions and 50% for the rest.

Item No. 11. To consider the proposal of the Government of Assam that the All-India Council for Technical Education should depute Experts for periodic inspection of Technical Institutions and examination of the working of the States Boards of Technical Education

The Council considered it important that the development programme approved in the field of Technical Education should be implemented speedily and suggested that the Regional Committees should set up a Standing Committee to watch the progress of the schemes in their respective regions. If the Standing Committees find that in any particular case the progress is not satisfactory, the matter should be brought to the notice of the Regional Committees and the Regional Committees should send a small committee of two or three members including the Secretary of the Committee to make an on-the-spot study with a view to suggesting measures for expediting implementation of the scheme.

Item No. 12. To consider Mysore Government's proposal for the increase of Government of India's share of assistance for the Development of Technical Institutions

The Council noted that the Central Government had recently revised the pattern of assistance to State Governments and non-Government Institutions. In the opinion of the Council, the revised pattern, which provided for larger grants from the Centre generally, should enable the State Governments to implement the programmes speedily.

Item No. 13. To consider the proposal of the M. S. University of Baroda to upgrade the existing Diploma Course in Textile Design to that of Degree Course in the same subject

The Council was of the view that the nature, scope and standard of work in Textile Design did not warrant the organisation of a course in the subject at the level of a university degree.

The Council, however, stressed the importance of the subject in the context of training good craftsmen in the line. The Council requested Shri Kasturbhai Lalbhai to suggest a scheme for the purpose, in consultation with the Textile Industry.

Item No. 14 : To consider the recommendations/decisions of the Regional Committees of the Council

General

The Council noted with concern that in Uttar Pradesh the State Board of Technical Education had not yet been set up nor had satisfactory arrangements been made for holding examinations for institutions approved for development under the Plan. The Council suggested that the Central Government should take up the matter with the State Government to remedy this serious situation. The State Government should be urged to set up without any further delay, the State Board of Technical Education which should *inter-alia* take over the work of conducting examinations for recognised institutions.

The Council noted the observations of the Southern Regional Committee that adequate facilities had not been provided in the institutions selected under the Special Expansion Scheme to implement the recommendations of the Engineering Personnel Committee. The Council further noted that the Regional Committee desired the appointment of a high-powered Committee to suggest necessary steps to ensure that standards of instruction in these institutions will not deteriorate. The Council did not favour such a step in view of the fact that the scheme had been sanctioned only recently and the institutions could not therefore have had sufficient time to build the desired level of instructional facilities.

The Council endorsed the recommendation of the Northern Regional Committee that all Technical Institutions should appoint training and placement officers to look after the training and placement of students.

The Council did not favour the acceptance of the suggestion made by the Southern Regional Committee that the scope of the Practical Training Stipend Scheme should be extended to include students undergoing vocational training. The Council did not think it proper that the Government should be called upon to pay stipends during vocational training, apart from the difficulties which would have to be encountered to make proper arrangements under Government auspices for organizing training of large numbers of students. The Council, however, felt that Industrial and other establishments might well consider paying suitable subsistence allowance to the trainees during this period as is the practice in many countries.

Western Regional Committee

The Council considered the recommendations of the Western Regional Committee made at its 14th meeting held on 26th February, 1957.

The Council approved the proposal to increase the intake into the degree courses at the Birla Vishwakarma Mahavidyalaya to 240 from the present intake of 150, subject to the conditions suggested by the Regional Committee. As the country's need of mechanical engineers and electrical engineers will be large in future, the Council desired that the Regional Committee should review the distribution of 240 admissions among the various branches.

The Council further recommended that with the above increase in admissions to Degree courses, Diploma courses at present run by the Birla Vishwakarma Mahavidyalaya should be discontinued and a separate polytechnic established at Anand under the Charutar Vidya Mandal with an intake of 150 students. (Civil 90, Mechanical 30 and Electrical 30).

The Council recommended the establishment of a Government Polytechnic at Karad under the Five-Year Plan.

The Council's recommendations regarding development in the region and the financial implications are given below :—

Institution	Class of Institution	Buildings & Furniture	Equipment	Total	Additional Recurring (ultimate)	Interest-free loan for Hostels	
<i>Bombay</i>							
1. Birla Vishwakarma Mahavidyalaya, Anand.	Non-Government	1,09,000	1,13,000	2,22,000	—	6,23,800	
2. Polytechnic, Vallabh Vidyanager.	-do-	7,49,410	3,60,080	11,09,490	—		
3. Government Polytechnic, Karad.	Government	9,92,000	8,54,000	18,46,000	2,52,000	5,67,000	
				Total	31,77,490	2,52,000	11,90,800

The Council suggested that the development costs should be shared between the Central Government, the Institution and/or the State Government in proportions currently in force.

The Coordinating Committee at its meeting held on 3rd December, 1957 had expressed the view that the cost of land and its development should not be included in the estimates for a new institution, for purposes of assistance from the Government. The Council did not agree with the suggestion of the Regional Committee that expenditure on land and its development should be considered for assistance and confirmed the view taken by the Coordinating Committee.

The representative of the Government of Bombay had suggested at a meeting of the Regional Committee that facilities for training in automobile engineering be provided at the diploma level, with a three year course, the first two years being common with the mechanical engineering as in the case of the state diploma course in the subject. The Council reaffirmed its earlier decision that automobile engineering courses should be for students who have already completed the National Certificate/State Diploma Course in mechanical engineering and not as a basic diploma course, as suggested.

The Council considered the recommendations of the Regional Committee on the question of meeting the existing shortage of teaching staff in technical institutions along with the matter placed before it under item No. 20. The recommendations of the Council are given under that item.

Northern Regional Committee

The Council considered the recommendations of the *Northern* Regional Committee made at its 6th meeting held on 14th December, 1957.

The Council approved the scheme of development of Guru Nanak Engineering College, Ludhiana for degree courses as formulated by the Regional Committee subject to the following modifications :—

i) The requirements of accommodation (plinth area) be reduced by 15,300 sq. ft., so as to conform to All-India Council for Technical Education standards.

ii) The provision for library be reduced by Rs. 65,000/-, so as to conform to the All-India Council for Technical Education standards.

iii) The provision for hostels be made for 230 students involving an expenditure of Rs. 5.75 lakhs.

The Council was of the view that admissions to the institute should be made on merit and the present practice of reserving 70% seats for candidates from rural areas should be discontinued; the only reservations should be for those for which the constitution of India lays down a special responsibility. Further the College and the Polytechnic should function as separate units except for the common physical facilities of Laboratories and Workshops.

The Council approved the scheme formulated by the Regional Committee for the establishment of a Government Polytechnic at Ajmer under the Five-Year Plan.

The Council recommended an additional expenditure of Rs. 5,000 by the Government Leather Working School, Kanpur to enable it to purchase the equipment required.

The Council recommended a further sum of Rs. 3,84,700 for additional equipment for the Civil Engineering Department of the Banaras Hindu University.

The recommendations of the Council for development of the institutes in the Region are given below :—

Institution	Class of Institution	Buildings & Furniture	Equipment	Total	Additional Recurring (ultimate)	Interest-free loans for hostels
<i>Punjab</i>						
1. Guru Nanak Engg. College, Ludhiana.	Non-Government	11,71,600	8,77,037	20,48,637	6,57,760	5,75,000
<i>Rajasthan</i>						
1. Government Polytechnic, Ajmer.	Government	4,16,800	6,08,600	10,25,400	1,33,200	2,25,000
<i>Uttar Pradesh</i>						
1. Government Leather Working School, Kanpur.	Government	—	5,000	5,000	—	—
2. Engineering College, Banaras Hindu University.	University Institution	—	3,84,700	3,84,700	—	—
		15,88,400	18,75,337	34,63,737	7,90,960	8,00,000

The Council recommended interest-free loans totalling Rs. 7,20,000 for the following institutions for construction of students' hostels:—

	Institution	Loan
<i>Punjab</i>		
(i)	Ramgarhia Polytechnic, Phagwara.	3,50,000
(ii)	Tarakaran S.D. Technical Institute, Bainnath.	1,45,000
<i>Uttar Pradesh</i>		
(iii)	Harcourt Butler Technological Institute, Kanpur	25,000
(iv)	Government Leather Working School, Kanpur	20,000
(v)	Government Central Textile Institute, Kanpur	30,000
(vi)	Northern Regional School of Printing Technology, Allahabad	1,50,000

Southern Regional Committee

The Council considered the recommendations of the Southern Regional Committee made at its 8th meeting held on 18.2.1957.

The Council approved the scheme formulated by the Regional Committee for the establishment of a non-Government Polytechnic at Tanuku by the M.V.M. Educational Trust.

The Council approved the scheme prepared by the Regional Committee for the development of B.V. Bhoomaredi College of Engineering, Hubli and the National Institute of Engineering, Mysore for provision of degree courses in Mechanical and Electrical Engineering. The Council also approved the scheme of development of the K.H. Kabbur Institute of Engineering, Dharwar to provide diploma courses in Mechanical and Electrical Engineering.

The Council recommended an additional building accommodation of 12,500 sq. ft. (plinth area) for the Faculty of Automobile Engineering, Madras Institute of Technology.

The Council approved the proposals of the Regional Committee for improvement of the Government College of Technology, Coimbatore and the College of Engineering, Guindy under the Second Five-Year Plan but suggested the following modifications in the schemes prepared by the Regional Committee:—

(i) That the additional accommodation for the Government College of Technology, Coimbatore be reduced by 29,000 sq. ft., so as to conform to the standards laid down by the Council.

(ii) That the provision made for the Babcock & Wilcox boiler for the Government College of Technology, Coimbatore be deleted.

The Council approved the scheme prepared by the Regional Committee for the establishment of a Government Engineering College at Trichur under the Second Five-Year Plan.

The recommendations of the Council for the development of various institutions in the Region are given below:—

Institution	Class of Institution	Buildings & furniture	Equipment	Total	Additional Recurring (ultimate)	Loans for Hostels
<i>Andhra Pradesh</i>						
1. M.V.M. Educational Trust Polytechnic, Tanuku	Non-Government	7,94,000	8,68,880	16,62,880	1,60,000	—
<i>Mysore</i>						
1. B.V. Bhoomareddy College of Engg., Hubli	-do-	5,77,000	7,31,000	13,08,000	—	—
2. National Institute of Engineering, Mysore	-do-	7,65,000	10,51,000	18,16,000	4,50,000	—
3. K.H. Kabbur Institute of Engineering, Dharwar	-do-	3,74,000	3,62,400	7,36,400	1,60,000	—
<i>Madras</i>						
1. Madras Institute of Technology, Chromepate	-do-	1,90,000	—	1,90,000	—	—
2. Government College of Technology, Coimbatore	Government	8,70,000	6,70,000	15,40,000	4,60,000	8,40,000
3. College of Engineering, Guindy	-do-	4,30,600	2,69,000	6,99,600	—	—
<i>Kerala</i>						
1. Engineering College, Trichur	-do-	19,90,000	15,12,000	35,02,000	3,80,600	—
		59,90,600	54,64,280	1,14,54,880	16,10,600	8,40,000

The Council considered the recommendation of the Regional Committee for the establishment of an engineering college at Warangal by the Osmania University under the Five-Year Plan. The Council noted that the Regional Committee intended to formulate a detailed scheme after consultations with the State Government of Andhra Pradesh on the question of its participation in the development cost. The representative of the State Government informed members that his Government now desired that the proposed college be located at Tirupathi and that the Centrally sponsored large-sized college be located at Warangal instead of Hyderabad. In view of this, the council did not take any final decision and suggested that the Central Government may discuss the matter with the State Government with a view to finalizing the proposals.

The Council considered the recommendations of the Regional Committee for the establishment of three engineering colleges in Kerala, one engineering college and three polytechnics in Mysore by private agencies and decided that the matter should be brought up for the consideration after the Regional Committee had formulated detailed proposals.

The Council recommended interest-free loans for the construction of students' hostels totalling Rs. 36.1 lakhs for the following institutions in the Region :—

Madras

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| (i) Thiajarajar College of Engineering,
Madurai | 6.00 lakhs. |
| (ii) A.M.M. Charities Polytechnic, Avadi | 4.50 lakhs. |

Andhra

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| (i) Visakhapatnam Polytechnic,
Visakhapatnam | 6.75 lakhs. |
| (ii) Venkateswarn Polytechnic, Tirupathi | 6.35 lakhs. |
| (iii) Coimbatore Institute of Technology,
Coimbatore | 6.00 lakhs. |
| (iv) Nachirnuthu Polytechnic, Pollachi | 4.50 lakhs. |

Kerala

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| (i) Nair Service Polytechnic, Pandalam | 2.00 lakhs. |
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In connection with the recommendation of the Regional Committee that the Central Government assistance to non-government institutions be brought back to the pattern that existed before February, 1957, the Council noted that the Central Government had recently rationalized the pattern of Central assistance and did not consider that any further changes need be made.

Eastern Regional Committee

The Council considered the recommendations made by the Eastern Regional Committee at its 14th meeting held on 7th March, 1958.

The Council approved the scheme of establishment of degree courses in Civil, Mechanical and Electrical Engineering at the Government Engineering College, Jorhat, at a cost of Rs. 40.02 lakhs Non-recurring (Build-

ings and furniture Rs. 20.00 lakhs and Equipment Rs. 20.02 lakhs) and Rs. 4,85,560 recurring. The Council recommended the grant of interest-free loan of Rs. 11.28 lakhs for the construction of hostels for the college.

The Council was of the view that the question of improvement of salary scales of the staff of the three technological Departments of the Calcutta University should be considered in the context of the general question of improvement of salary scales of teachers for technical institutions.

The Council noted that the College of Engineering and Technology, Jadavpur had originally submitted a scheme for organising the National Diploma Course on part time basis which was recommended by the Regional Committee. Since then the University of Jadavpur had been established and the University was now engaged in formulating a scheme for part-time degree courses in place of the part-time National Diploma courses.

Item No. 15 : **To consider the proposals regarding expansion of Technical Education in the country**

The Council discussed at length the criteria which may be laid down for further expansion of facilities for Technical Education in the various regions. The Council recognised the complexity of the matter and was of the view that it was not possible to lay down any criteria which could be mechanically applied to settle the question. All the various factors such as population in the Region, the state of educational progress in Science, the nature of economy of the region etc. would have to be considered in their totality.

The Council understood that the tentative assessment of requirement carried out in the Planning Commission indicated that many more institutions will require to be set up in the future. The Council approved the proposals placed before it with one modification namely that the Northern Region should have two entirely new colleges in addition to the degree courses in the Delhi Polytechnic being separated and provision made therefore on a more extensive scale in an institute to be located in Delhi. The location of the second entirely new college should be decided in consultation with the State Governments.

Item No. 16. **To consider the recommendations of the Co-ordinating Committee regarding pay scales for Technical Teachers**

The Council considered this item alongwith Item No. 20. The recommendations of the Council are set out under that item.

Item No. 17. **To consider the report of the Joint Committee of the All-India Council for Technical Education and University Grants Commission on the Development of Teaching facilities in Geology and Applied Geology**

The Council noted that the Joint Committee's recommendations indicated changes of a fundamental nature in the structure and duration of courses in Applied Geology and that these required to be examined further. The Council requested the Educational Adviser (Tech.) to the Government of

India to discuss the matter with the Chairman of the Joint Committee and bring it up before the Council/Coordinating Committee at a subsequent meeting.

Item No. 18. To report the progress of Technical Education Schemes under the Second Five-Year Plan

The Council recorded the note on the progress made.

Item No. 19. To consider the question of holding Supplementary Examinations by the Council

The Council recommended that arrangements be made for holding Supplementary Examinations in September/October for National Diplomas and National Certificates.

Item No. 20. To consider the recommendations of the Conference of Principals of Technical Institutions regarding shortage of teachers

Item No. 16 was considered along with this item.

The Council noted with concern that the shortage of teachers in the Technical Institutions had assumed such high proportions namely 40% of the sanctioned cadres as assessed by the Principals. Having regard to the needs of teachers during the next three to five years period, estimated at 5000 by the Principals, the Council recommended that immediate measures should be taken by Government as proposed by the Principals or else the standards would deteriorate rather steeply, jeopardising the entire programme of expansion and improvement of Technical Education in the country.

The Council endorsed the recommendations of the Conference of Principals and suggested immediate action in respect of the following:—

I—SALARY SCALES.

1. Degree and Post-graduate institutions:

(a) Technical Institutions should be divided into two categories for the purpose of pay scales—Class 'A' institutions where the main emphasis is on post-graduate courses and research and Class 'B' institutions which conduct degree and even a limited number of post-graduate courses. The Ministry of Education and Scientific Research, in consultation with the All-India Council for Technical Education and the University Grants Commission should determine the categorisation of institutions.

(b) The Salary Scales in these institutions should be as follows:—

Designation of post	Salary Scales for institutions in	
	Class 'A'	Class 'B'
1	2	3
Director Principal	2000–2500 (in exceptional cases an additional pay of Rs. 500 may be allowed)	1300–60–1600–100–1800.

1	2	3
Professor (Senior Scale)	1600-100-1800	**
Professor (Ordinary Scale)	1000-50-1500	1000-50-1500.
Asstt. Professor	600-40-1000-50/2-1150.	600-40-1000-50/2-1150.
Lecturers	350-350-380-380-30- 590EB-30-770-40-850. with a starting salary of Rs. 410/- p.m.	350-350-380-380-30- 590EB-30-770-40-850. with a starting salary of Rs. 410/- p.m.
Workshop Superintendent	600-40-1000-50/2-1150.	600-40-1000-50/2-1150.

The number of posts in the senior and ordinary scales for Professors should be determined from time to time.

**Ordinarily there would be no post of senior professor in a Class B institution. However, having regard to the personal eminence of a member of the staff, a post of professor in the senior scale may be created in a class 'B' institution also.

Also the number of posts in the Senior and Ordinary scales for professors should be determined from time to time.

(c) For the purpose of salary scales, all existing posts of Associate Professors should be regarded as Professors in ordinary scale and the post of Readers regarded as Assistant Professors.

2. Diploma Institutions

(a) The salary scales in these institutions should be as follows:—

<i>Designation of Post</i>	<i>Salary Scale</i>
Principal	800-40-1000-50-1250.
Head of the Department (Lecturer-in-charge)	600-40-1000.
Lecturer	350-350-380-380-30-590EB-30-770- 40-850.
Workshop Superintendent	350-350-380-380-30-590EB-30-770- 40-850.
Senior Instructor	260-10-300-15-450-25/2-500.
Junior Instructor	160-10-300.

B-Qualifications for Teaching Staff

It was not considered necessary to specify qualifications appropriate to each level of teaching post in degree institutions in view of the fact that in future initial recruitment to the posts of lecturers would be filled from amongst candidates who successfully complete the training under the teaching fellowships scheme. However, it was laid down that teaching fellowships should be offered only to first Class graduates. All higher posts should normally be filled by lecturers having at least five years' experience. Candidates appointed to the posts of professors should have the highest

qualifications. Candidates possessing advanced degrees may be paid a special pay over the grade pay.

For the posts of lecturer and above in diploma institutions only degree holders should be appointed. They should have combined teaching and professional experience of not less than seven years for the post of Principal and five years for the posts of Heads of Departments and lecturers. Candidates appointed to the posts of Senior instructors should have three years' experience. Diploma holders may be appointed to the posts of Senior and Junior instructors.

The existing teaching personnel should be fitted into the appropriate salary scales recommended after proper assessment.

The Coordinating Committee had at a previous meeting, suggested that pending the introduction of the scales of pay as proposed above, the teaching posts may be equated in the interim period to the corresponding level of posts in the State's Public Works Department and for posts of Lecturers and upwards, the teachers should in addition be paid an allowance of Rs. 100/- per mensem over the grade pay of equated posts. The Council was of the view that uniform scales of pay in the various institutions should be introduced forthwith.

Having regard to the fact that all the financial resources of the States had been pledged for the various schemes already approved under the Five-Year Plan, the Council recommended that the entire financial liability for the improvement of scales of pay should be borne by the Central Government during the Second Five-Year Plan period. Further, there should be a gradual devolution of financial responsibility on this account, on to the State Governments over successive plan periods.

II. Teaching Fellowships

The Central Government should institute 500 Senior Teaching Fellowships of the value of Rs. 350-25-400 for Degree holders and 200 Junior Teaching Fellowships of the value of Rs. 200-20-240 for Diploma holders during the current Plan period. Phasing may be *Senior Fellowships*—150 in 1958, 150 in 1959 and 200 in 1960, *Junior Fellowships*—50 in 1958, 50 in 1959 and 100 in 1960.

Degree holders intending to be appointed as teachers in Diploma institutions should be trained in the diploma institutions.

III. Appointment of Probationary Lecturers

TEACHERS

While the Teaching Fellows under the Central scheme would be posted to selected institutions, the various institutions in the country should themselves train further teachers and for this purpose they should be permitted to appoint probationary lecturers-teachers to the extent of at least 50% of the number of teachers required to be appointed by them on the regular cadre three years later. The scales of pay admissible to such probationary lecturers-teachers should be Rs. 300-25-350 for Degree holders and Rs. 170-15-200 for Diploma holders. Arrangements should be made with the

Selection and Appointing Authorities of the institutions so that the probationary lecturers-teachers are appointed on the regular cadre later on the basis of an assessment of the work done by them during the training period.

For the same reasons as indicated under I, the additional expenditure involved in the appointment of probationary lecturers-teachers should be borne by the Central Government during the current Plan period.

Institutions should take advantage of the offers of scholarships for training abroad and the facilities for post-graduate courses in the country to the maximum possible extent to train the probationary lecturers-teachers.

IV. Recruitment Procedures

Recruitment procedures for appointment to teaching posts should be simplified. Adhoc Selection Committees may be set up for the purpose with which the members of the Public Service Commissions may be associated in the case of Government Institutions.

With the concurrence of the State Governments and the authorities of the non-Government institutions, arrangement may be made for a Central Committee to be constituted which should go round to the various institutions offering facilities for post-graduate courses and select from amongst the students undergoing such courses, persons who could be appointed to the teaching posts in the various institutions in the country.

V. Age of Superannuation

The age of superannuation in the case of technical teachers should be raised to 60.

VI. Meeting of immediate shortage

Immediate shortage of teachers may be eased by securing the services on deputation, from Government departments and industry, of persons with aptitude for teaching. Arrangements in this behalf should, however, be such that the final choice of the persons will lie with the teaching institutions.

Item No. 21. To consider the proposals of the Government of Orissa for the Establishment of an Engineering School at Bhadrak and an Institute of Mining and Metallurgy at Rourkela

The Council recommended that the new polytechnic proposed for Orissa under the scheme for establishment of new institutions (vide item No. 15) be located in Bhadrak.

The Council reiterated its view that courses in Mining and Metallurgy should be started only in well established engineering colleges having Civil, Mechanical and Electrical Engineering Departments, and did not, therefore, recommend the proposal of the Orissa Government to establish an Institute for Mining and Metallurgy at Rourkela.

Item No. 22. **To nominate a representative of the All-India Council for Technical Education on the Building Division Council of the Indian Standards Institution**

The Council nominated Dr. A.N. Khosla as its representative on the Building Division Council of the Indian Standards Institution.

Item No. 23. **To consider the recommendation of the Post-Graduate Development Committee regarding the scheme of P.S.G. and Sons Charities College of Technology, Peelamedu for starting a Post-Graduate Course in Electrical Machine Design**

The Council approved the proposal to organise a post-graduate course in Electrical Machine Design in the P.S.G. & Sons' Charities College of Technology, Coimbatore.

The meeting terminated with a vote of thanks to the Chair.

ANNEXURE-I

Speech delivered

by

DR. MONO MOHAN DAS

*Deputy Minister for Education & Scientific Research
on the occasion of the*

11th Meeting of the

ALL-INDIA COUNCIL FOR TECHNICAL EDUCATION

held on 24th March, 1958

NEW DELHI

Friends,

I have great pleasure in welcoming you to this the 11th Meeting of the All-India Council for Technical Education.

The various Committees of the Council, namely the Coordinating Committee, the Regional Committees and the Special Committees have been actively functioning for the development of Technical education in the country. As a result, the good work started by the Council for all-round improvement and expansion in 1953 has proceeded at a quicker pace than heretofore.

The most important aspect of our activity since the last meeting of the Council, is the implementation of the scheme of expansion of 19 existing Engineering Colleges and 50 Polytechnics as the first step towards the fulfilment of the recommendations of Engineering Personnel Committee for training of additional technical personnel. The scheme makes provision for 2,568 additional sets for degree courses 4,885 additional sets for diploma courses. These figures represent 92% and 60% of the expansion of facilities recommended by the Engineering Personnel Committee for degree and diploma courses respectively. The keen interest of the Central Government in bringing this about expeditiously is evident from the fact that the Government has decided to bear the entire non-recurring expenditure and a substantial part of the recurring expenditure of the scheme during the Plan Period.

The Council suggested at its last meeting held in February 1957 a new pattern of assistance to be given by the Central Government to private enterprise whose important role in the development of Technical education is recognised fully. The pattern was designed to encourage the establishment of technical institutions by private agencies. I am glad to inform the Council that it has met with very good response and as many as 20 new institutions are being established by various private agencies. This is the first time in the history of Technical education in the country that private organisations and individuals have come forward to establish such a large number of technical institutions in a short period. This is a very significant development and worthy of notice and appreciation by the Council.

There is no doubt that the employer today is as greatly concerned with the calibre of technical personnel trained by our technical institutions as he is interested in participating in the training programmes. It is heartening to note that arrangements have been completed for starting an institute at Calcutta for sandwich courses for the National Certificate in Mechanical Engineering. The Birla Group of Industries and the Government of West Bengal are cooperating in this project. It is hoped that at a not too distant date, similar institutes will be established at Bombay, Madras and other industrial centres.

You will be glad to know that the recommendations of the Expert Committee for Mining Engineering have been accepted by the Government and six new Centres are being developed for degree courses in Mining Engineering and 14 Centres for diploma courses,

In the field of Management studies, the Administrative Staff College has started functioning at Hyderabad in accordance with the scheme formulated by the Expert Committee of the Council. The first course was conducted during December, 1957-March, 1958.

Satisfactory progress has also been made in the implementation of the schemes included in the Second Five-Year Plan of State Governments. As a result of revisions made recently in consultation with the Planning Commission, provision has been made in the State plans for the establishment of eight engineering colleges and 36 polytechnics. Of these, six colleges and 17 polytechnics have started functioning and the rest are in the process of establishment.

These are some of the important achievements of the year in the field of Technical education. While we have reason to feel gratified, we have also to recognise that certain urgent problems confront us and we should address ourselves to them.

In his address to the Council last year, the late Maulana Saheb referred to the acute shortage of technical teachers and the urgent need of devising concrete measures to attract right men to the staff of technical institutions. This matter has been considered in detail at a conference of Principals of Technical Institutions, convened by the Ministry recently. A number of recommendations, made by the conference are placed before you for consideration. The Coordinating Committee has also made certain suggestions for the improvement of salary scales of teachers in Technical Institutions, on the basis of the recommendations made by a Special Committee presided over by Dr. J.C. Ghosh. The advice of the Council will be most useful to the Government in dealing with the problems.

The reorganisation of Secondary education in the country has raised the issue regarding the duration and content of degree and diploma courses in engineering and technology. The Joint Committee of the All-India Council for Technical Education and Inter-University Board has examined the matter in detail and has made recommendations, which are placed before you today. I have no doubt that as a result to your deliberations, technical institutions in the country will receive valuable guidance in this important matter.

I will not dilate further on the Agenda which includes many other important items. The country looks to the Council for advice regarding coordinated and accelerated progress in the field of Technical education with emphasis on high quality and standard. I take this opportunity to thank you all for the time you give, in the midst of your various pre-occupations to the work of the Council.

I would now request you to proceed with the consideration of the Agenda.

ANNEXURE II

ALL-INDIA COUNCIL FOR TECHNICAL EDUCATION

11TH MEETING

Date: 24th March, 1958.

Place : Commission Room No. 'G'
Vigyan Bhavan,
King Edward Road, New
Delhi.

Time : 10. 30 A.M.

A G E N D A

- Item No. 1.* To report that the Minutes of the 10th meeting of the Council were confirmed by circulation.
- Item No. 2.* To consider the recommendations/decisions of the All-India Boards of Technical Studies.
- Item No. 3.* To consider (i) a memorandum from the Government of Madras regarding the future of Pre-Professional (Engineering) Course and the admission qualifications for degree Courses in engineering, (ii) the recommendations of the Coordinating Committee of the Council on the question.
- Item No. 4.* To consider a Note on the Selection of students for admission to the Engineering Colleges in the country.
- Item No. 5.* To consider the question of replacement of English as medium of Instruction in Technical Institutions.
- Item No. 6.* To consider the report of the Sub-Committee appointed by the Council to examine the provisions of and suggest modifications, if any, to the draft Bill for Registration of Architects.
- Item No. 7.* To receive a note from the Planning Commission on correlation between Post-graduate courses in Engineering, Technology and General Sciences and employment possibilities under the Second Five-Year Plan.
- Item No. 8.* To consider the suggestion made by Shri V.G. Garde to enhance grants to institutions to enable them to meet the rise in cost of equipment.
- Item No. 9.* To consider the request of the Rajasthan Government regarding the liberalisation of the policy with regard to issue of import licences.
- Item No. 10.* To consider the proposal of the Rajasthan Government for grant of interest-free loans for construction of hostels for the additional intake contemplated under the Ghosh-Chandrakant Special Expansion Scheme.

- Item No. 11.* To consider the proposal of the Government of Assam that the All-India Council for Technical Education may depute experts for periodic inspection of Technical Institutions and examination of the working of the States Boards of Technical Education.
- Item No. 12.* To consider the Mysore Government's proposal for the increase of Government of India's share of assistance for the development of Technical Institutions.
- Item No. 13.* To consider the proposal of the M.S. University of Baroda to upgrade the existing Diploma Course in Textile Design to that of Degree course in the same subject.
- Item No. 14.* To consider the recommendations/decisions of the Regional Committees of the Council.
- Item No. 15.* To consider the proposals regarding expansion of Technical education in the country.
- Item No. 16.* To consider the recommendations of the Coordinating Committee regarding pay scales for Technical teachers.
- Item No. 17.* To consider the report of the Joint Committee of the All-India Council for Technical Education and University Grants Commission on the development of teaching facilities in Geology.
- Item No. 18.* To report the progress of Technical education Schemes under the Second Five Year Plan.
- Item No. 19.* To consider the question of holding of Supplementary Examinations by the Council.
- Item No. 20.* To consider the recommendations of the conference of Principals of Technical Institutions regarding shortage of teachers.
- Item No. 21.* To consider the proposals of the Government of Orissa for the Establishment of an Engineering School at Bhadrak and an Institute of Mining and Metallurgy at Rourkela.
- Item No. 22.* To nominate a representative of the All-India Council for Technical Education on Building Division Council of the Indian Standards Institution.
- Item No. 23.* To consider the recommendation of the post-graduate development committee regarding the scheme of P.S.G. and Sons Charities College Technology, Peelamedu for starting a Post-graduate Course in Electrical Machine Design.

Item No. 2. To consider the recommendations/decisions of the All India Board of Technical Studies.

Chemical Engineering and Chemical Technology

(A) Matters for Report

1. The Board at its meeting held on 8th March, 1958 elected Dr. J.C. Ghosh Chairman. The Board also coopted the following three specialists.

- 1). Dr. Husain Zaheer, Hyderabad.
- 2). Dr. S.K. Mukerji, Sindri Chemicals and Fertilizers.
- 3). Dr. R.R. Hattiangadi, Associated Cement Companies Ltd., Bombay.

Courses of Study

2. The Board considered a revised draft Scheme for four-year degree course in Chemical Engineering and approved generally the structure of the course, content and standard of subjects, provision for electives and other aspects. As regards the details of the syllabii, however, it was decided that the scheme should be sent to all Chemical Engineering institutions and their comments invited. On the basis of the comments received the question of any further revisions required should be examined. A copy of the Scheme is given at Appendix A.

3. The Board noted that on the recommendations of the Joint Committee of the All-India Council for Technical Education and Inter-University Board, the Coordinating Committee had approved that in view of the reorganised pattern of Secondary education the first degree courses in Engineering and Technology should be five-year integrated courses with the higher secondary as admission qualification. It was decided that the Courses Committee of the Board should prepare a scheme for five-year integrated course for Bachelor's degree in Chemical Engineering.

Instructional facilities required

4. The Board also approved the recommendations of its Sub-Committee regarding the requirements for equipment, accommodation, staff etc. for a four-year degree course in Chemical Engineering with Intermediate in Science as admission qualification. It was decided that these requirements should be revised after the Courses Committee had prepared the 5-year integrated course.

Training of Operators

5. The Board decided that for the training of Chemical Operators a scheme should be prepared which would provide for two types of courses : viz., (a) one of two to three years' duration for those candidates who have passed the Matriculation or equivalent, and (b) another of about four years' duration for those candidates who have completed compulsory education up to the age of 14.

As regards the latter, the Board was of the considered view that diversified educational and training opportunities should be provided to boys who have completed their 14th year and wish to be prepared for a

specific occupation in life by the time they attained the age of 18. Since the chemical industry represents an important field of employment for a large number of young men it is desirable that the course of training for the positions of chemical operators should provide for the admission of boys who have completed the 14th year. Since the course has to include training in industry on a sandwich basis and boys below the age of 16 are not accepted in industry for training, the first two years of the course should include general education, technical subjects, workshop and drawing and the last two years should provide for integrated education and factory training on a sandwich basis. The Board decided that the scheme should be prepared by its Expert Committee, on this basis.

(B) Matters for decision

Chemical Engineering in Kerala

1. The Board considered the proposal of the Government of Kerala for starting a degree course in Chemical Engineering in one of the Engineering Colleges of the State preferably in the new Engineering College to be established at Trichur. The Board reiterated its previous recommendations that required, since comprehensive facilities in workshop and general engineering a Chemical Engineering course should be organised hereafter only in well-established engineering colleges. The new Engineering College proposed at Trichur has not yet been established. The only other Engineering College in Kerala is in Trivandrum which, however, is being expanded under a special scheme for a degree course in Civil, Electrical and Mechanical Engineering and any additional courses at this College at this stage will be very difficult to organise. It was therefore recommended that the proposal for starting a Chemical Engineering degree course in Trichur Engineering College should be considered after the College had been established and developed fully for the degree courses in Civil, Mechanical and Electrical Engineering.

2. The Board also noted that several States had proposed courses in Chemical Engineering. However, since such proposals would only be practicable in well-established and developed engineering colleges that the Board recommended that for those states which had no Chemical Engineering training facilities of their own, a certain number of seats should be reserved in other institutions and those seats should carry scholarships. It was also decided that a complete review of Chemical Engineering facilities available in each State and the general development of engineering courses should be carried out. On the basis of this review, wherever, conditions were satisfactory for organising Chemical Engineering Courses, suitable schemes should be formulated.

Teachers for Chemical Engineering

3. The Board recommended that for the training of teachers for Chemical Engineering, teaching fellowships should be instituted at the Indian Institute of Technology, Kharagpur, and the A.C. College of Technology, Madras University. The Board also felt that Summer Schools should be organised for teachers of Engineering and Technology and a suitable scheme for the purpose should be formulated by the Coordinating Committee.

Practice School for Chemical Engineering

4. The Board was of the view that for conducting training in Chemical Engineering on proper lines with particular reference to plant design and operation, and control, institutions should establish collaborative arrangements with chemical factories whereby facilities for carrying out studies under actual factory conditions could be provided. This requirement is being increasingly met in U.S.A. and other countries through Practice Schools established jointly by institutions and industry. In these Practice Schools students and staff spend stated periods in the works examining the chemical engineering problems encountered by industry from time to time, analysing them and finding suitable solutions. The design, operation and control of equipment in the factory under actual operating conditions are also closely studied and evaluated. The Board was of the view that efforts should be made to establish such Practice Schools in the country; for that purpose collaboration should be established between institutions and industry. The Board understood that certain chemical factories in the country had offered facilities for running Practice Schools. It was decided that a small committee of two or three experts should be appointed to formulate a detailed scheme.

Item No. 3.

To consider (i) a memorandum from the Government of Madras regarding the future of Pre-professional (Engineering) course and the admission qualifications for degree courses in Engineering, (ii) the recommendations of the Coordinating Committee of the Council on this question.

The Government of Madras have suggested that the Pre-professional course for admission to the degree course in Engineering should be abolished. They have further suggested that the Pre-professional course should form an integral part of the B. Sc. degree course and the candidates finishing the first year of the three-year degree course should be admitted to the degree course in Engineering. (A copy of the memorandum may be seen at Annexure to this item.)

At its meeting held at Madras on 28th September, 1957 under the Chairmanship of Dr. A. L. Mudaliar, the Joint Committee of the All-India Council for Technical Education and Inter-University Board considered (a) the question of minimum qualifications for admission to degree and diploma courses in Engineering and Technology and (b) the structural changes required in the professional courses as a sequel to the reorganisation of the pattern of Secondary education in the country. The recommendations made by the Joint Committee were generally approved by the Coordinating Committee at its 25th meeting held on the 3rd December, 1957 at New Delhi. A Summary of the suggestions as finally recommended by the Coordinating Committee is given below :

1. In view of the new pattern of Secondary education and the need for a higher standard of scientific preparation in basic sciences for engineering and technological studies, the first degree course in engineering or technology should be reorganised into a five year integrated course with at least six months' practical training.

2. Admission to this five year integrated course should be open to (a)

those who have successfully completed the Higher Secondary course with Physics, Chemistry and Mathematics in the Science Stream and (b) those who have successfully completed the Higher Secondary course in the Technical Stream with suitable subjects.

3. Purely as a transitional measure, I. Sc.s. in Physics, Chemistry and Mathematics may be admitted to the second year of the five-year course, but additional work in Workshop and Drawing should be prescribed to cover the first year's portions in those subjects.

4. Purely as a transitional measure candidates who have successfully completed the Pre-university course (i.e. one-year course after Matric) may be admitted to five-year engineering course after they have passed such tests as may be prescribed by technical institutions.

5. For the Diploma courses in polytechnics, S.S.L.C., Higher Secondary Certificate or Junior Technical School Certificate should be prescribed as admission qualifications for the time-being. The Board of Technical Studies in Engineering should, however, examine whether in the case of those who have done Technical Stream in Higher Secondary or Junior Technical School the duration of the Diploma courses could be reduced. (The Junior Technical School Certificate refers to a Certificate from the proposed Technical Schools at present under consideration of the Ministry of Education & Scientific Research and the National Council for Vocational Training of the Ministry of Labour).

6. In order to provide for adequate studies in Physics and Mathematics which are essential for engineering and technology, full-fledged Departments for these subjects should be established in all technical institutions conducting degree or equivalent courses.

7. For reorganising degree courses into a five-year curriculum along right lines, technical institutions should be given necessary assistance by the Central Government, State Governments and University Grants Commission on the recommendations of the All-India Council for Technical Education and its Regional Committees.

8. The Boards of Technical Studies of the All-India Council for Technical Education should be requested to prepare detailed curriculum and syllabii for five-year degree courses in the different branches of engineering and technology.

9. As a transitional measure, wherever four-year degree courses in Engineering and Technology with I.Sc. as the admission qualification are continued, students, who have completed the first year of the three-year degree course in Science (Physics, Chemistry and Mathematics) should be considered as eligible for admission with the proviso that they pass such tests as may be prescribed by the Institutions. The question of continuance or otherwise of these arrangements may be reviewed after five years.

The Committee also recommended that for reorganising degree courses into a five-year curriculum along tight lines, technical institutions should be given necessary assistance by the Central Government, State Governments and University Grants Commission on the recommendations of the All-India Council for Technical Education and its Regional Committees.

With the introduction of the proposed five-year degree courses in Engineering as recommended by the Coordinating Committee, the pre-Professional (Engineering) course will be automatically abolished. The question to be considered is whether the training of an Engineer should be provided for the entire duration of five years in a professional institution or in parts in a Science College and then in an Engineering College. The repercussions on the content and the concept of integration of the three-year Science degree course also require serious consideration.

It may be mentioned that the Coordinating Committee have already suggested the acceptance of the recommendations made by the All-India Board of Technical Studies in Commerce and Architecture that the minimum qualifications for admission to the degree courses in Commerce and Architecture respectively should be Matriculation for the present and as soon as the Matriculation is abolished, it should be Higher Secondary School Certificate.

ANNEXURE

(Item No. 3 of Agenda)

Memorandum of the Government of Madras regarding the future of Pre-professional (Engineering) Course and admission qualifications for degree courses in Engineering.

REVISION AND COORDINATION OF COURSES OF STUDIES LEADING TO THE B.E. DEGREE AND B. Sc. DEGREE.

1. *Difficulties which require to be removed*

1. The old system of general education in Arts and Science colleges consisted of a two-year Intermediate course followed by one or other of several B.A./B. Sc. Degree courses. This two plus two pattern has been replaced by an one plus three pattern; a new pre-University course of one year being followed by a new three-year B.A./B. Sc. degree courses. (This paper is not concerned with the B. A. degree courses or with any of the B. Sc. Degree courses except the first group).

2. The B.E. degree course is a four-year course. Admission to this course used to be effected by a process of special selection among those who have passed the University examination held at the end of the Intermediate course. Now that the Intermediate course has been abolished, a special course of one year called the pre-Professional (Engineering) course has been devised. The content of this course may be expressed by the formula pre-Professional (Engineering) course—the old Intermediate course—pre-University course plus a little bit of geometrical drawing.

The present arrangement is that admission to the B.E. degree course is limited to pupils who pass an University Examination held at the end of the pre-Professional (Engineering) course. Admission to the pre-Professional (Engineering) course is made by a process of special selection among the pupils who passed the pre-University course. This arrangement is felt to be unsatisfactory for a number of reasons explained below.

3. *Objections from the point of view of pupils*

(i) Before getting admission to Engineering colleges the pupil used to be exposed to only two hazards ; one the S.S.L.C. examination and the other Intermediate examination. The two examinations were separated by two years. Now, he faces three hazards viz. the S.S.L.C. examination, the pre-University examination and the pre-Professional examination ; and they have to be taken in three successive years.

(ii) A pupil, who is specially selected for the pre-Professional course, after passing the pre-University course, is usually brighter than the pupils, who proceed to the B. Sc. course after the pre-University course. Nevertheless, the brighter pupil runs the risk of being stranded, if he fails in the pre-professional course. He cannot, in that event, join the B. Sc. course without losing a year; and if competition is keen for admission to the B. Sc. course, he may even fail to get admission. This is a serious objection specially from the point of view of the pupils belonging to scheduled castes and backward classes. They are admitted to reserved seats, even if they stand somewhat low in the list and they run a great risk of failure.

(iii) Pupils of this State who passed the Intermediate examination of the Madras University, were eligible for admission to Engineering colleges in other States and to the Higher Technological Institute of Kharagpur. Now this opportunity is lost, since the Madras University does not recognise any one as eligible for admission to Engineering colleges except one who passes the pre-Professional Engineering course and the number of admissions to the pre-Professional (Engg.) course is severely limited to seats available in Engineering colleges of this State.

4. *Objections from the point of view of the Government*

The Government are concerned, in respect of the cost and efficiency of Engineering education, in private colleges which receive grants-in-aid from Government no less than in Government colleges. The University expects (as the normal permanent arrangement) that the management of every Engineering college should make arrangements for selecting the pupils for admission to the four-year Engineering course one year earlier than the commencement of that course, and to make provision for teaching the pre-professional (Engineering) course in addition to the four-year Engineering course.

(i) It follows that no one should be admitted to the pre-professional (Engineering) course for whom a seat in the Engineering college cannot be guaranteed. This leads, on the one hand, to the pupils difficulty referred to in para three above; and, on the other hand, it creates a difficulty for the management also. What is to happen when some of the pupils fail and drop out? The College will have to run with some seats unfilled, unless a Supplemental course for admission to the first year of the four-Year B.E. Degree course is designated by the University.

(ii) The location of the pre-professional course in an Engineering college entails the consequence that building accommodation and scientific equipment have to be increased by about 25 per cent. and a substantial increase effected in recurring annual expenditure on staff. This has to be done without securing any increase in the output of engineering graduates

and also without raising the level of attainment. The Engineering colleges are in no better position—in fact they are in a worse position—than general educational colleges for providing instruction in the pre-professional course effectively. (The syllabus of this course, as mentioned already, contains nothing that was not formerly provided in the Intermediate course except a little geometrical drawing). In general the cost per pupil of education in Engineering colleges is very much higher than in Arts and Science colleges. The location of the pre-professional course in Arts and Science colleges would be, therefore, less costly and more efficient than its location in Engineering colleges. Such funds as are available for provision of additional building accommodation, scientific equipment and teaching staff in Engineering colleges would be far better utilised either in increasing the in-take of pupils or in instituting Post-graduate courses or both than in cluttering up the Engineering college campus with large numbers of young pupils who should be studying in Arts and Science colleges. Actually Government have undertaken a sizable programme of expansion of the in-take of Engineering colleges as well as institutions of Post-graduate courses. It was because the implementation of this programme was impeded by the University requirement about pre-professional courses, that special arrangements were made this year for the location of the pre-professional courses in selected Arts and Science colleges.

5. The considerations referred to above have been reinforced by the results of admission to the reorganised three-year degree courses in Arts and Science colleges on the result of the pre-University course. It appears that there are a large number of unfilled seats in these colleges. There is need for replanning the total number as well as the relative proportion of the different degree courses provided in the colleges of the State. As part of such replanning it should be possible to arrange that selected colleges where adequate facilities exist are utilised to relieve the Engineering colleges of the burden of providing the pre-professional (Engineering) course.

Given this position, is it not possible to remove all the other difficulties as well by revising the B.Sc., degree course and B.E. degree course and coordinating them in such a way that the pre-professional course is merged with the B.Sc. degree courses?

It is suggested that this can and should be done. A method of revision and coordination of the courses of studies, is outlined in the next Section.

II. METHOD OF REVISION AND COORDINATION OUTLINED

6. The syllabus of the first year of the (first group of the) B.Sc. course should be revised so as to bring its Science content as near as may be to that of the pre-professional (Engineering) course. Consequential changes should be made in the second year (and if need be also the third year) so as to leave the total content of the reorganised three-year B.Sc. course unaltered.

7. The syllabuses of the first year (and if need be also the second year) of the four-year B.E. degree course should be revised so as to dovetail with the first year of the B.Sc. course as revised. (The third and fourth year of the B.E. course need not be changed, merely for this purpose).

8. The University should define eligibility for admission to the B.E. degree course, in terms of :—

(a) passing the pre-University examination, with specified minimum grading in Mathematics and Physical Science; and

(b) satisfactory completion of the first year of the B.Sc. course in the first group.

9. If the foregoing changes are made, pupils who pass the pre-University course will know whether or not they have obtained the specified minimum grading in Mathematics and Physical Science. If they have, they will join the B.Sc. degree course in the first group, along with others, and towards the end of the first year apply for admission to the Engineering college. Selections will be made from among applicants on exactly the same basis as at present. Selected candidates will join the first year of the four-Year B.E. degree course; while others will proceed to the Second Year of the three-Year B.Sc. degree course.

10. This will suffice to remove all the difficulties referred to in the preceding Section. It is suggested as a further point for consideration whether it would not be possible to locate the first year of the four-year B.E. degree course in these Arts and Science colleges in which pre-Professional (Engineering) course has been located this year. If this should prove practicable, the accommodation, equipment and teaching facilities available in Engineering colleges may be put to even better use than at present. The annual in-take can be increased, and new post-graduate course instituted.

Note :—This paper deals only with the course of studies leading to the B.E. degree. Almost identical considerations apply to the course of studies leading to the M.B.B.S. degree (except that the suggestion in para 10 may not be feasible). In respect of the Agriculture and Veterinary degrees, the balance of advantage may lie in integrating the pre-professional course with the Professional degree courses, by prefixing an extra year and reorganising the courses.

Sd/-R.A. Gopaldaswami
Secretary to Government,
H.E.L.A. Department,
2-9-57

Item No. 4

To consider a note on the selection of students for admission to the Engineering colleges in the country.

The methods adopted for the selection of students for admission to under-graduate courses in the various Engineering and Technical Institutions in India vary with the different institutions. These may be broadly classified as under:

- (i) On the basis of a written Entrance Examination with or without a *viva-voce* test;

- (ii) On the basis of marks awarded at a *viva-voce* test, credit being also given for the student's performance at the Intermediate examination, as also on other qualifications such as sportsmanship, National Cadet Corps practical training etc.
- (iii) On the basis of the results of the Intermediate examination, candidates being interviewed just to test their general fitness.
- (iv) On the basis of the results of the Intermediate and B.Sc. examinations only.

The details of methods outlined above may be seen in the Annexure-I to this item.

2. From the experience of the Indian Institute of Technology Kharagpur, it is noticed that the system of holding a *viva-voce* examination before selection provides, an opportunity to assess the academic fitness and professional promise of the candidates for a particular course in Engineering and Technology. It has also been observed that often candidates apply for admission to a particular course without knowing what the course is and also without knowing whether he has the right aptitude for that particular course. At the time of *viva-voce* examination candidates are not only required to answer questions of general interest but are also told the significance of the various courses offered at the Institute. In a large number of cases it has been found that the candidates completely change their mind about the particular course of their first choice in the application form and request for another course for which they are considered most suitable by the *viva-voce* board.

3. The methods adopted by various institutions for selecting the students from all over the State/country, as the case may be, puts considerable strain not only on an institution's staff and office machinery but also on the applicant as well, since the facilities for Technical education in the country being limited it is quite usual for a pupil to apply simultaneously for admission to several engineering colleges, medical colleges and to Arts and Science colleges.

4. A brief note on the methods adopted for selection of students for admission to institutions of higher education and universities in America may be seen in Annexure-II to this item.

It will be observed therefrom that some of the State Universities there, do conduct their own entrance examination and a large number of private Institutions including denominational institutions of higher education, which enjoy world wide reputation have each their own special admission regulations. But to assist such institutions and some State colleges too in the selection for admission of students from schools spread all over America having somewhat different courses and perhaps different standards, an institution peculiarly American in its conception and working has grown up in that country. This is the College Entrance Examination Board which is a Membership Association. The Board conducts the entrance examination for admission to its member colleges. The College Entrance Examination Board arranges to conduct the tests in some 800 or more centres. Special centres are also arranged for the convenience

of candidates who would otherwise have to travel more than 75 miles to reach such a centre.

5. It has been suggested that a suitable machinery such as the Colleges Entrance Examination Board be set up for the admission of candidates to the various colleges in India too.

6. In this connection it may be pointed out that the All-India Board of Technical Studies in Engineering and Metallurgy, which considered the report of the Joint Committee of the All-India Council for Technical Education and Inter-University Board set up to consider admission qualifications for Degree and Diploma colleges at its last meeting held on 14th and 15th November, 1957, recommended that a committee consisting of Principals of Engineering Institutions may be appointed to consider the matter and make recommendations in this behalf. The Board was also of the view that the question of admission should not be based merely on the results of the Higher Secondary School Leaving Certificate, but the Committee may consider *inter alia* the question of subjecting the candidates to psychological and other tests, *viva voce* etc. on a country-wide or regional basis for the purposes of admission to Engineering colleges.

7. The matter is now placed before the All-India Council for Technical Education for its consideration.

ANNEXURE I

(Item No. 4 of the Agenda)

The methods of selection of students for admission to the undergraduate courses in the various Engineering and Technical Institutions in India may be broadly classified as under :

- (I) On the basis of a written Entrance Examination with or without a *viva-voce* test ;
- (II) On the basis of marks awarded at a *viva voce* test, credit being also given for the student's performance at the Intermediate Examination, as also on other qualifications such as sportsmanship, N. C. C., practical training etc.;
- (III) On the basis of the results of the Intermediate examination candidates being interviewed just to test their general fitness.
- (IV) On the basis of the results of the Intermediate and B.Sc. examination only.

Category I.

Physics, Chemistry, Mathematics and English with or without general knowledge are generally included in the curriculum for the Entrance Examination wherever it is held. A test in drawing in some form or other is also part of the examination.

In the Aligarh Muslim University the Entrance Examination comprises

a written test in Mathematics (100 Marks), Physics (100 Marks), Chemistry (50 Marks) and English (50 Marks) and an Interview carrying 100 marks. Compulsory questions involving drawing are included in Mathematics and Chemistry papers to test the competence of a candidate in drawing. The standard of questions is equivalent to I. Sc. of Aligarh. Candidates who obtain at least 40% marks in the aggregate are considered for admission in order of merit.

At the Roorkee University the subjects for the Entrance examination are as follows :--

i)	Language (English) Essay, Precis writing, General Knowledge	100	marks
ii)	Mathematics	300	„
	Algebra, Trigonometry, Mensuration	..	100	„
	Differential Calculus & Co- ordinate Geometry	..	100	„
	Statics & Dynamics	..	100	„
iii)	Science	200	„
	Physics	..	100	„
	Chemistry	..	100	„
iv)	Drawing (Geometrical Freehand & Sketching)..		100	„
			<hr/>	
			Total.	700 marks

Candidates for the Architecture course are required to appear for an additional paper of 100 marks in Drawing (Creative & Pattern Design).

To qualify for admission candidates must obtain 50% marks in the aggregate. For admission to the Architecture course candidates must also obtain 40% marks in Drawing: Marks less than 20% in any paper are not included in the aggregate. No *viva voce* examination is held.

At the Indian School of Mines, Dhanbad, the subjects for the Entrance examination are : (i) English Composition, World Geography and Common Knowledge; (ii) Mathematics; (iii) Physics; and (iv) Chemistry each paper carries 100 marks. The pass marks are 40% in individual subjects and 50% in the aggregate. No *viva voce* examination is held. The standard is similar to I. Sc. of an Indian University.

In the Bengal Engineering College there is one paper of 100 marks each on (I) English, Precis Writing & General Knowledge; (ii) Mathematics (iii) Physics & Chemistry; and (iv) Geometrical Drawing or Freehand Drawing (for Architecture students). A *viva voce* examination is also held and 100 marks are allotted to it.

Admissions to the Indian Institute of Technology, Kharagpur are made on the results of an Entrance examination conducted at various centres throughout the country in the following subjects :—

- | | | |
|---|---------|-------------|
| 1) Mathematics & Mechanics | 1 paper | — 100 marks |
| 2) English Composition & General Knowledge | 1 paper | — 100 marks |
| 3) Freehand Drawing | 1 paper | — 100 marks |
| 4) Physics & Chemistry
or
Humanities. | 1 paper | — 100 marks |

(Special paper for the Intermediate Arts candidates eligible for Architecture Course as alternative to Physics & Chemistry paper)

- | | | |
|---------------------|--|-------------|
| 5) <i>Viva voce</i> | | — 100 marks |
|---------------------|--|-------------|

Candidates' names are arranged in order of merit i. e. on their performance in the Entrance examination and they are required to appear for a *viva-voce* examination at the Institute. As a safeguard against absentees and candidates likely to be medically unfit 50% more candidates than the Admission quota are generally called for *viva-voce* examination).

Category II

Admission to the Government Engineering colleges at Nagpur, Jabalpur and to the Government College of Mining & Metallurgy at Raipur are made according to the following procedure :

(a) Candidates are interviewed by a Committee consisting of the Principal and the Head of the Departments of the College concerned. At the interview candidates are asked questions on Physics, Chemistry, Mathematics and General topics and marks are allotted on the following basis :

(b) (i) For marks at the qualifying examination— proportionate marks out of a maximum of ..	80
(ii) for performance at the Interview and proficiency in games	5
(iii) for Higher degrees	5
(iv) for N. C. C.	5
(v) for Drawing or practical training	5
Total	<hr style="width: 10%; margin-left: auto; margin-right: 0;"/> 100

Admission is made in order of merit determined by the marks secured out of 100.

The selection for admission to the College at Anantapur and Kakinada are made together by a four-man committee appointed by the Government. Double the number of admission strength are called for interview by the Committee on the basis of the marks obtained by the candidates in Physics, Chemistry and Mathematics. A maximum of 100 marks is awarded at the interview for the candidates' personality, aptitude, social service group marks (for a maximum of 450) and the candidates are arran-

ged in order of merit according to their total marks. Selection is made on the basis of the merit list.

Similar methods with some variations are followed in certain other Institutions like the Maharaja Sayajirao University of Baroda and the Victoria Jubilee Technical Institute, Bombay.

The Jadavpur University makes a preliminary selection on the basis of the Intermediate results of the candidates. The selected candidates are required to appear at a *viva voce* test, and the final selection is made on the basis of such test.

Category III

Some institutions like the Birla Institute of Technology, Ranchi the College of Engineering, Guindy, Madras, the Birla College of Engineering Pilani, the Bihar Institute of Technology, Sindri, the College of Engineering, Bangalore, do not hold any entrance examination. Students for admission are selected on the basis of their Intermediate results. In the College of Engineering, Bangalore only the marks in Physics, Chemistry and Mathematics are taken into account. Candidates are however, interviewed to test their general fitness, before they are finally offered admission.

Category IV

The Osmania University, Hyderabad, the Orissa School of Engineering, Cuttack do not hold any Entrance nor *viva-voce* examination but select students on the basis of their Intermediate results only. The Banaras Hindu University recruits students on the basis of their Intermediate or B. Sc. results. No *viva voce* examination is held.

ANNEXURE—II

(Item No. 4 of the Agenda)

A Brief Note on methods adopted for selection of students for admission to institutions of Higher education and Universities in America

It is well known that school education in America is of 12 years' duration and it is ordinarily given on a 6-3-3 plan or 8-4 plan or 6-6 plan.

2. Under the 6-3-3 plan there are three types of schools, named as the Grade or Elementary School, the Junior High School and the (or the Senior) High School. The responsibility for examining, grading and ranking of pupils rests generally on the school. (In most States the schools are supervised by the State Board of Education and they "certify graduates" from high schools who come up to their standard and in a few States a "Board of Regents" conducts the examinations).

Every three or four years the school is visited by the Education Authority of the State to ensure that the requisite standard of education is main-

tained. The opinions of employers and universities are also sought by the School and local Education Authority; their opinions are regarded as a dependable guide in assessing the standing of the School. There are regional agencies viz. the North Central Association of Colleges and Secondary schools, which render a valuable service as accrediting agencies. Such agencies lay down regulations prescribing the minimum standards in matters such as staff (Instructional, library & administrative), requirements for graduation, library expenditure, financial stability etc. which the schools must satisfy in order to be approved. The standard of excellence which a school holding membership of an Association such as the North Central Association is expected to maintain is based on certain evaluative criteria on philosophy and objectives, educational programme, school staff administration and supervision and school plant and equipment.

3. When the Institution of higher education or the University is a land-grant or a State College or a Municipal College, and a substantial portion of its expenditure is met by the State (or Municipality) concerned the institution is usually content with laying down the subject and class rank requirement for each particular course of study and accepting an applicant's school record as an adequate indication of his capacity to pursue higher education. (Almost any "graduate" from and recommended by a recognised "accredited" high school of the State is eligible for admission to some curriculum in a State Institution of higher learning).

Admission is made considering the student's high school or preparatory school record, the recommendation of the school official and the recommendation of a person unrelated to the applicant and in some cases a personal interview; the last two are not usually required. Normally the school leaver of a particular State, if he wants higher education can expect to gain admission to some State supported College or University of that State. In some States the law requires the State University to admit all recommended graduates of certified high school of that State. (There is a growing trend to require non-resident Students to meet standards that are higher than those required of resident students and the tuition fee is usually higher for a student normally resident outside the State).

Some of the State Universities e. g. the University of California at Berkley do, however, conduct their own Entrance examination—50% credit is given on school record and 50% on Entrance examination. Some of the New York State Colleges conduct Entrance examination and psychological tests and take into account the school record.

In the U. S. A. there are a large number of private institutions, including denominational institutions, of Higher education, for example, to name a few, the California Institute of Technology, the Stanford University, the Massachusetts Institute of Technology, the Harvard University, the Yale University, the Princeton University, which enjoy world wide reputation. These Institutions have each their own special admission regulations and the school record is not necessarily accepted as the primary or the only guide for purposes of selection.

To assist such institutions and some State colleges too, in the selection for admission of students from schools spread all over the country having somewhat different courses and perhaps also standards, an insti-

tution peculiarly American in its conception and working has grown up. This is the College Entrance Examination Board which is a Membership Association founded in the year 1900. Students can take the examinations conducted by the Board to prove their fitness for collegiate education.

6. The membership of the Board is open to individual colleges and universities and to Secondary schools and other educational associations. The College Entrance Examination Board is composed of 171 colleges and 24 Secondary schools and other educational associations (1956-57 figures).

7. The basic activities of the Board are its testing programmes.

The tests conducted by the College Entrance Examination Board consist of a three-hour Scholastic Aptitude Test and not more than three hours' Achievement Tests.

An applicant wishing to be considered for admission to any of the 171 colleges can take the *Scholastic Aptitude Test* on any or more of six dates, (for the year 1956-57 - 1st December, 1956, 12th January, 1957, 16th February, 1957, 16th March 1957, 18th May 1957 and 14th August, 1957.

The prospective entrant to a College generally has, in addition, taken certain Achievement Tests which are held in the afternoons, four times a year on dates when Scholastic Aptitude Tests are held in the morning except in January and February. The Achievement Tests are each of one-hour duration and a student has to select *not more than three* of the following subjects :-

- (i) English Composition.
- (ii) Social Studies.
- (iii) Intermediate Mathematics.
- (iv) Advanced Mathematics.
- (v) Spatial Relation.
- (vi) Biology.
- (vii) Chemistry.
- (viii) Physics.
- (ix) French.
- (x) German.
- (xi) Latin.
- (xii) Spanish.
- (xiii) Greek.
- (xiv) Italian.

The tests for the last two are given only in March. (The test fee for the Scholastic Aptitude Test is \$ 7 and that of the Achievement Tests altogether \$ 9.

8. There are no prescribed pass marks for these tests. The test scores are expressed on a standard scale which ranges from 200 to 800. The test scores are reported to any College or University for admission to which the candidate has applied. The scores are confidential, and cannot be divulged to the candidates, beginning from tests to be administered in December 1958, colleges and schools have been given complete discretion in the release of score information to enrolled students,

The test scores are reported to the college or colleges about five weeks following the testing date. The scores are used by colleges as only one measure of the student's ability and academic preparation. The Admission Officers consider also the applicant's school record, rank in class, recommendations and other indications of the candidate's readiness for Collegiate education. In addition, there is generally an interview conducted by one of the Admission Officers of the College, at the applicant's school in collaboration with the school teachers.

9. The College Entrance Examination Board conducts the tests in some 800 or more centres. Special centres are also arranged for the convenience of candidates who would otherwise have to travel more than 75 miles to reach such a centre. The centres are arranged in United States, Canada, Alaska, Hawaii, Canal Zone, Mexico, West Indies, Europe, Asia, Africa, Australia and Central and South America.

10. The Scholastic Aptitude Test consists of two distinct Sections, the Verbal Section and the Mathematics Section. Each of these sections has three half-hour sub-sections.

The questions in the Verbal Section are designed to test the ability of the candidate to understand the word relationship and to read with understanding. There are usually questions on sentence completions, analogies and reading comprehension.

The questions in the Mathematics Section are designed to measure the candidate's reasoning ability rather than his achievement.

The test scores on the Verbal Section and those on the Mathematics Section are given separately in order to get a clear picture of the students' Scholastic Aptitude.

11. The Achievement Tests are designed to obtain an indirect measure of the candidate's ability to write English, to solve a Mathematical problem and so on.

The English Composition test, for example, has questions to test correctness and effectiveness of expression, organisational ability, sensitivity and so on.

The Achievement Test in Mathematics, is designed to test a candidate's manipulative skill and abilities, knowledge and understanding of formulae, theorems, and mathematical terms, ability to translate sentences into Algebraic or Graphic form and conversely the ability to interpret Algebraic or Graphic representations, ability to draw conclusions from given data, ability to recognise which facts or processes are necessary for the solution of a problem and to use these accurately for solution, ability to visualise forms and relationships in three dimensional set-up and to apply knowledge of Algebra, Plain Geometry or Trigonometry to them.

The test on Spatial Relations usually comprises questions on identical blocks inter-sections, surface development and block counting. The Spatial Relationship Test is really an Aptitude Test rather than an Achievement Test and it is designed to measure the ability of a candidate to solve problems, express in pictures concerning the shape of objects or the inter-

relationships of their parts. It has been found that it is related to the ability, which the candidate requires in Engineering Drawing course and to a lesser extent in some Mathematics course and Engineering curriculum as a whole.

12. The Director of the College Entrance Examination Board sets up each year with the approval of the elected members of the Executive Committee (The Chairman, the Vice-Chairman, former Chairman of the Board and 15 Committee members), the Committees of Examiners. Usually, there is one Committee called the College Board Aptitude Test Committee to design the Scholastic Aptitude Tests. There are 14 College Board Examiners' Committees—One each for Biology, Chemistry, English, French, General Composition, German, Greek, Italian, Latin, Mathematics, Physics, Social Studies and Spanish.

The Committees assume responsibility for the preparation of each Test offered by the Board. These Committees are composed of distinguished teachers, usually five in number, of whom at least two must be Secondary School teachers. Each Committee plans the tests for which it is responsible and with the technical assistance of the Educational Testing Service specialists prepare the questions to be used in the test. The Educational Testing Service is an independent non-profit agency founded in 1948 with support from the College Entrance Board, the Carnegie Corporation and the American Council of Education. In addition to setting the Test Papers it assists in the appraisal of the results.

An Example-Admission to California Institute of Technology

13. The typical way in which the system works may be illustrated by the method of selection at the California Institute of Technology. For admission to this Institute, a school student first ascertains from the Institute, the admission requirements for various courses and formally applies to the Institute in January or February and in any case before the 15th of March (A small fee is payable). The student has simultaneously or earlier applied to the College Entrance Examination Board. The College Entrance Examination Board, at the request of the applicant, transmits to the Institute his test scores. These test scores and the applicant's school records are studied by the professor or Director-in-charge of admissions and the Admission Committee comprising 14 or 15 regular teachers of the Institute. The Committee decides which of the students should be interviewed; 240 male students are admitted to under-graduate courses each year. The individual members of the Admission Committee then go out to the schools, and interview the provisionally selected students who have been found to have the requisite qualification which the Institute expects in a student. Before its members set out for the different schools, the Admission Committee decides on the kind of enquiries each member would make at the schools from the class teachers and also from the candidate. Some 500 students are usually interviewed each year in schools spread all over America.

The purpose of the interview is to ascertain from the teacher and the Headmaster the potentialities of the boys, their motivation and curiosity and tenacity, i. e. personal qualities of the applicant and his potentiality as a scholar. The interviews are usually completed between the 15th of April and the 15th of May each year. The interviewers then spend about

a week discussing each of the cases, particularly the marginal cases and the selected candidates are usually advised by the 20th May each year. The Director of Admissions of the California Institute of Technology claims, on the basis of statistical data, that only 14% of those selected by the Admission Committee have failed to maintain the requisite standard expected of them by the Admission Committee.

Item No. 5

To consider the question of Replacement of English as medium of Instruction in Technical Institutions

The Madhya Pradesh Government in their letter No. 989/218/27 dated 24th August, 1955 had stated that a conference of the Vice-Chancellors of the Nagpur and Saugar Universities and the Cabinet Ministers was convened in July, 1955, to consider the question of medium of instruction in the technical and vocational institutions. In pursuance of the recommendations made at that Conference, a preliminary examination of the various problems connected with the question of change of medium of instruction was undertaken by the State Government. Before this matter could be pursued further, the State Government considered it advisable to ascertain the steps proposed to be taken by the All-India Council for Technical Education in this behalf.

2. The main recommendations made at the aforesaid Conference are given below :-

- (a) Instruction in technical and professional institutions should be through the medium of Hindi and that Hindi medium should be introduced as soon as suitable technical terms and textbooks are made available.
- (b) English should continue to be the medium of instruction in these institutions until text-books in Hindi are made available; and
- (c) That the Languages Departments should examine the position and indicate within six months;
 - (i) How long it would take to prepare and publish the text-books in Hindi required for instruction in these Institutions ?
 - (ii) What will be the most suitable machinery for preparing them ?
 - (iii) What will be the most suitable date for introduction of Hindi medium ?

The conference also considered the question of the nature of technical terms and decided that :—

- (a) The science students in the Universities of the State should be conversant with what are called the "International Terms" along with the terms evolved out of Sanskrit roots, and
- (b) The textbooks in science subjects should mention in brackets the International terms against Hindi and Marathi technical terms.

3. The Coordinating Committee considered the matter at its 22nd meeting held on the 31st October, 1955, and expressed the view that the question regarding medium of instruction in technical institutions raised by the Government of Madhya Pradesh should be considered at a full meeting of the All-India Council for Technical Education. The Committee further suggested that this matter should also be referred to the University Grants Commission. The Commission, when referred to decided to defer consideration of the matter till the recommendations of the Official Language Commission are available.

4. In this connection, the University Grants Commission had also appointed a Committee under the Chairmanship of Pandit H. N. Kunzru to examine the question of medium of instruction at the University stage and to recommend ways and means of securing an adequate proficiency in English at that stage. The Commission have also recommended to the All-India Council for Secondary Education to consider the question of making English a compulsory subject at the Secondary stage. The Central Advisory Board of Education have also considered this matter and have recommended that Hindi, English and mother tongue or a regional language should be made compulsory at the Secondary stage and that those whose mother tongue is Hindi should learn one more Indian language.

5. The matter was accordingly placed before the Council for consideration at its last meeting held on 22nd February, 1957. The Council decided to defer consideration of the question of medium of instruction in Technical Institutions until the reports of the Official Language Commission and of the Kunzru Committee appointed by the University Grants Commission became available.

6. The reports have now become available and their recommendations are given at annexures I and II to this item, Official Language Commission has recommended that :-

"In case of Scientific and Technical Education Institutions, where the students drawn from different linguistic regions avail of instruction imparted, the common medium of the Hindi language will have to be adopted; where students are drawn exclusively or almost wholly from a single linguistic group, the medium will have to be the regional language concerned. All such cases must be decided pragmatically on the specific merits of each". The Kunzru Committee has not made any specific recommendations in this behalf.

The matter is now placed before the Council for their consideration.

ANNEXURE-I

(Item No. 5 of the Agenda)

Extracts from the Report of the Official Language Commission

THE UNION LANGUAGE AND THE EDUCATIONAL SYSTEM

The problem of language instruction and of language medium in the educational system is considered in this Report only in so far as it is related to the language question of the country.

In view of article 45 of the directive principles of State policy in the Indian Constitution, under which the State shall endeavour to provide for free and compulsory education for all children until they complete the age of 14 years, the educational system must be reorientated to achieve the imparting of sufficient literacy in the Hindi language by the age limit of 14 years ; so that every citizen, if so inclined, may be in a position to comprehend and keep in touch with trends and movements in public life at pan-Indian levels including the activities of the Union Government.

The children undergoing compulsory education up to the age of 14 years in terms of Article 45 of the Constitution would receive about eight years of school education, during the whole of which they would have studied the regional language both as a subject and as the medium of instruction for other subjects. It is essential to provide for a minimum of three or four years of instruction in Hindi during the later part of this period.

Even when English ceases to be the medium of instruction in our Universities, it would be necessary for a long time to come, to provide that the graduates emerging from our Universities, especially in the scientific subjects and professions, are equipped with a sufficient command of English (or other suitable advanced foreign language) to enable them to comprehend and follow further advances in their particular departments of study through journals and new publications available in such language.

In view of the different purposes that English would now serve in the educational system of the country, it is necessary to review the present teaching methods and the content and character of instruction in English imparted presently. English should be taught hereafter principally as a 'language of comprehension' and not as a literary language, excepting when it is taken as a voluntary subject for special study.

It will be for the appropriate authorities after a study of detailed pedagogic considerations to formulate the exact curricula for imparting to students, during the Secondary school stage and after, the degree of knowledge in the English language that we consider necessary for under-graduates and graduates to possess. Tentatively, it would seem appropriate if instruction in the English language commenced in the secondary school at a stage about five years pre-S.L.C.

There may be a suitable 'streaming off' of boys destined to follow further academic education from those who would leave off education at the end of the 14-year age limit of compulsory education, the instruction in English suggested above being imparted, as a rule, only to the former.

The quantum of instruction in the Hindi language which we consider indispensable for students in secondary schools could be imparted to them if instruction in the Hindi language commenced roughly at the close of the primary stage and continues up to the S.L.C. stage.

In our view instruction in Hindi should be compulsory at the Secondary school stage all over the country and the arguments for such a course of action are strong and decisive. However, reasons of expediency might also have relevance within particular regions and the decision as to when compulsion should be introduced must be left to be made by the State Government concerned in whose jurisdiction the decision lies.

The suggestion that there should be 'compensatory compulsion' to the students in Hindi-speaking areas in secondary schools to learn another Indian Language (a South Indian language) is examined and negatived.

However, the educational authorities in the Hindi-speaking areas should be encouraged to provide facilities for the learning of other Indian languages to the maximum possible extent and where necessary, special assistance should be made available from Governmental sources for this purpose.

For various reasons the English language must eventually be replaced by an Indian language or languages as a general medium of higher education. The waste of energy that the foreign medium involves, the burden that it imposes on the intellectual development of our youth, the general blighting effect that the whole situation has on independent and original thinking, and the resultant alienation of the educated classes from the rest of the community, make it imperative that the medium of instruction should be changed. Provided such a change-over is properly phased and made after complete and satisfactory preparations, it would not itself cause any fall in academic standards, and should indeed eventually open the way for their considerable improvement.

If English is to be displaced as a general medium of University education, the question arises whether it should be replaced by one single common medium i.e. Hindi at all Universities, or by respective regional languages in the Universities in the different regions. There are certain advantages in a country-wide single medium of university education ; at the same time there are strong and comprehensible reasons which urge people to seek to replace the English medium by the regional language.

It is not necessary that the change-over of medium be simultaneous or uniform or monolithic. It may be that some courses of study, say, for instance the Humanities, can be more appropriately taught in the regional languages ; it may be that for other courses of study the advantages of a common medium in all Universities operate much more powerfully ; in yet other faculties it may be preferable, particularly at higher levels, even to continue the English medium ; it may also be that in some courses of study, the regional language medium may be adopted for lower levels and a common, i.e. the English or the Hindi language, medium adopted for post-graduate studies. Among other things, the decisions of Universities in this regard would depend upon availability of teachers, textbooks and other supporting literature in various branches of study.

The whole situation is still fluid and we would advocate that it may be left, in the first instance to the Universities to judge it after mutual consultation through their customary channels and to decide for themselves what medium or media they would adopt for different courses of study and stages therein.

Certain minimum arrangements from the point of view of the Language problem of the country, however, seem to us quite necessary. These may be as under :-

All Universities in any event be required to arrange to examine students offering themselves for any university examination with Hindi as

the medium of instruction.

All affiliating Universities should also be under obligation to offer affiliation on equal terms to any colleges or institutions teaching through Hindi as the medium of instruction for any of their courses in the territorial jurisdiction of the University.

The establishing, in addition, of Central Universities in the non-Hindi-speaking areas, with Hindi as the medium of instruction and allowing Hindi medium institutions situate within jurisdiction of other universities to affiliate to them, would not be necessary if the above-mentioned arrangements are found sufficient to provide affiliation facilities to institutions adopting the medium of Hindi.

In scientific and technical educational institutions, where students drawn from different linguistic regions avail themselves of the instruction imparted, the common medium of the Hindi language will have to be adopted; where students are drawn exclusively or almost wholly from a single linguistic group, the medium will have to be the regional language concerned. All such cases must be decided pragmatically on the specific merit of each.

So far as the question of the linguistic medium of instruction is concerned, the principle of 'autonomy of Universities' can, in the final analysis, have only a qualified bearing and the national language policy must ultimately prevail.

The supply of textbooks for various university courses in Hindi and the regional languages would, of course, tend to respond to the greater demand for them; nevertheless, it is necessary to provide for effective and co-ordinated action in this field. As for the production of 'reference literature' in these languages, special promotional efforts may be necessary and will have to be organised.

ANNEXURE—II

(Item No. 5 of the Agenda)

SUMMARY OF RECOMMENDATIONS OF THE ENGLISH COMMITTEE APPOINTED BY THE UNIVERSITY GRANTS COMMISSION

1. That the change from English to an Indian language as the medium of instruction at the university stage should not be hastened.
2. That the change to an Indian language should be preceded by an adequate preparation both in the cultivation of the Indian language concerned as a medium of expression for learned purposes, and by preparation of a sufficient body of learned literature in that language in all subjects of study.

3. That even when a change in the medium of instruction is made, English should continue to be studied by all university students.
4. That a proper foundation in English should be laid at the Secondary school stage so that the students going up to the University can have an adequate knowledge of English.
5. That it would be necessary to have the methods of teaching English at the schools carefully examined so that teachers might be suitably trained and the benefit of the latest techniques in the study of foreign languages made available to our teachers and students.
6. That it would be necessary to have textbooks prepared on scientific principles and that the Government of India or the Council of Secondary Education should take up this question for consideration.
7. That it is necessary to define the aims of English teaching at the school stage and to have some arrangement by which those who propose to go up for university education can have additional emphasis laid on proficiency in English.
8. That in relation to the three-year degree course which is now proposed to be introduced in our Universities, the teaching of English be given special attention in the pre-University class.
9. That the teaching of English literature should be related to the study of Indian literatures, so that apart from its value for linguistic purposes, it could be an effective means of stimulating critical thinking and writing in Indian languages.
10. That it is desirable to have the question of courses of study in English and methods of teaching English at the university stage examined by an expert body and the recommendations of that body adopted by all the Universities.
11. That where English is not the medium of instruction at any university course it is necessary to adopt special methods to secure an adequate knowledge of English as a second language.
12. That far greater attention should be given to linguistics in our Universities and in our teachers training colleges.
13. That it is possible to learn languages more effectively and much faster than was considered possible in the past with the assistance of special techniques and the use of gramophone and tape recorders and other mechanical devices.
14. That it is in our educational interest that English should be retained as a properly studied second language in our Universities even when an Indian language is used as the ordinary medium of teaching.

Item No. 6

To consider the report of the Sub-Committee appointed by the Council to examine the provisions of and suggest modifications, if any, to the draft Bill for Registration of Architects

At its meeting held in November, 1953, the Coordinating Committee considered the recommendations of the All-India Board of Technical Studies in Architecture and Regional Planning in regard to a draft Bill for the registration of Architects prepared by the Ministry of Works, Housing and Supply. The Committee expressed the view that for the healthy and proper development of the Architectural profession in the country, a Bill for the Registration of Architects, as suggested by the Board should be introduced by the Government. The Committee, however, recommended that the matter should be further considered by the Council.

The Council considered the draft Bill and was of the view that the role of the Civil Engineer vis-a-vis the Architect after the passing of the proposed legislation, required to be examined fully. The Council appointed a Committee consisting of Shri C. P. Mathen, Shri N.K. Mitra and Shri C. M. Master to go into this question and to make recommendations to the Council.

The Special Committee met on the 9th July, 1956 and the 8th May, 1957. The Committee considered the provisions of corresponding Act in force in some of the important English-speaking countries. The Committee came to the conclusion that small factories which cover great extent of the country would suffer unless authority is given for engineers to be able to design and construct buildings according to their training and experience. At the same time it was also felt necessary that a clear distinction should be made between the profession of an engineer and an architect as the training in these two professions is quite distinct and the design of large buildings, townships, etc. is primarily the concern of the architect. While generally agreeing with the provisions of the draft Bill, as modified by the Architecture Board, the Committee recommended that the following modifications may be made to safeguard the interests of engineer vis-a-vis the architect consequent on the Bill becoming an Act :

- i) Any building whose value is less than Rs. 40,000 should be exempted from the operation of the provisions of the draft Bill.
- ii) According to the provisions of the draft Bill, no engineer, who has not been practising as an architect for a minimum period of 10 years is eligible to be registered as an architect. It was felt that this period is somewhat too long and that it may be reduced to seven years.

The Committee generally agreed with the other provisions of the draft Bill* as reported to the Council. The Bill may be seen at pages 86-97 of the "Proceedings of the Ninth meeting of the All-India Council for Technical Education", copies of which have been circulated to the members.

The Council may like to make its final recommendations in the matter.

*Note :—If any member desires to have copy of the Proceedings of the Ninth meeting of the Council, he may obtain it, on request, for the Secretary of the Council.

Item No. 7

To receive a note from the Planning Commission on Co-relation between Post-graduate Courses in Engineering, Technology and General Sciences and employment possibilities under the Second Five-Year Plan

With a view to bringing about a closer understanding between the institutes training technical personnel and enterprises which are expected to utilise the skill and knowledge of such personnel. Planning Commission held a meeting on 24th October, 1956 to discuss the question of "Co-relation between Post-graduate courses in Engineering, Technology and General Sciences and employment possibilities under the Second Five-Year Plan". The meeting was attended by the Deputy Chairman and Members of the Planning Commission and Senior Officers of the Ministries of Finance, Education & Scientific Research, and Home Affairs and of the Planning Commission. It was generally agreed at the meeting that it was necessary to develop appropriate training facilities in India for design, development and research in the field of Engineering, Technology and General Sciences, so that necessary personnel with adequate training is turned out from engineering and technological colleges and other institutions of higher education, in accordance with the needs of the country and employed suitably without any wastage. In this connection the recommendations of Post-Graduate Development Committee of the All-India Council for Technical Education to the same effect were noted. It was decided that the final recommendations of the Planning Commission for the proper utilisation of trained technical personnel for projects under the Second Five-Year Plan should be forwarded to the various central Ministries and Public Service Commissions for suitable action. The following recommendations were made at the meeting :—

- (i) There is a certain amount of uncertainty and doubt in the minds of young graduates that at the end of Post-graduate courses and specialised training they may not be absorbed in positions, where they could make use of their training and may not be given credits for the time spent in these courses. In order to remove such doubts and assist the programme of Post-graduate training in engineering and technical institutions, the following positive measures which were recommended by the Post-Graduate Development Committee of the All-India Council for Technical Education in March 1956, should be considered by Government and industries :—
 - (a) For all superior technical posts for which advanced knowledge and training in a particular subject is useful, Post-graduate qualifications in the concerned subject should be prescribed for recruitment to such posts.
 - (b) Appointments to superior technical posts should not be made exclusively on the basis of promotion from the lower ranks and the length of experience in service, but should be open to persons who have acquired Post-graduate qualifications and have undergone advanced course of training.
 - (c) The Union Public Service Commission and the State Public Service Commissions should count the period spent by the candidates in recognised Post-graduate studies for advanced courses against the same period for professional experience

and service experience prescribed for appointment on a technical post.

- (d) The age limits prescribed for competitive examinations should be raised in the case of those candidates who have taken Post-graduate qualifications or have undergone a recognised advanced course.
- (ii) Governmental procedures for recruitment are so cumbersome that students completing the Post-graduate course have to wait for about a year or so after responding to the Public Service Commission advertisements in order to know if they would be employed in positions requiring their special training. State enterprises and their employing Departments may set up Selection Panels, in consultation with the Public Service Commissions and go round the various technological and engineering institutions running Post-graduate courses and make bulk selections out of the students about to complete the courses for purpose of subsequent recruitment.
- (iii) Government Departments, State enterprises, and private industries should institute Post-graduate scholarships in the subjects in which they are interested. Besides acting as an incentive to meritorious students to go in for further training, this would also indicate the likely demand of the departments and enterprises for such personnel.
- (iv) The amount of Rs. 150/- p.m. given as scholarships to candidates for taking up Post-graduate courses and training is inadequate and needs to be enhanced.
- (v) The policy of bulk recruitment of technical personnel after making assessment of immediate and future requirements and also taking into consideration the numbers required to replace the normal and inevitable wastage should be recommended.
- (vi) (a) Government projects should carry extra staff or create supernumerary posts and employ trained and senior technical persons who could later be either used for the projects or for staffing higher technological institutions. This principle should be adopted in practice. Ministry of Finance should consider the question of creating supernumerary posts, where necessary.
- (vi) (b) Senior fellowships of the scale of pay of about Rs. 325-500 should be created in the various departments of Post-graduate institutions with a view to securing the services of these Fellows for staffing the institutions later. The Ministry of Education should take adequate action for this purpose.
- (vii) Every major project should set-up, sustain and support Research, Design and Development Departments as a legitimate charge on its funds.
- (viii) The Government of India should keep track of every person undergoing training abroad either through our Embassies or by means of some periodical correspondence with the candidate concerned with a view to utilising his services in undertakings and enterprises after the completion of his training. One officer should be made responsible for this purpose possibly in the newly created wing of Man-Power Directorate in the Ministry of Home Affairs.

- (ix) In selecting candidates for undergoing Post-graduate courses and research abroad, one of the important criteria should be their employability.
- (x) The Man-Power Directorate recently created in the Ministry of Home Affairs should be in a position to think generally in a coordinated manner on man-power planning with a view to seeing that within a period of ten years or so we are independent of outside help. This Directorate should have fairly clear-cut functions and they should be properly defined, in relation to those of similar units in the Planning Commission, Ministry of Labour, Ministry of Education and Scientific Research, The Council of Scientific and Industrial Research etc., dealing with the various aspects of man-power resources and training.
- (xi) Unemployment among technicians could be avoided if candidates are selected and recruited by Government Departments and other undertakings and sent for further training on the technicians giving some sort of assurance to serve the department.
- (xii) Government and State enterprises should keep in view the likely demand of personnel with specialised training while instituting and awarding scholarships and make provisions for scholarships in such fields for which there would be sufficient demand.

This is placed before the All-India Council for Technical Education for information and advice.

Item No. 8

To consider the suggestion made by Shri V.G. Garde to enhance grants to institutions to enable them to meet the rise in cost of equipment

Shri V.G. Garde has suggested that the Coordinating Committee may consider the question of the increase in the percentage of the assessed cost of equipment for the Engineering institutions and polytechnics having regard to the fact that the prices have risen since the assessment was made. In his view on an average a rise of 50% approximately has already taken place in these costs.

The All-India Board of Technical Studies in Engineering & Metallurgy at its last meeting held on the 15th November, 1957 while considering the scheme for National Certificate Courses prepared by the Joint Syllabus Committee recommended that a provision of 15% for the variation in the cost of equipment may be made subject to proper justification being furnished by the institutions.

The Coordinating Committee at its last meeting held on 3rd December, 1957 *interalia* approved the aforesaid recommendation of the All-India Board of Technical Studies in Engineering & Metallurgy.

*Item No. 9***To consider the request of the Rajasthan Government regarding the liberalisation of the policy with regard to issue of import licences**

The Government of Rajasthan has requested that the Council may make a recommendation to government to liberalise the policy with regard to the issue of import licences, so that the Engineering colleges may be able to provide adequate equipment for the additional candidates admitted under the Expansion Scheme.

At the instance of the Ministry of Education & Scientific Research, the Chief Controller of Imports has already agreed to consider favourably applications for the grant of licences to the educational institutions from out of the actual users and commercial quota. It is believed that by this arrangement, the requirements of institutions for equipment not manufactured in the country, are being largely met. A survey is being carried out with a view to ascertaining, if any, further arrangements are necessary in the matter.

*Item No. 10***To consider the proposal of the Rajasthan Government for grant of interest-free loans for the construction of hostels for the additional in-take contemplated under the Ghosh-Chandrakant Special Expansion Scheme**

The Rajasthan Government has requested the All-India Council for Technical Education to consider the question of the grant of interest-free loans for the construction of hostels for the additional in-take contemplated under the Special Scheme of Expansion of the existing degree and diploma institutions.

In this connection, it may be stated that the Council at its last meeting held on the 22nd February, 1957 considered the Ghosh-Chandrakant Committee Report. The recommendations made therein including that relating to payment of interest-free loans for construction of hostels were approved by the Council. The following institutions were recommended for grant of loans under this scheme :—

1. Bengal Engineering College, Sibpur.
2. Bihar Institute of Technology, Sindri.
3. M.B.M. Engineering College, Jodhpur.
4. Punjab Engineering College, Chandigarh.
5. Nilokheri Polytechnic
6. Birla Institute of Technology, Ranchi.
7. Engineering College, Banaras Hindu University, Banaras.
8. Roorkee University
9. University Polytechnic, Aligarh.

A total provision of Rs. 68.625 lakhs has been made in the Second Plan

for the purpose, of which Rs. 15 lakhs is the provision in the current year's budget. In view of the shortage of building materials and also the funds available under the Five-Year Plan, approval has been given for the present to a programme of Hostels' construction for 50% of the additional student body in case of residential institutions and nil in the case of non-residential institutions.

Requests for payments of loans have been received from only four institutions so far. Two of these institutions viz. the Bengal Engineering College, Sibpur, and the Bihar Engineering College, Sindri have already been paid Rs. 2 lakhs each. Sanction of loans to other institutions is under consideration.

Item No. 11

To consider the proposal of the Government of Assam that the All-India Council for Technical Education may depute experts for periodic inspection of Technical Institutions and examination of the working of the State Boards of Technical Education

The Government of Assam have suggested that in view of the fact that a number of schemes have been sanctioned by the Government of India for the development of Technical Education in all the States, expert guidance of the All-India Council for Technical Education will be very much welcome for proper and expeditious implementation of these schemes.

The Government of Assam have further stated that on the recommendation of the All-India Council for Technical Education and at the direction of the Government of India, State Boards of Technical Education have been set up in the States to (a) to bring about coordinated development of Technical Education and Training, (b) to ensure proper standards of instruction and facilities in the Institutions and (c) to hold examinations of the proper standards for candidates and award diplomas or certificates which might be recognised on all-India basis. The Council may therefore set up Inspection Committees to advise the State Boards and Governments periodically on the development of Technical Education and other cognate aspects.

A copy of the model constitution of the State Board is annexed (Annexure-I).

ANNEXURE-I

(Item No. 11 of the Agenda)

**OUTLINES OF THE CONSTITUTION AND FUNCTIONS OF
A STATE BOARD OF TECHNICAL EDUCATION**

(a) *Constitution :*

(1) State Minister of Education (Chairman)

- (2), (3), (4), (5) Four representatives of the State Government Departments, viz. Industry, Labour, P.W.D. & Finance.
- (6), (7), (8) Three Principals of Technical Institutions.
- (9) A representative of Labour.
- (10), (11), (12) Three representatives of Industry & Commerce nominated by Government.
- (13) A representative of the Regional Committee of All-India Council for Technical Education.
- (14) A representative of the University.
- (15), (16) Two experts either coopted by the Board as a whole or nominated by Government.
- (17) A representative of the Institution of Engineers (India).
- (18) Director of Technical Education/Head of Technical Education Unit (Ex-officio Member and Secretary).

The above composition of the Board may, however, be changed to suit conditions obtaining in each State.

(b) *Functions :*

- (a) To advise the Government on the Coordinated development of Technical education in the State at all levels.
- (b) To work in liaison with the Regional Committees of the All-India Council in the formulation of schemes for its area.
- (c) To affiliate or recognise institutions not conducting University courses and prescribe courses of study for them.
- (d) To inspect institutions periodically and ensure that the standards of the courses and the instructional facilities provided are satisfactory.
- (e) To conduct examinations and award diplomas and certificates conforming to the minimum standards prescribed by the All-India Council.
- (f) To establish and develop Cooperative relationships with Industry and Commerce.

Item No. 12

To consider the Mysore Government's proposal for the increase of Government of India's share of assistance for the development of Technical institutions

The Government of Mysore have requested that in view of the large expansion of Technical education specially in the several backward and under-developed areas in the new State of Mysore and in view of the limited resources of the State, the quantum of Central assistance in case of new private institutions and Government Institutions be raised. They have suggested that in respect of the new private institutions to be started, the same quantum of Central assistance as in the case of old and continuing Schemes (ie. Non-recurring, 66-2/3% and Recurring 33-1/3% of approved

expenditure) may be given. In the case of Government institutions, it has been suggested that the Central share of non-recurring expenditure may be raised to 50% and recurring to at least 33-1/3% during the plan period.

The details of the Central assistance in respect of non-Government and Government institutions as given previously and as proposed now may be seen at Annexure-I. It will be observed that for the establishment of new institutions it has since been decided to give 50% on non-recurring as well as on recurring account, as against 66-2/3% non-recurring and 33-1/3% recurring for non-Government institutions and 50% non-recurring and 33-1/3% recurring for Government institutions, as suggested by the Government of Mysore.

ANNEXURE—I

(Item. 12 of Agenda)

Pattern of Central assistance for Technical education

Comparative statement showing Pattern of Central assistance so far and proposed

Nature of Development	Government Institutions		Non-Government Institutions	
	Central Govt.'s share so far	Central Govt.'s share as proposed	Central Govt.'s share so far	Central Govt.'s share as proposed
1) Development & Improvement of Degree & Diploma Courses in Engineering & Technological Institutions.	33-1/3rd% non-recurring Nil recurring.	50% non-recurring 50% recurring	66-2/3% non-recurring 33-1/3% recurring (up to 1955-56 only)	*Rationalisation under consideration
2) Establishment of New institutions at first Degree & Diploma level.	33-1/3% non-recurring Nil recurring	50% non-recurring 50% recurring	50% non-recurring 25% recurring.	50% non-recurring up to 50% recurring.
3) Courses at Post-graduate level	75% non-recurring 66-2/3% recurring.	100% non-recurring 100% recurring.	75% non-recurring 66-2/3% recurring	100% non-recurring 100% recurring.
4) Specialized Courses such as				
(a) Management Studies	75% non-recurring 66-2/3% recurring	For all Specialised Courses Govt. and Non-Government Institu-	75% non-recurring 66-2/3% recurring	For all Specialised Courses Govt. and Non-Govt. Institutions

1	2	3	4	
(b) Mining Engineering.	75% non-recurring 66-2/3% recurring	tions—the Central Government will meet 100% of the non- recurring and 100% of recurring expenditure.	75% non-recurring 66-2/3% recurring.	— the Central Govt. will meet 100% of the non-recurring and 100% of recurring expenditure.

* The question of rationalising assistance to the non-Government institutions for first degree and diploma courses whose schemes for development and improvement have still to be considered by the A.I.C.T.E. at 50% for both recurring and non-recurring is under consideration.

Note:— In the case of private institutions the remaining portion of the expenditure is borne either wholly by the institution or by the State Government and the institutions concerned in agreed proportion.

Item No. 13

To consider the proposal of the M.S. University of Baroda to upgrade the existing diploma course in Textile Design to that of a degree course in the same subject.

In order to encourage the teaching in Textile Design, Printing and Tie-dyeing which are very important crafts of Gujrat, the M.S. University of Baroda in the year 1954-55 introduced a diploma course in Textile Design. It has been observed that the diploma course has not been sufficiently popular to attract sufficient number of students. The University has now proposed to upgrade the existing diploma course to that of a degree course in order to make it more popular and attract sufficient number of students.

The scheme submitted by the University has been jointly prepared by its faculties of Fine Arts and Technology and Engineering and envisages a four-year degree course in Textile Design. The estimated cost of the scheme is :

Non-recurring (for equipment and materials)	Rs. 80,000/-
Recurring (for staff and contingencies)	Rs. 41,960/-

The scheme has been received by the Western Regional Committee, direct. According to the arrangements approved by the All-India Council all schemes, which relate to special courses and studies should be first considered by the All-India Council which, after necessary examination regarding the general principles, will indicate the manner in which they should be processed. Accordingly the scheme of the M.S. University, Baroda for degree course in Textile Design is placed before the Council for consideration. The advice of the Council is sought regarding the concept and need for the course and the lines on which it should be processed.

It may be mentioned in this connection that the All-India Board of Technical Studies in Textile Technology considered recently the question of developing facilities for degree courses in Textile Dyeing, Printing and Bleaching (Textile Chemistry). For this purpose a Joint Committee of experts of the Boards of Textile Technology and Chemical Engineering was set up. The Joint Committee on the basis of a survey in consultation with the Mill Owners' Associations came to the conclusion that the demand for Textile Chemists in the country was not large and that there was no need for further expansion of training facilities in this subject at the present time. The Textile Board accepted this view.

As regards Textile Design, this subject is included in the normal degree courses in Textile Technology. The model syllabus for National Diploma Course in Textile Technology has a special subject—Cloth Designing in the final-year course, having 90 hours out of a total of 330 hours.

*Item No. 14***To consider the recommendations/decisions of the Regional Committee of the Council**1. *Meetings*

1.1 Western Regional Committee, 14th meeting held on 26th February, 1957.

1.2 Northern Regional Committee, 6th meeting held on 14th December, 1957.

1.3 Southern Regional Committee, 8th meeting held on 18th February, 1958.

1.4 Eastern Regional Committee, 14th meeting held on 7th March, 1958.

2. *Matters for Report : Important Decisions*2.1 *Western Regional Committee*

The Coordinating Committee at its last meeting approved the Nowgong Polytechnic for diploma course in Civil, Mechanical and Electrical Engineering. While generally agreeing with the Western Regional Committee that institutions offering Diploma courses should not be unduly burdened with conduct of certificate courses at a lower level, the Coordinating Committee desired that the Regional Committee may examine the case of this institution on its own merits whether the various certificate courses (Auto Engineering, Chemical Technology, Shorthand and Type-writing and Civil Mistries) conducted in it should continue or not. It is understood that these certificate courses have since been discontinued.

2.2 *Northern Regional Committee*

1. The Government of Uttar Pradesh and Chief Engineer, P.W.D. Punjab have set up *ad-hoc* boards for conducting technical examinations. The Regional Committee observed that these boards are conducting examinations for certain institutions which neither possessed adequate instructional facilities nor had been approved for development by the All-India Council. The Committee decided to advise the concerned State Governments not to conduct examinations for such unrecognised institutions.

2. The Committee recommended that the salary scales in technical institutions for the same designations of teaching posts should be the same for technical and other subjects.

3. The Committee decided that instances of non-observance of conditions attached to grants by the institutions should be brought to the notice of the Central Government, so that the matter may be taken up with the State Governments concerned to ensure the Development of technical institutions on proper lines.

4. The Regional Committee decided that it may carry out a survey

of the progress made by university institutions recommended by the All-India Council for development/establishment.

2.3 *Southern Regional Committee*

2.31 Boards of Technical Education have recently been set up in the States of Mysore and Kerala. The other States in the region viz. Madras and Andhra have already done so. With this the recommendations of the Council that each State should set up its own Board of Technical Education has been implemented in so far as the Southern Region is concerned.

2.32 The Committee observed that adequate facilities have not been provided in all the institutions selected for expansion under the scheme for implementing the Engineering Personnel Committee recommendations. The Regional Committee decided to appoint a High Power Committee to suggest necessary steps to ensure that standards of instruction in these institutions will not deteriorate.

3. *Matters For Consideration*

3.1 *Western Regional Committee*

3.11(a) *Birla Visvakarma Mahavidyalaya, Anand*

This College is affiliated to Vallabh Vidyapeeth and is at present conducting degree and diploma courses in engineering. The Vice-Chancellor, Vallabh Vidyapeeth, requested the Central Government some time back that the provision for degree courses in the College should be expanded under the Engineering Personnel Committee Scheme. He also informed members that the Charatur Vidya Mandal which runs the colleges at the Vidyapeeth would be willing to separate the diploma courses and run them in a new institution to be established and that the Mandal would meet the cost in the usual manner (33% of non-recurring expenditure). The State Government of Bombay also supported the request of the Vidyapeeth for expanding degree courses.

Since the special Expansion Scheme under the Engineering Personnel Committee had been finalised and was in the course of implementation, the authorities of Birla Visvakarma Mahavidyalaya were informed that they may submit a memorandum stating their case for increasing the in-take to degree and diploma courses and that the memorandum would be considered by the Council under the normal development programme. The Principal, Birla Visvakarma Mahavidyalaya subsequently addressed the Chairman, All-India Council for Technical Education stating that the Charatur Vidya Mandal which is the parent society would establish a new Polytechnic in Vallabh Vidya Nagar for the State diploma courses in Civil, Mechanical and Electrical engineering and that the admissions to the degree courses would be increased to 300.

The Western Regional Committee appointed a Visiting Committee to examine the matter. On the report of the Visiting Committee, the Regional Committee has made the following recommendations :—

Expansion of Degree courses

The admissions to the degree courses in Birla Viswakarma Mahavidyalaya should be increased from 150 to 240 as shown below :—

<i>Intake</i>	<i>Civil</i>	<i>Mech.</i>	<i>Elect.</i>
Existing	100	25	25
After expansion	180	30	30

The cost of the above expansion is estimated as shown below :—

Non-recurring	Rs.
Buildings (6132 sq. ft.)	96,000
Equipment	1,13,000
Furniture	13,000
Total	2,22,000/-

With the above expansion the institution will not conduct diploma courses. A separate Polytechnic has therefore to be established.

Establishment of a new Polytechnic at Vallabh Vidya Nagar

A Polytechnic capable of admitting 150 students (Civil 90 ; Mechanical 30 ; Electrical 30) should be established at Vallabh Vidya Nagar and this institution should take over the diploma course from the Birla Viswakarma Mahavidyalaya for which the present admissions are 150. The estimated cost of the new Polytechnic is as shown below :—

Non-recurring	Rs.
Buildings (46,814 sq. ft. plinth)	6,83,410
Equipment	3,30,080
Furniture	66,000
Library Books	30,000
Total :	11,09,410

The Regional Committee has also recommended a hostel loan of Rs. 6.238 lakhs (288 students) for degree and diploma courses.

The special conditions recommended by the Regional Committee are :—

- (i) Admissions to the above courses should be made fairly on merit except to the seats, which are required to be reserved for backward classes in accordance with the State Government rules in force, and the seats required to be filled up by the nominees of Trusts, Individuals and Societies, where such nomination have been agreed upon by Charatur Vidya Mandal with any Trust, Individual or Society in a written agreement. Under no circumstances will such reserved seats be filled up by candidates obtaining less than 50% marks in the qualifying examination.

- (ii) The scheme of starting four year integrated degree courses with increased in-take capacity and transfer of State Diploma Courses to a new Polytechnic will not be put in effect until the Western Regional Committee has satisfied itself that physical facilities considered essential for the first-year classes have been provided. For this purpose it may be necessary to visit these institutions before admissions to the courses are finalised.

It may be stated that the Birla Viswakarma Mahavidyalaya had been approved for development in November, 1953. For this purpose a grant of Rs. 13.32 lakhs had also been approved. All but Rs. 44,000 of the grant has been paid.

It is for consideration whether an Engineering College have an admission 150 students should be expanded for an admission of 240 students, particularly when it has not been included in the Special Expansion Scheme under the Engineering Personnel Committee. This question also involves two other aspects viz. (a) Establishment of a separate polytechnic for the transfer of the diploma courses from the College and (b) the basis on which financial assistance should be given. The advice of the Council in the matter is sought.

3.12 *Establishment of Government Polytechnic, Karad*

(Under the Second Five-Year Plan)

Nature and Scope of development ;	Establishment of State diploma course in Civil Mech. and Elect. Engineering.								
Annual In-take	<table border="0"> <tbody> <tr> <td>Civil</td> <td>— 60</td> </tr> <tr> <td>Mechanical</td> <td>— 30</td> </tr> <tr> <td>Electrical</td> <td>— 30</td> </tr> <tr> <td>Total</td> <td>120</td> </tr> </tbody> </table>	Civil	— 60	Mechanical	— 30	Electrical	— 30	Total	120
Civil	— 60								
Mechanical	— 30								
Electrical	— 30								
Total	120								
<i>Estimated Developmental cost</i>									
Non-recurring									
Buildings including (59,332 sq. ft.) furniture	Rs. 9,92,000/-								
Equipment including Library books	Rs. 8,54,000/-								
	Total Rs. 18,46,000/-								
Recurring									
Staff and Maintenance	Rs. 2,52,000/- from third year of establishment and onwards.								
Interest-free loan for hostels for 180 students	Rs. 5,67,000/-								

This is one of the six polytechnics included in the revised Second Five-Year Plan of Bombay and the fourth one to be established, so far.

3.13 The Regional Committee did not agree with the views of the Coordinating Committee that the estimates for the establishment of an institution should not include the cost of land in all cases. In places where the price of land is prohibitive, the cost of land to be acquired for locating the institution (Government and non-Government) might be included in the estimates for the purpose of grants. The Regional Committee requested the All-India Council to reconsider the matter.

3.14 The Committee noted the recommendation of the Coordinating Committee that Automobile Engineering may be offered as one-year course for those who have taken diploma in Mechanical Engineering, but not as the first diploma course.

The representative of the State Government of Bombay stated that the present three years' State diploma course in Automobile Engineering conducted in some State-owned institutions, with the first two years in common with Mechanical Engineering may serve the purpose of the industry and will also reduce the total period of training by one year. He desired that this view may be placed before the All-India Council for consideration.

3.15 The Committee recommended that the following measures are necessary to meet the existing shortage of teaching staff in technical institutions:—

1. Accelerated scales of pay should be introduced as under:—
 - (a) For first class or second class fresh graduates :
Rs. 300 for two years of fellowship and then as lecturers—
Rs. 325-50-525-25-550. For at least 30% the scale should continue Rs. 550-35-760-40-1000-50-1100.
 - (b) For first class or second class graduates with four to five years' industrial experience—Rs. 500/- for two years for fellowships and then as Professors: Rs. 550-35-760-40-1000-50-1100.
 - (c) For first class and high second class diploma holders—Rs. 200/- for two years of fellowship and then as Tutors or Assistant Lecturers—Rs. 250-25-350-30-500.

A selected number out of these three categories may be given specialised training in our own institutions, industry or abroad.

2. Service conditions of teachers such as housing facilities etc. should be improved and suitable measures taken for social recognition of a teacher.

3. Institutions should be enabled to recruit their staff at least one year in advance of their actual employment and this period should be used to train them in well-established institutions. During the period of training scholarships and fellowships of suitable value should be instituted.

4. A large measure of uniformity of pay scales in technical institutions in the various States should be brought about.

Recommendations of the Special Salary Scale Committee and the heads of the selected degree and diploma institutions in respect of meeting the shortages of technical teachers may be seen under item Nos. 16 and 20 respectively.

3.2. Northern Regional Committee

3.21. Guru Nanak Engineering College, Ludhiana

The Council at its 10th meeting held on 22nd February, 1957 approved this institution in principle for starting the degree courses in Civil, Mechanical and Electrical Engineering with an annual in-take of 120 in accordance with the conditions laid down for the establishment of new non-government institutions. The courses have been instituted. The Regional Committee has now recommended in addition the provision of draftsmanship courses with an annual in-take of 60 (30 Civil, 15 Mechanical and 15 Electrical). It has made the following assessment of the requirements of the institution for starting the degree and draftsmanship courses.

Non-recurring

Building including furniture and fittings (98, 106 sq. ft. plinth)	Rs. 13,55,272
Equipment and Library	Rs. 9,42,037

Total	Rs. 22,97,309
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Recurring

Salaries of staff	Rs. 5,36,760
Running expenses	Rs. 1,15,000

Total	Rs. 6,51,760
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Interest-free loan for hostels

For 480 degree students	Rs. 13,44,000
Hostel for additional number of 210 diploma certificate courses students	Rs. 5,25,000

Total	Rs. 18,69,000
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Special conditions for grants

- (i) There should be no reservation of seats of any kind except as provided for in the Constitution of the country.
- (ii) The institution should discontinue the reservation to students from rural areas of 70% admissions to the existing diploma courses.
- (iii) The 'College' and the 'Polytechnic' should function as separate units except for the common facilities of laboratories and workshops having separate staff under the over-all administrative charge of the Principal of the college.

The institution had been approved for conducting diploma courses in Civil, Mechanical and Electrical Engineering with an annual admission of 120. For these courses, the facilities provided were .

Buildings : 50,000 sq. ft. (plinth)

Equipment, Library and Furniture-costing Rs. 82.48 lakhs.

It may be pointed out that on the basis of the present assessment for Degree and Draftsmanship courses and facilities already provided for Diploma courses, the institution has to have accommodation of the order of 1,53,106 sq. ft. (plinth.) On the other hand, in cases of some other institutions, conducting Degree and Diploma course, the accommodation approved by the Council is of the order of 1,32,400 sq. ft. (plinth.) If accommodation of 5,400 sq. ft. for Draftsmanship courses is added, the total accommodation required for all the three courses in the same institution would come to 1,37,800 sq. ft. (plinth.) The present estimates of the Regional Committee are therefore in excess by 15,306 sq. ft. It is for consideration whether this excess accommodation as assessed by the Regional Committee may be accepted. However, it may be mentioned that the All-India Council has not drawn up a standard schedule of accommodation for an institution conducting degree, diploma and draughtsmanship courses.

The estimates of library for the College for Degree and Diploma courses as assessed by the Regional Committee are Rs. 1.50 lakhs of which library costing Rs. 35,000 has already been provided for the Diploma courses. The All-India Council has however, approved previously an estimate of Rs. 75,000 for a library to serve only degree courses and an additional amount of Rs. 10,000 if it has to serve Diploma course also. Thus the estimates of the Regional Committee for the Gurumanak Engineering College are in excess by Rs. 65,000. It is for consideration whether this additional amount should be approved.

3.22	Name of the Institution	College of Engineering, Banaras Hindu University.
	Nature and scope of development	Improvement in the instructional facilities in the Department of Civil Engineering.
	Estimated developmental cost	Rs. 3,84,700.

This institution was approved for development in 1947 at a cost of 19.99 lakhs non-recurring and 5.12 lakhs recurring for an annual admission of 160 students (60 Electrical, 60 Mechanical and 40 Civil). Further development of the institution at a cost of Rs. 20.41 lakhs non-recurring and 1.25 lakhs recurring was approved by the Coordinating Committee at its 23rd meeting held on 14-7-56. The present development envisages the improvement of instructional facilities in the Department of Civil Engineering on the lines indicated by the Engineering Board in regard to a fully developed institution. It may also be observed that under the scheme for expansion of selected existing institutions, envisaged in the Ghosh-Chandrakant Committee Report, the annual admissions to the institution had been increased to 270 (Civil 120, Mechanical 75, Electrical 75).

3.23	Name of the Institution	Government Polytechnic, Ajmer.
	Nature and scope of development	Establishment of Civil Engineering Diploma Course of the National Certificate Standard.
	Annual In-take	60 in Civil Engineering.
	Estimated developmental cost	

Non-Recurring

Building (33,066 sq. ft.) including furniture	Rs. 4,16,800
Equipment including Library	Rs. 6,08,600

Total Rs. 10,25,400

Recurring

Staff	Rs. 1,12,200
Maintenance	Rs. 21,000

Total Rs. 1,33,200

Loan for hostel

Interest-free loan for hostel for 90 students	Rs. 2,25,000
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The establishment of this institution is included in the revised Second Five-Year Plan of the Rajasthan State Government. The cost of development is on the basis of standards of the Regional Committee which are slightly different from those approved by the All-India Council for Technical Education.

3.24 Name of the Institution Government Leather Working School, Kanpur.

The institution was approved for development at the 21st meeting of the Coordinating Committee held on 9th June, 1955. The Regional Committee has now recommended an additional equipment grant of Rs. 5,000/- for the purchase of electrical ironing machine instead of a level-bed glazing machine contained in the earlier recommendation.

3.25 The Committee recommended an interest-free loan for additional hostel accommodated for students for the three institutions as given below. The total student body and the existing hostel accommodation in respect of each institution is also stated.

Name of the Institution	Total Student body in approved courses	Student body for which hostel accommodation.		Amount of Loan Recommended.
		Exist- ing	Additional Recommended	
Ramgarhia Polytechnic, Phagwara.	640	175	Additional hostel for 175 students.	Rs. 3,50,000
Northern Regional School of Printing Technology, Allahabad.	120	Nil	Hostel for 60 students.	1,50,000
Tarakaran S. D. Technical Institute, Baijnath.	190	90	Hostel for 40 students of the Draftsmanship certificate course.	1,00,000

3.26 The Committee earlier recommended interest-free loans for the construction of students' hostels, to the following four institutions, on the basis of estimates of cost made at the rate of Rs. 2,000/- per student. On account of the need to provide for the cost at a rate of Rs. 2,500/- per student, the Regional Committee revised its earlier estimates and recommended the following additional amounts in respect of each institution as stated :

Name of the Institution	Student Body for which Hostel accommodation was earlier recommended	Amount of loan recommended on original estimates	Amount of loan recommended on revised estimates	Additional amount of loan
1	2	3	4	5
Tarakaran S. D. Technical Institute, Baijnath	90	1,80,000	2,25,000	45,000
Harcourt Butler Technical Institute, Kanpur	50	1,00,000	1,25,000	25,000
Government Leather Working School, Kanpur	40	80,000	1,00,000	20,000
Government Central Textile Institute, Kanpur	60	1,20,000	1,50,000	30,000

3.27 The Regional Committee recommended that all the Technical Institutions in the region should appoint training and placement officers to look after the practical training and placement of students. The post of the training and placement officer should be in addition to the normal complement of the staff.

3.3 Southern Regional Committee

3.31	Name of the Institution	Mullapudy Venkatrayudu Memorial Educational Trust Polytechnic, Tanuku.
	Nature and scope of development	Establishment of diploma courses in Civil, Mechanical and Electrical Engineering.
	In-take	Civil Engineering 60 Mech. Engineering 30 Elect. Engineering 30
		Total 120

Estimated development cost

Non-recurring.

Buildings	Rs. 7,59,000
Equipment including Library and furniture	Rs. 9,03,880
Total	Rs. 16,62,880

Recurring :

Staff	Rs. 1,20,000
Maintenance	Rs. 40,000
Total	Rs. 1,60,000

The above assesment was made by the Regional Committee on the basis of its original standards.

3.32 The Committee recommended that the three institutions in Mysore State be approved for starting additional courses as shown below:—

Name of the Institution	Existing courses and In-take		Additional courses Recommended and in-take	
1. B.V. Bhoomareddy College of Engineering, Hubli.	Degree Civil	60	Degree Mech. Elect.	30
	Diploma Civil	60		30
2. National Institute of Engineering, Mysore.	Degree Civil	60	Degree Mech. Elect.	30
	Diploma Civil	60		30
3. K.H. Kabbur Institute of Engineering, Dharwar.	Diploma Civil	60	Diploma Mech. Elect.	30

The requirements of the Bhoomareddy College of Engineering have been assessed as under and they also include the cost for increasing the duration of the existing three year degree course to four years.

Non-Recurring.

Building (37,600 sq. ft. Plinth) and furniture.	Rs. 5.77 lakhs.
Equipment.	Rs. 7.31 lakhs.
Total :	Rs. 13.08 lakhs.

The Committee has yet to assess the requirements of the other two institutions.

3.33 The Committee recommended interest-free loans for the construction of students' hostels for the seven institutions as shown below. All the institutions are new and there is no existing hostel accommodation for any of them :—

Name of the Institution	Total Student body in approved courses	No. of students for whom hostel accommodation is recommended	Amount of loan recommended (in lakhs)
Thiagarajar College of Engineering, Madurai.	480	240	6.00
A.M.M. Charities Polytechnic, Avadi.	360	180	4.50
Visakhapatnam Poly., Visakhapatnam.	540	270	6.75
Venkateswara Polytechnic, Tirupathi.	510	255	6.35
Coimbatore Institute of Technology, Coimbatore.	480	240	6.00
Nachimuthu Polytechnic, Pollachi.	360	180	4.50
Nair Service Poly., Pandalam.	360	120	2.00

3.34. The Committee recommended that the scope of the practical training stipend scheme which at present provides for fresh graduates and diploma holders from technical institutions be enlarged to include students in vocational training also and that they be paid stipends at corresponding rates.

3.35. The Committee recommended the following basis for central assistance to non-government institutions in the various States of the Region:—

- (a) The Central Government assistance may be brought back to the pattern that existed before February, 1957.
- (b) The question of assistance from the State Government should be left to the State Board of Technical Education which might determine this individually on the merits of each institutions.

It may be observed that the All-India Council for Technical Education in its 10th meeting held on 22nd February, 1957 laid down the following conditions for the establishment of new non-government institutions in the Second Five-Year Plan period;

- (i) The private agencies by themselves or in association with the State Governments concerned should meet at least 50% of the approved non-recurring cost, the balance being met from the grants to be given by Central Government. Wherever the State Government make a contribution, that amount should be provided in its Five-Year Plan.
- (ii) The private agencies should have adequate resources including income from tuition fees to meet at least 50% of the approved recurring expenditure. The balance should be provided by the

State Government and the Central Government in agreed proportions, subject to the condition that the State Government shall assume the entire responsibility after the current plan period.

The pattern of central assistance in respect of development of non-government institutions prior to the above decision of the Council was as following:—

Non-Recurring	66.2/3% of the approved expenditure
Additional Recurring	33.1/3% of the approved expenditure

3.36. The Committee recommended that the new Government Engineering College included in the revised Second Five-Year Plan of the Kerala Government be located at Trichur and estimated the following cost of establishment on the basis of standards approved by the Council.

Non-recurring

Building and furniture	(1,05,000 sq. ft. Plinth)	Rs. 19,90,000
Equipment and Library		Rs. 15,12,000
	Total	Rs. 35,02,000

Recurring

Staff	Rs. 3,20,600
Maintenance	Rs. 60,000
	Total: Rs. 3,80,600

3.37. *Madras Institute of Technology, Chrompet, Madras*

The Committee recommended an additional building covering 12,500 sq. ft. Plinth at a cost of Rs. 1.9 lakhs for its automobile faculty.

3.38. The Committee recommended in principle the establishment of an Engineering College at Warrangal by the Osmania University subject to formal confirmation by the Andhra Pradesh Government of the assurance given by their representative that the State Government will participate in the cost in the usual manner. The requirements of the institution will be assessed by a Visiting Committee appointed for the purpose.

3.39. The Committee recommended in principle the establishment of the following non-government institutions in accordance with the conditions laid down by the Council for the establishment of such institutions:

- (a) Three Engineering Colleges in Kerala, one each at Palghat, Quilon and Cannanore for an annual admission of 120 students to the degree courses in Civil, Mechanical, and Electrical Engineering.
- (b) One Engineering College in Gulberga in Mysore State for an annual admission of 120 students to the Civil, Mechanical, and Electrical Engineering degree courses,

- (c) Three diploma institutions in Mysore State each for an annual admission of 120 students to the Civil, Mechanical, and Electrical Engineering diploma courses.

Names of the sponsors and detailed estimates of cost in respect of these institutions to be established will be forwarded shortly.

The Southern Regional Committee at its fifth meeting held on 21st November, 1956 authorised its Chairman to forward the reports of the Visiting Committee in respect of the development of Government College of Technology, Coimbatore and the College of Engineering, Guindy. The Chairman has since approved and forwarded these reports which assessed the requirements of the institutions as under:—

3.310. Government College of Technology, Coimbatore

Nature and Scope of Development	Improvement of the existing degree courses in Civil, Mechanical and Electrical Engineering.	
In-take	Civil Engg.	60
	Mechanical Engg.	30
	Electrical Engg.	30

Estimated Developmental Cost

Non-Recurring

Building	74,567 sq. ft. cost.	Rs. 13.4 lakhs
Equipment		Rs. 8.4 „
Furniture		Rs. 0.5 „
		Total Rs. 22.3 lakhs

Interest-free loan for the construction of hostel for 300 students)		Rs. 8.4 lakhs
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Recurring

Staff		Rs. 4.0 „
Consumables and maintenance)		Rs. 0.6 „
		Total Rs. 4.6 lakhs

It may be stated that with the addition of buildings as recommended above, the total *pucca* plinth area of the building for the institution would be 1,42,000 sq. ft. against a total plinth of 1,05,000 sq. ft. approved by the Council as a standard for a first degree college. The Regional Committee has however, expressed the view that an area of 8000 sq. ft. plinth available in the workshops in excess of the standards for this purpose cannot be put to any other use. If this view is accepted, then the excess accommodation recommended over the standards of the Council would be 29,000 sq. ft. plinth. It is for consideration whether this should be agreed to.

Of the additional equipment recommended, 4.02 lakhs worth of equip-

ment including a Babcock and Wilcox Boiler costing 1.7 lakhs is from list B, of approved lists applicable to well-established institutions. This institution has now 13 years of standing. Also equipment for pre-stressing and applied Electronics worth 0.62 lakhs now recommended is outside the approved list. It is for consideration whether

- (a) in view of the foreign exchange position the Babcock boiler be allowed. The institution has a fire-tube boiler which can meet the requirements of steam supply and
- (b) the equipment costing Rs. 0.62 lakhs for electronics and pre-stressing but not included in the approved lists be allowed to the institution.

3.311. *College of Engineering, Guindy*

Nature and Scope of Development

Improvement of existing facilities for the degree courses in Civil, Mechanical Electrical and Tele-Communication Engineering. *

In-take

Civil Engg.	60
Mechanical Engg.	30
Electrical Engg.	30
Tele-Communication Engg.	20

Estimated Cost of Development

Non-Recurring

Building and Furniture	(21,920 sq. ft.) plinth	Rs. 4,30,600
Equipment		Rs. 2,69,000
		Total Rs. 6,99,600

It may be stated that this institution has been approved for expansion under the scheme for implementing the recommendations of the Engineering Personnel Committee for an annual admission of 250 students (90C-60M-60E and 40T.C.). The estimates include (a) Rs. 10,000 worth of prestressing equipment not included in the approved list of the Council. It is for consideration whether this should be agreed to.

It may be stated that the development of the Government College of Technology, Coimbatore & College of Engineering, Guindy are included in the Second Five-Year Plan of Madras State and the schemes are in progress.

3.4. *Eastern Regional Committee*

3.41. Name of the Institution	Government Engineering College, Jorhat.
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Nature and scope of development	Establishment of degree courses in Civil, Mech. and Electrical Engineering.	
In-take	Civil Engg.	60
	Mech. Engg.	30
	Elect. Engg.	30
	<hr/>	
	Total	120

*Estimated cost:**Non-recurring*

Building	(1,04,000 sq. ft.) plinth.	20 lakhs
Equipment, furniture and library		20.02 lakhs
		<hr/>
	Total Rs.	40.02 lakhs.

Interest-free loan for Hostel for 480 students. Rs. 11.28 lakhs.

Recurring

Staff	Rs. 4,13,560
Working expenses	Rs. 72,000
	<hr/>
Total:	Rs. 4,85,560

The establishment of the institution is provided for in the revised Second Five-Year Plan of the State. The above estimates made by the Regional Committee are on the basis of approved standards of the Council in respect of a new first degree institution. The estimate for equipment includes provision for transportation and erection at 20% of the cost of equipment.

3.42. The Coordinating Committee at its meeting held on 14th July, 1956 approved the development of the three technological departments of the Calcutta University and recommended non-recurring and recurring grants. The Committee earlier indicated the staff required for three departments but did not specify the salary scales. The Committee now recommended that the salary scales for the technological departments of the Calcutta University should be the corresponding scales recommended by the Council for technical institutions.

It may be noted that the recommendations of the Special Salary scales Committee are placed before the Council under item No. 16 for consideration.

3.43. Proposal of the Jadavpur University to start the National Diploma Course on part-time basis for students who passed the National Certificate Examination.

In the scheme approved by the Council for the National Diploma Course in engineering subjects, there is a provision for candidates who

have already passed the National Certificate examination to take the course on a part-time basis over a period of three years. In pursuance of several requests received in the Ministry of Education from such candidates for the provision of these part-time courses at suitable centres in the country, the Regional Committees have been requested to examine the possibilities and make suitable recommendations. The Eastern Regional Committee at its 12th meeting held on 25th April, 1957 recommended the proposal of the Jadavpur University to start this course and accepted the following estimates of cost worked out by the University:

Non-recurring	Nil	
Recurring	1st year	Rs. 13,230
	2nd year	Rs. 24,660
	3rd year	Rs. 63,090

The scheme was referred to the members of the Standard Committee of the Engineering Board whose comments are briefly as follows:—

The rates of remuneration for part-time teaching staff appear to be somewhat on the high side. Instead of engaging all the teaching staff on a part-time basis there should be a nucleus of permanent staff augmented by part-time lecturers for specific subjects particularly in the last year of the course. 45 weeks in a year should exclusively be used for teaching as otherwise, the course may not be adequately covered.

In this connection it may be stated that as a result of the changed pattern of Secondary education and acceptance of the Five-Year degree course for technical subjects by the Council, the Engineering Board is at present considering the changes necessary in the schemes for the National Certificate and National Diploma courses. There is however a certain amount of urgency for an immediate beginning with the part-time courses in view of the repeated number of requests from all over the country. The matter is placed before the Committee for consideration and decision.

Item No. 15.

To consider the proposals regarding Expansion of Technical Education in the country

1. For fulfilling the recommendations of the Engineering Personnel Committee, a scheme was formulated some time back which envisaged the following aspects :

- (a) expansion of the training capacity of 19 existing Engineering colleges and 50 Polytechnics capable of yielding 2568 additional seats for degree courses and 4885 additional seats for diploma courses, and
- (b) establishment of three new Engineering colleges and 23 Polytechnics capable of yielding 520 seats for degree courses and 4020 seats for diploma courses. The new Colleges were to be located in Asansol, Durgapur, Jamshedpur, and Nagpur.

2. The Central Government approved the first part of the scheme viz. expansion of existing institutions and decided to implement it im-

mediately. As regards the new institutions proposed, it was decided that the matter should be re-examined in the light of the following considerations :—

- (a) New institutions both for degree and diploma courses should be spread more evenly to ensure progressively equal opportunities for training all over the country.
- (b) In planning the capacity for training courses both in the existing and the new institutions, the requirements of future five-year plans should also be kept in view. The Central Government also decided that the new institutions to be established after a review of the whole matter, should start at least with effect from the academic year 1958.

3. In pursuance of the above decisions, the scheme of expansion of existing institutions is in process of implementation in all the institutions except six where it is proposed to increase admissions next year. The Central Government have agreed to provide the entire non-recurring expenditure involved and the recurring expenditure in a certain proportion.

4. Since the scheme was formulated, the state of Technical education in various parts of the country has undergone changes owing to the activity of State Governments. The increasing interest taken by private enterprise in the development of Technical education has also altered the picture to some extent. A number of new Engineering colleges and Polytechnics have been established or are in the course of establishment by State Governments under their five-year plans. The scheme of expansion of training capacity of existing institutions has also added to the facilities available in the different regions to varying extents. A number of private institutions are also in course of establishment adding to the Technical education facilities to an appreciable extent. Therefore, in planning for further development of Technical Education, due regard has to be given to all these new situations and a quantitative approach has to be adopted.

5. Tables I and II give a picture of the state of Technical education in, 1956 in the four regions and a forecast of the position by 1960-61 on the basis of various schemes approved or proposed in the plan period. It is anticipated that by the end of the plan period, over 9000 seats will be available for degree courses and over 18,000 seats for diploma courses. That means a National Index* of 24 and 48.35 respectively as against a National Index of 12.98 for degree courses and 23.55 for diploma courses in 1956. This represents nearly 85% and 105% increase in degree and diploma courses respectively over the position in 1956; and as compared to the position in 1951, that is the beginning of the First Five-Year Plan, it represents 138% and 245% increase. This improvement will be shared by all regions though to a varying extent. The Northern Region which had the lowest regional index in 1956 will show over 100% increase both in degree and diploma courses. So will the Eastern Region; in fact in this region the provision for diploma courses will increase by over 135%. In these two regions, the order of increase will be more than in the country as a whole. This is of particular significance since it reflects largely the effect of the Special Expansion Scheme implemented on the recommendations of the Ghosh-Chandrakant report.

*The Index represents number of seats available per million of population.

6. In view of the decisions of the Central Government regarding new institutions as indicated in para 2 above, one of the issues to be considered is, whether in the further efforts of the Central Government to expand Technical education in the country as a whole, Parity or Equity among the regions should be aimed at. On this issue depends the location of all new institutions that may be required to meet the country's demand for technical personnel.

7. The development of Technical education is a process the rate of which in a particular area is governed by a number of factors viz. initiative and interest of State Governments, private enterprise, universities and other educational authorities, industrial progress, the general educational standard of the people and their interest in Higher education, occupational interests of different sections of the community, etc. In fact, the state of Technical education in an area reflects in large measure the way of life of the people concerned. Forces beyond the control of a people may retard the progress of Technical education in an area but that is an exceptional situation. The existing differences in the state of Technical education in different parts of the country are due largely to these various factors. Both in the Southern and Western Regions, progress is in a large measure due to the keen interest evinced by private enterprise in Technical education. For instance, whereas the Second Five-Year Plans of the States in these regions include four new Engineering colleges and 17 polytechnics, private enterprise has come forward to establish five colleges and 12 polytechnics in the last two years alone. In other regions, the activity of private enterprise in Technical education is extremely limited: only one Engineering college and no Polytechnic has been proposed for establishment by private enterprise, so far. Of the existing institutions in the country, today over 30% are private institutions excluding university institutions; over 65% of the private institutions are in the Southern and Western Regions. The number of private institutions in these two regions will increase further during the current plan period. This is so in spite of the fact that the assistance of the Central Government has been offered to private enterprise in all regions on the same basis. In view of this, it seems that parity among the regions is possible only if all developments in the more progressive or advanced regions are retarded and the efforts and resources of the Central Government are concentrated in other regions. That, however, is both impracticable and undesirable. There is no reason why those regions which are active in the field of Technical education should not be assisted and encouraged to progress further as long as other regions are not denied the same opportunity to advance. The Central Government should not supplant but should supplement local initiative and effort in an equal measure in all regions save when exceptional circumstances in a particular area call for special attention from the Centre. Further, in Five-Year Plans, the special responsibility of the Central Government is to ensure an adequate supply of Technical man-power for various projects on an all-India basis. The fact that the new steel plants or fertilizer factories or ship-building yards are located in certain areas for technical reasons would not justify the recruitment of Technical personnel required from those areas. Every State and Region should be given an equal opportunity to share in the enterprises.

8. In all future schemes of Technical education initiated and largely financed by the Central Government to meet the requirements of

the country as a whole, all regions should be treated alike and the same order of expansion of facilities should be aimed at, in each. So far as local enterprise is concerned - whether by State Governments under their own plans or by private agencies that should be assisted and encouraged on an equal basis. These considerations should apply in so far as basic engineering course, viz., Civil, Mechanical and Electrical are concerned. For specialised courses or studies the scope of development and the centres for the purpose should be decided on the recommendations of the All-India Council for Technical Education.

9. The next issue for consideration is how many Engineering colleges and Polytechnics should be planned immediately on the initiative of the Central Government? The problem would require a statistical and integrated approach on the basis of the nature and scope of the future five-year plans. However, at this stage when the details of the future five-year plans have not been settled, it is not possible to make without any degree of certainty, an estimate of the requirements of graduates and diploma holders in Engineering and Technology. Such an assessment has to be undertaken in due course. Nevertheless, expansion of technical educational facilities to the extent possible cannot and should not be delayed, particularly since institutions have to be established and courses organised well in advance of the initiation of development projects. It takes at least four years to train a graduate engineer or a diploma holder; development of a technical institution takes even longer. It is therefore necessary to keep a distant situation in mind and plan for Technical education in stages. At each stage of the process, various aspects should be considered, and a re-assessment or review of the plans should be carried out in relation to the requirements of particular personnel.

10. In view of what has been said, the provision for Technical education may be extended in the current plan period to about 11,000 seats for degree courses and about 22,700 seats for diploma by means of a special scheme sponsored by the Central Government. To that end, eight engineering colleges with a total admission capacity of 2,000 students per year and 27 polytechnics with a total admission capacity of 4,020 students may be established in the different parts of country. This expansion will raise the National Index to 28.59 in respect of degree courses and to 58.72 in respect of diploma courses by 1960-61. It will not only fulfil the recommendations of the Engineering Personnel Committee but will meet to an appreciable extent the requirements of third and subsequent five-year plans. Later on, as and when the nature and scope of the five-year plans has been settled and their requirements for technical man-power have been assessed, further expansion of Technical education may be attempted.

11. It is proposed that each of the new Engineering colleges should have an admission capacity of 250 students per year. By conventional Indian standards, this is a large unit. However, a large-sized College would be more efficient and more economical than the equivalent in small colleges. Further, since the proposed colleges have to meet the additional requirements of the country as a whole, and for that purpose may have to function on all-India basis, the smaller they are in number and the larger in size the better. For the same reasons, their location is important from an all-India point of view.

12. So far as Polytechnics are concerned, a uniform size cannot be prescribed for all since a number of factors have to be taken into consideration. They have to meet local and State needs, which in many cases are large. Their number, size and location have, therefore, to be decided with reference to conditions obtaining in each State. Diploma courses provide suitable opportunities of preparation for gainful employment in life to those who have completed Secondary education, but are without the ability or the means for Higher education at Universities. Polytechnics which provide such opportunities should be spread out as widely as possible—not merely in a metropolis and cities but in all district headquarters, small towns and even in rural areas wherever Secondary education has spread. It is not reasonable to expect students to go far from their home towns for Polytechnic education; facilities should be made available as near their home as possible.

13. It is proposed that the eight new colleges sponsored by the Central Government should be distributed equally among all four regions. The two colleges for the Eastern Region may be located at Durgapur and Jamshedpur; those for the Western Region at Nagpur and Bhopal; those for the Northern Region at Delhi and Allahabad; and those for the Southern Region at Hyderabad and Mangalore. It should, however, be emphasised that the regional character of the institution applies only to its geographical location and not to the area which it is expected strictly to serve. These institutions are intended to serve the country as a whole and should admit students from all over the country as far as possible.

14. The College in Nagpur need not be a separate institution from the one that has just been started by the State Government under the Second Five-Year Plan. Since the latter is yet in the initial stages of development it should be organised and developed into a large institution under the present scheme. The State Government has itself suggested that since inadequate provision has been made in the current plan for the College in Nagpur, necessary funds for its development may be provided by the Central Government under the present scheme.

15. When the proposed College in Delhi is established, the degree courses in Engineering and Technology in the Delhi Polytechnic should be transferred to the former and the Polytechnic developed for diversified courses, both full time and part-time, of the National Diploma and National Certificate types. The location of the colleges at Durgapur, Jamshedpur, Nagpur, Hyderabad, Bhopal, Mangalore and Allahabad has been discussed with the State Governments concerned that welcome the proposal. In fact, West Bengal, Bihar and Mysore Governments have already selected suitable sites for colleges and are ready to start work.

16. In view of the difficulties in finding the right staff for all the institutions at the same time it is suggested that five colleges—viz., Durgapur, Jamshedpur, Nagpur, Delhi and Hyderabad be established in the first stage and other three—Bhopal, Mangalore and Allahabad in the next. The first five colleges should make admission by 1959 and the rest by 1960. Such phasing would also facilitate the training of the required staff under the Teacher-Training Scheme and make suitable personnel available for the institutions. However, if satisfactory arrangements could be made in advance, all the eight colleges may start in 1959.

17. Each college should offer degree courses in Civil, Electrical and Mechanical Engineering courses in Metallurgy, Chemical Engineering, and Tele-Communication Engineering may also be organised in some depending upon the demands for Technical Personnel in these fields. For instance, Metallurgy would be an useful addition to the Durgapur and Jamshedpur Colleges in view of the possible collaboration and cooperation between these institutions and the steel plants.

18. As regards Polytechnics, their sizes, number and location for each region and State have been generally examined on the basis of various considerations. The shortages observed by the Engineering Personnel Committee in respect of diploma holders in different region and the Committee's recommendations in the matter have also been considered. It is suggested that the 27 polytechnics proposed be distributed as shown below and their sizes be also as shown as against each :

<i>Region/State</i>	<i>No. of Polytechnics and sizes</i>	<i>Total number of seats available</i>
(1)	(2)	(3)
<i>Western Region</i>		
West Bengal	3 each with an admission capacity of 180 students/year.	540
Bihar	2 each with an admission capacity of 180 students.	360
Assam	1 with an admission capacity of 180 students.	180
Orissa	1 with an admission capacity of 180 students	180
Total	7	1260
<i>Western Region</i>		
(1)	1 with an admission capacity of 300 students to be located in Bombay city; 2 each with an admission capacity of 120 students.	540
(2)		
Madhya Pradesh	2 each with an admission capacity of 120 students.	240
Total	5	780
<i>Northern Region</i>		
Uttar Pradesh	1 with an admission capacity of 240 students to be located in Kanpur	240
	2 each with an admission capacity of 150 students.	
Punjab	3 each with an admission capacity of 120 students.	360
Rajasthan	2 each with an admission capacity of 120 students	240
Total	8	1140

1	2	3
<i>Southern Region</i>		
Madras	2 each with an admission capacity of 120 students.	240
Mysore	2 each with an admission capacity of 120 students.	240
Andhra	2 each with an admission capacity of 120 students.	240
Kerala	1 with an admission capacity of 120 students.	120
Total	7	840

19. The exact location of the Polytechnics wherever not indicated should be decided by the State Governments concerned in consultation with the Regional Committees of the All-India Council for Technical Education.

20. When the schemes for eight new Colleges and 27 new Polytechnics are implemented (which it is hoped will be by 1960-61), the final position regarding the number of seats for degree and diploma courses available in each region will be as shown in Table-III. While the National Index increases by about 147% for degree and diploma courses respectively as compared to the position in 1956, similar improvement in each region, particularly in the Northern and Eastern Regions may also be observed. In fact, in these two regions individually, the development is better than in the country as a whole. The distribution of the additional training facilities among the four regions is therefore equitable.

21. The eight new large-sized colleges proposed are intended to serve the whole country and not any particular State or region in respect of technical personnel. The State Regional needs are being met mostly by existing institutions, which in many cases are being expanded, as well as by new institutions under the Five-Year Plans of the States and otherwise. Both for the expansion and development of existing institutions and for the establishment of new State institutions assistance is being provided by the Central Government. A large part of the additional man-power requirements both in the current and in subsequent plan periods is for new industrial and other projects which will draw men from all over the country. Even for State projects there will always be an element of mobility of Technical personnel from one State to another. In view of these considerations, the eight new colleges should have an all-India character in so far as their aims and objects are concerned. Their location in particular States or regions should be regarded merely as a matter of Technical and geographical convenience. Admissions to the institutions should therefore be made as far as possible on an all-India basis.

22. Each college should be regarded as a joint and cooperative enterprise of the Central Government and State Government concerned. However for administrative purposes it should be under the State Government concerned. The College at Delhi should be entirely a Central Government enterprise.

23. The Colleges should have the maximum amount of autonomy both financial and administrative so that their establishment and development may proceed with speed and efficiency. For this purpose, each college should have a Board of Governors fully representative of all interests concerned and with full powers for the administration and management of the institution.

24. Each college should be fully residential so far as staff and students are concerned. For this purpose, the College campus should offer the necessary facilities, and the construction of staff quarters and hostels should be an integral part of the scheme of establishment of the Colleges. From the point of view of getting suitable teachers for the colleges, provision of staff quarters is also necessary.

25. In order that facilities for Higher Technical Education specially made available through the colleges might be best utilised by students from all over the country, each college should offer scholarships of a suitable value for at least 25% of the seats. The scholarships should be awarded on the basis of merit-cum-means. Expenditure on this account should be a part of the normal recurring expenditure of the Colleges.

26. For each college, the State Government concerned should provide adequate and suitably developed land free of cost, water and electricity. The cost of establishment and maintenance of the college may be shared by the Central Government and State Government in the following manner :

Non-recurring

College buildings and equipment:

The entire amount to be provided by the Central Government.

Recurring

The expenditure to be borne by the Central Government and State Government concerned in equal parts for the first five years. After five years the position should be reviewed.

Staff Quarters

The Central Government to provide 50% of the expenditure as grant-in-aid and the rest as loan at 4½% interest. (As in the case of Industrial Housing Scheme).

Hostels

The entire amount to be provided as interest-free loan repayable in 33 equal annual instalments.

So far as the College at Delhi is concerned, the entire expenditure on all the above items should be borne by the Central Government.

27. The 27 new polytechnics proposed for establishment are intended to meet State and regional requirements to a large extent. It is therefore not necessary that these institutions should function as all-India institu-

tions like the Engineering College, although it would be desirable to make as many seats as possible in each Polytechnic available to students from other States. That would help to break down any apparent regional barriers in Technical education.

28. Speedy establishment and development of the polytechnics is as important as the colleges since at the level of diploma holders the requirements for Technical personnel are large and in several areas also urgent. It is therefore desirable that the State Governments should adopt suitable measures for speeding up the construction, equipping and staffing of the institutions. For this purpose, Governing Bodies vested with adequate administrative and financial powers may be set up for the polytechnics generally on the same lines as for the proposed new colleges. The State Government may also recruit the necessary staff on the cadres of their Public Works, Irrigation, Electricity and other technical departments and send them or depute them to the polytechnics. It is expected that this measure will facilitate the staffing of Technical institutions and from the point of view of the individuals concerned, it will ensure their future prospects in the departments.

29. In the absence of full information regarding the resources of the State Governments, it is not possible at this state to make any definite suggestions regarding the manner in which the expenditure on the polytechnics should be shared by the Central Government and State Governments. However, it is apparent that the States have pledged all available resources to the Second Five-Year Plan as it has already been formulated and therefore they may not be able to take any further responsibility for Technical education without substantial aid from the Centre. In the circumstances, the question of assisting the States on the following basis may be considered:

Non-recurring

Building & Equipment : 50% of the expenditure may be provided by the Central Government as grant-in-aid and the balance by the State governments by suitable adjustments in their plan provision. Wherever the resources of a State are inadequate the Central Government may grant loans to assist it.

Recurring

50% of the expenditure may be borne by the Central Government for the first five years, and the rest by the State Governments. The Central Government's share should be taken over by the State Governments after the five-year period.

Hostels

At the beginning, hostel accommodation may be provided up to 50% of students in each polytechnic. The amount required may be provided by the Central Government as an interest-free loan.

Staff Quarters

Wherever staff quarters are required, the State Governments should

bear the necessary expenditure. The question of including staff quarters for polytechnics in the Low-Income Group Housing Scheme or Industrial-Housing Scheme may also be considered.

30. The additional seats viz., 2,000 for degree courses and 4,020 for diploma courses to be provided in the current plan period on the basis of the proposals formulated in this report, cover all basic branches of engineering, viz., Civil, Mechanical, Electrical and Electrical Commission. For the Engineering Colleges in Durgapur and Jamshedpur, Metallurgy is also included as a subject of study. It is, however, important that the distribution of the seats among all these subjects should be determined with due regard to the requirements for technical personnel in each field. The details should be settled in consultation with the Regional Committees of All-India Council for Technical Education while preparing detailed plans and estimates for new engineering colleges and polytechnics.

31. The estimate of the expenditure for the eight engineering colleges and 27 polytechnics depending upon their location, admission capacity, etc. has been worked out tentatively which is as shown below :

Items

(a) <i>Non-recurring</i>	<i>Cost in Rs.</i>
i) Instructional Buildings	Rs. 483 lakhs
ii) Equipment	Rs. 444 ,,
iii) Hostels	Rs. 620 ,,
iv) Staff Quarters	Rs. 200 ,,

Total Rs. 1,747 lakhs

(b) *Recurring (Ultimate)* Rs. 175.5 lakhs per year.

32. In these estimates the cost of land with the necessary water and electricity services for the institutions has not been included. Similarly, the expenditure on staff quarters for the polytechnics is also not included, since that has to be considered by the State Governments in each individual case separately.

33. Assuming that the cost of the schemes will be shared by the Central and State Governments as indicated earlier, the share of the Central Government will be as follows :

Non-Recurring

i) Building and Equipment	Rs. 670.5 lakhs
ii) Hostels for the College in Delhi	Rs. 35.0 ,,
iii) Staff Quarters Grants including Delhi College	Rs. 111.0 ,,

Rs. 816.5 lakhs

*Recurring
Loans*

i) For Hostels	Rs. 585 lakhs
ii) For Staff Quarters	Rs. 89 lakhs

Rs. 674 lakhs

34. If the additional training places proposed in this report have to be made available by the end of the current plan period, the scheme of establishment of new colleges and polytechnics should be initiated at least by the beginning of 1958. Having regard to the various stages of the schemes in respect of construction of buildings, procurement of equipment, appointment of Staff, etc., it is estimated that an amount of Rs. 700 lakhs would be required up to the end of the plan period as the Central Government's share of the expenditure. Since this amount is not available within the present plan provision for Technical education of the Central Government, additional funds have to be provided. Similarly, for meeting their share of expenditure on the scheme the State Governments have to provide additional funds under the Second Five-Year Plan.

TABLE 1
(Item No. 15 of the Agenda)

**Sanctioned Intake in 1956 for Degree and Diploma Courses in Civil, Mechanical,
Electrical & Tele-Communication Engineering**

Region	Population (in million)	Degree Courses			Diploma Courses		
		No. of Institutions	Intake	Regional Index	No. of Institutions	Intake	Regional Index
Southern	102.61	18	1680	16.37	30	2915	28.41
Western	80.21	11	1310	16.33	25	2490	31.04
Northern	109.05	9	900	8.25	20	1927	17.67
Eastern	95.48	11	1137	11.91	19	1790	18.75
Total	387.35	49	5027		94	9122	
		National Index : 12.98			National Index : 23.55		

TABLE II
(Item No. 15 of the Agenda)

Forecast of position in 1960-61 on the basis of Second Five-Year Plan Schemes and other approved schemes

Region	Population (in million)	Degree Courses			Diploma Courses			Percentage increase over 1956	
		No. of Institutions	Intake	Regional Index	No. of Institutions	Intake	Regional Index	Degree	Diploma
Southern	102.61	22	2925	28.51	50	6275	61.15	74.16	115.24
Western	80.21	14	2425	30.23	31	4160	51.86	85.12	67.07
Northern	109.05	11	1900	17.42	26	4052	37.16	111.15	110.30
Eastern	95.48	12	2045	21.42	24	4240	44.41	79.85	136.85
Total	387.35	59	9295		131	18727			
		National Index : 24.00			National Index : 48.35				
		Percent Increase over 1956 : 84.90			Percent Increase over 1956 :			105.31	

TABLE III
(Item No. 15 of the Agenda)

Region	Population (in millions)	Degree Courses			Diploma Courses			Percentage increase over 1956	
		No. of Institutions	No. of seats	Regional Index	No. of Institutions	No. of seats	Regional Index	Degree	Diploma
Southern	102.61	24	3425	33.38	57	7115	69.34	103.91	144.07
Western	80.21	15	2805	34.97	36	4940	60.09	114.15	98.39
Northern	109.05	12	2300	21.09	34	5192	46.51	155.64	169.43
Eastern	95.48	14	2545	26.65	31	5500	57.60	123.76	207.20
Total	387.35	65	11,075		158	22747			
		National Index : 28.59			National Index : 58.72				
		Percent Increase over 1956 : 120.26			Percent Increase over 1956 : 149.34				

Item No. 16 :

To consider the recommendations of the Coordinating Committee regarding pay scales for Technical Teachers.

The Council some time back, appointed a Special Committee under the Chairmanship of Dr. J.C. Ghosh to go into the question of salary scales and qualifications for teaching staff in technical institutions and to make suitable recommendations with a view to attracting and retaining suitable persons in the teaching posts in technical institutions. The recommendations of the Special Committee were considered at the 25th meeting of the Coordinating Committee held on 3rd December, 1957. While the recommendations with some modifications were generally accepted, the Coordinating Committee desired that the financial implications of the recommendations should be worked out and placed before the Council at the next meeting in order that a specific recommendation could be made to the Government in regard to the scale of assistance that might be given to the institutions.

The recommendations for the Coordinating Committee are given below :—

A. Salary Scales

1. Degree and Post-Graduate Institutions

(a) Technical institutions should be divided into two categories for the purpose of pay scales - Class A institutions where the main emphasis is on post-graduate courses and research and Class B institutions which conduct degree and even a limited number of post graduate courses. The Ministry of Education in consultation with the All-India Council for Technical Education and the University Grants Commission should determine the categories of institutions.

(b) The Salary Scales in these institutions should be as follows :—

Designation of Post.	Salary Scales for Class A.	institutions in Class B.
Director/ Principal	2000-2500 (in exceptional cases an additional pay of Rs. 500 may be allowed).	1300-60-1600-100-1800.
Professor (Senior Scale)	1600-100-1800	**
Professor (Ordinary Scale)	1000-50-1500	1000-50-1500
Asstt. Professor	600-40-1000-50/2-1150	600-40-1000-50/2-1150
Lecturer	350-350-380-380-30 590-EB-30-770-40-850 with a starting salary of Rs. 410/- P.M.	350-350-380-380-30 590-EB-30-770-40-850 with a starting salary of Rs. 410/- P. M.
Workshop Superintendent	600-40-1000-50/2-1150,	600-40-1000-50/2-1150

The number of posts in the senior and ordinary scales for Professors should be determined from time to time.

** Ordinarily there would be no post of Senior Professor in a class B institution. However, having regard to the personal eminence of a member of the staff, a post of professor in the senior scale may be created in a class B institution also.

Also the number of posts in the senior and ordinary scales for professors should be determined from time to time.

(c) As an interim measure the teaching posts may be equated to the corresponding level of posts in the State Public Works Department and for posts of lecturers and upwards, the teachers should in addition be paid an allowance of Rs. 100/- P. M. over the grade pay of equated posts.

<i>Teaching Posts</i>	<i>Equated State P.W.D. Posts</i>
Principal	Additional Chief Engineer
Professor	Superintending Engineer
Asstt. Professor	Executive Engineer
Lecturer	Assistant Engineer
Instructor	Supervisor

(d) For the purpose of salary scales, all existing posts of Associate Professors should be regarded as Professors in ordinary scale and the post of Readers regarded as Assistant Professors.

2. DIPLOMA INSTITUTIONS

(a) The salary scales in these institutions should as follows :--

<i>Designation of post</i>	<i>Salary Scale</i>
Principal	800-40-1000-50-1250
Head of the Department (Lecturer-in-charge)	600-40-1000
Lecturer	350-350-380-380-30- 590 EB 30-770-40-850
Workshop Superintendent	" " " "
Senior instructor	260-10-300-15-450-25/2-500
Junior Instructor	160-10-300

B. Qualifications for Teaching Staff

It was not considered necessary to specify qualifications appropriate to each level of teaching post in degree institutions in view of the fact that in future initial recruitment to the posts of lecturers would be filled from amongst candidates who successfully complete the training under the teaching fellowships scheme. However it was laid down that teaching fellowships should be offered only to first class graduates. All higher posts should normally be filled by lecturers having at least five years' experience.

Candidates appointed to the posts of professors should have the highest qualifications. Candidates possessing advanced degrees may be paid a special pay over the grade pay.

For the posts of lecturer and above in a polytechnic, only degree holders should be appointed. They should have combined teaching and professional experience of not less than seven years for the post of a Principal and five years for the posts of heads of departments and lecturers. Candidates appointed to the posts of Senior Instructors should have three years' experience. Diploma holders may be appointed to the posts of Senior and Junior Instructors.

The existing teaching personnel should be fitted into the appropriate salary scales recommended after proper assessment.

The estimated additional expenditure that would be incurred by the institutions on account of increase in salary scales to the level recommended, is of the order of Rs. 1.78 crores (approx.) per year for the whole country. The State-wise break up of this amount for degree and diploma courses separately may be seen in the Annexure. The following assumptions were made in working out the estimates of cost :—

- i) A part from the degree and diploma institutions in existence at present, institutions approved but not yet started would also require to be assisted to bring up the scales to the level recommended.
- ii) The additional recurring expenditure involved in bringing up the staff number to those prescribed by the A.I.C.T.E. will be borne out of the normal developmental grants. The estimate for this scheme includes only the effect of increase in salary scales even in respect of posts which have yet to be filled.
- iii) Since the standard schedules of requirement of staff laid down by the A.I.C.T.E. relate to engineering courses generally, wherever such schedules have not been prescribed, the additional expenditure on account of improvement of salary scales may be assumed to be the same per capita as for engineering students.
- (iv) The present salary scales not being uniform even in a particular State, the pay scales prescribed by the State Government may be taken as representing the average pay scales for the State.

The conference of heads of some of the Technical Institutions, convened by the Educational Adviser (Technical) to consider the question of shortage of teachers in Technical Institutions, has recommended that immediate steps should be taken to bring up the salary scales to the level recommended by the Coordinating Committee. The conference was not in favour of having different scales of pay even during the interim period, which would result if the posts are equated for the purpose of fixation of salary scales to those in the Public Works Department. Having regard to the fact that all the financial resources of the States had been pledged to the various schemes already approved in the Five-Year Plan, the conference of heads of Technical Institutions, recommended that the entire financial liability for the improvement of scales of pay for the technical teachers should be borne by the Central Government during this Plan period.

Further, there should be a gradual devolution of financial responsibility on to the State Government over successive Plan period.

ANNEXURE—Item No. 16

Statement showing estimated additional expenditure on account of improving salary scales in technical institution to the level approved by the council.

Serial No.	Name of the State	(No. of Instts.)		Estimated Additional cost in Lakhs		
		Degree	Diploma	Degree	Diploma	Total
1.	Delhi	1	1	2.58	—	2.58
2.	Punjab	6	10	5.11	0.88	5.99
3.	Rajasthan	3	3	6.08	0.27	6.35
4.	Uttar Pradesh	8	14	7.50	0.97	8.47
5.	West Bengal	7	13	2.81	9.93	12.74
6.	Bihar	5	5	7.55	1.19	8.74
7.	Assam	2	3	2.13	0.97	3.10
8.	Orissa	1	4	1.07	1.39	2.46
9.	Tripura	—	1	—	0.13	0.13
10.	Bombay	12	20	19.99	8.01	28.00
11.	Madhya Pradesh	5	5	12.56	1.48	14.04
12.	Andhra Pradesh	6	10	11.15	6.40	17.55
13.	Madras	9	16	16.96	10.07	27.03
14.	Mysore	9	23	12.20	9.33	21.53
15.	Kerala	4	11	12.14	6.12	18.26
16.	Pondicherry	—	1	—	0.49	0.49

Net total for the whole country Rs. 177.46 lakhs.

Item No. 17

To consider the report of the Joint Committee of the All-India Council for Technical Education and University Grants Commission on the development of teaching facilities for Geology and Applied Geology.

1. On the recommendation of the Scientific Man-power Committee, the Central Government had assisted some time back certain selected Universities for development of facilities for advanced studies and research in Geology and Geophysics. This work has since been taken over by the University Grants Commission as an integral part of the scheme of development of the Universities.

2. In view of large scale mineral development contemplated in the Second Five-Year Plan and the increasing demand for trained Geologists, Applied Geologists and Geophysicists, it was considered necessary to prepare and implement a comprehensive plan of development of facilities in Pure and Applied Geology in Universities and other Institutions. For this purpose, it was suggested that a Joint Committee of the All-India Council for Technical Education and University Grants Commission may be appointed. The Chairman of the Council and University Grants Commission approved the suggestion and a Joint Committee under the Chairmanship of Dr. D.N. Wadia was constituted.

3. The Report of the Joint Committee is placed before the Council. (Appendix 'B').

4. The Committee has prepared a scheme of Post-graduate studies in Geology and Applied Geology and have also indicated in broad outlines syllabus for the courses. The Universities have been given the freedom to prepare detailed syllabus in accordance with their needs as determined by the industrial environment and facilities available in allied subjects such as Engineering, Chemical Technology, Geophysics, etc.

5. The main recommendations of the Committee are as explained below :—

(i) *Pattern of courses*

- (a) M.Sc. course in Geology should cover a period of two years after B.Sc. Degree and for those taking Applied Geology, an additional one-year course be prescribed after M.Sc. in Geology. In the alternative, an integrated course of three years after B.Sc. leading to M.Sc. degree in Applied Geology may be started if a University so desires.
- (b) For Associateship in Applied Geology at the Indian School of Mines and Applied Geology, Dhanbad, the Course should be of five years' duration to be considered equivalent to M.Sc. in Applied Geology.

(ii) *Centres of training for Applied Geology*

The following centres should be developed for courses in Applied Geology.

- (a) Indian Institute of Technology, Kharagpur, (has also facilities for Geophysics)
 - (b) Indian School of Mines & Applied Geology, Dhanbad, (has also facilities for Geophysics)
 - (c) Andhra University, (has also facilities for Geophysics)
 - (d) Banaras Hindu University, (has also facilities for Geophysics)
 - (e) Saugar University
 - (f) Nagpur University
 - (g) Mysore University
- (iii) *Scope of Training*

With a view to meeting the requirements of industry and research organisations for qualified personnel, the training of a geologist should be channelled in a number of specialities as given below :—

- (a) Geological Mapping and Searching for mineral deposits
- (b) Geology and prospecting for mineral deposits with sub-specialities as
 - (i) Geology and prospecting for solid fuels
 - (ii) Geology and prospecting for metallic and non-metallic minerals
- (c) Geology and prospecting for Oil and Gas
- (d) Hydro-Geology and Engineering Geology

In pure Geology a good course in General Economic Geology, Geological Mapping and the Principles of Prospecting should be included.

For a complete course in Applied Geology, the following subjects should be included :

- (a) Mining Geology including mineral prospecting, sampling and underground Geological Surveying, mineral economics; principles of mineral beneficiation and processing, elements of mining, metallurgy and assaying; and mineral legislation.
- (b) Principles of Geophysical and Geochemical Prospecting
- (c) Ground-water Geology
- (d) Economic Palaeontology
- (e) Engineering and Soil Geology
- (f) Utilization of minerals in Industry

The award of M.Sc. degree by thesis only should be discontinued forthwith.

(iv) *Admission*

The number of candidates to be admitted to post-graduate courses (M.Sc.) in Applied Geology should ordinarily be 12, but should not exceed 15. No post-graduate course should be started unless provision has been

made for the appointment of and the requisite qualified staff as laid down in the scheme.

6. It may be pointed out that at the Indian Institute of Technology, Kharagpur, there is a three-year integrated course leading to B.Sc. (Hons.) in Geology and Geophysics with Intermediate Science as admission qualification. After the Hons. course, the candidate can proceed for two-year post-graduate course either in Geology or in Geophysics leading to M.Sc. degree. This pattern varies from the pattern suggested by the Committee. However it takes five years after Intermediate Science for a candidate to get M.Sc. in the Kharagpur Institute, and in that respect the duration is in conformity with the duration prescribed by the Committee. It may also be pointed out that the Hons. course is a terminal stage for preparing candidates for employment as Geologists at certain levels.

The Associateship course at the Indian School of Mines and Applied Geology, Dhanbad is at present a four-year course after Intermediate Science. The Associateship is recognised by the Government of India as equivalent to M.Sc. degree in Geology. This Institute is also affiliated to Bihar University and the students after undergoing the same course of four years can appear for the Bihar University Examinations and are awarded M.Sc. degree in Applied Geology by the University.

The Committee has, however, recommended that for the purpose of recognition of this course as equivalent to M.Sc., the duration should be five years.

The matter is now placed before the council for consideration.

Item No 18 :

To report the progress of Technical Education Schemes under the Second Five-Year Plan

(A) State Government Plans

1. It was reported to the All-India Council for Technical Education on 22nd February, 1957, that the Second Five-Year Plans of State Governments had included establishment of five new engineering colleges and 22 new polytechnics. Subsequently, however, various adjustments have been made in the plans and as a result the State Plans now provide for eight engineering colleges and 36 polytechnics. Of the three additional colleges, one has started functioning in Nagpur and the other two colleges are proposed to be established at Trichur, Kerala, and at Jorhat, Assam. The Council at its meeting held on 22nd February, 1957, decided that those new institutions for which the State Governments had made the necessary plan provision or will be able to make provision by adjustments should be proceeded with. In accordance with this decision, the Central Government have approved the establishment of the three additional colleges.

2. The change in the position regarding the polytechnics is due to the following factors :

- (a) The institutions which started in the last year of the First Five-Year Plan and for which the State Governments made the bulk of the provision in the Second Five-Year Plan had to be regarded as Second Plan Projects.
- (b) Tripura and Pondicherry plans also included one polytechnic each.
- (c) Due to the reorganisation of the States some State Governments made readjustments in their plans and provided for a few more institutions.
- (d) Inclusion of additional polytechnics in the State Plans.

3. A statement showing the State-wise distribution of the eight Engineering Colleges, 36 Polytechnics and 60 Junior Technical Schools included in the State Plans under the Second Five-Year Plan, their location, etc. is given in Annexure. Six of these colleges and seventeen polytechnics have already started functioning as indicated in the statement. It may be mentioned that two new polytechnics included in Mysore State Plan are in replacement of the existing Engineering School in Bangalore, which is largely drawing upon the facilities of the Engineering College. As the College is being expanded for degree courses and the School in its present place has no scope of development, the State Government have decided to start two Polytechnics in Tumkur and Chennapatna and close down the School.

4. During the year 1956-57, grants amounting to 65.68 lakhs were sanctioned to State Governments for the various schemes which overflowed from the First Five-Year Plan as well as for the implementation of new schemes in accordance with the Second Five-Year Plan. In the current financial year, grants amounting to Rs. 17.65 lakhs have been sanctioned up to the end of February, 1958. Further grants will be sanctioned during the rest of the financial year depending upon the progress of expenditure for the schemes.

5. In regard to Junior Technical Schools for which the State plans include provision for 60 institutions, a detailed scheme has been prepared by the Ministry and is now under the consideration of the National Council for Vocational Trades for advice on the content and standard of training in the various trades.

(B) *Central Plans*

1. EXPANSION OF EXISTING TECHNICAL INSTITUTIONS

1. The All-India Council for Technical Education, at its meeting held on 22nd February, 1957, approved the report of Ghosh-Chandrakant Committee on the implementation of the recommendations of the Engineering Personnel Committee and recommended that the proposed expansion of existing institutions may be proceeded with immediately.

2. The Committee envisaged conversion of 19 selected existing engineering colleges and 50 polytechnics into larger units so as to yield 2538 additional seats for the degree courses and 4885 additional seats for the diploma courses.

3. The polytechnics and colleges selected were examined further in consultation with the State Governments concerned and the number of Polytechnics to be expanded were reduced to 41, since in the rest the present conditions were not satisfactory for increasing the admissions at this stage. The polytechnics as finally selected included four institutions to be newly established for taking over the diploma courses conducted in four engineering colleges which were to be expanded for degree courses. The expansion programme of the 19 colleges and 41 polytechnics will yield 2458 additional seats for degree courses and 4370 seats for diploma courses. Against this, 2096 additional students to degree courses and 3369 additional students to diploma courses, have already been admitted from the academic session 1957-58.

4. The total cost of the scheme for expansion of the existing institutions is estimated as follows :—

	Rs.
Non-Recurring	
For Buildings and Equipment	647.664 lakhs
Recurring	296.677 lakhs
Loans for Hostels	361.375 lakhs
	1305.716 lakhs

5. It has been decided that the entire non-recurring expenditure of the scheme should be borne by the Central Government/U.G.C. and the recurring expenditure should be borne by the Central Government/U.G.C. in the following manner :—

First Year	100%
Second Year	80%
Third and fourth Year i.e. up to the end of the current plan period	50%

The balance of the recurring expenditure in the second and subsequent years will have to be borne by the State Governments in the case of Government institutions and in the case of non-Government institutions by the State Governments and the institutions concerned on an agreed basis. After the plan period the share of the Central Government on recurring expenditure would be borne by the State Governments/institutions.

6. A provision of Rs. 974.53 has been found so far, for the scheme by revising the allocation for various educational schemes in the Central Plan. The question of finding the additional funds required is under consideration. Sanction has been accorded, in principle, to an expenditure of Rs. 974.52 lakhs as per details given below :—

	Rs.
Non-recurring	620.964 lakhs
Recurring	284.932 lakhs
Loans for Hostels	68.625 lakhs
	974.521 lakhs

7. Grants and Loans amounting to Rs. 1,01,46,700/-, as per details below, have been sanctioned to non-University institutions for expenditure during the current financial year as per phased programme drawn up by the institutions :-

Grants

	Rs.
Non-recurring	89,40,400
Recurring	8,06,300
Loan for Hostels	4,00,000
	1,01,46,700

8. The following are the grants paid to University institutions by the University Grants Commission :

	Rs.
Non-recurring	6,17,932
Recurring	1,14,000
	7,31,932

II. INDIAN INSTITUTE OF TECHNOLOGY, KHARAGPUR

The incorporation of the Indian Institute of Technology (Kharagpur) by an Act of the Parliament on 1st April, 1957, marks an important step in the development of the Institute. The Act declares the Institute as an Institution of National Importance with powers to grant Degrees, Diplomas and other academic distinctions. It also provides for a Board of Governors, Academic Council, Finance Committee and other Statutory bodies to constitute the administrative and governing machinery with the President of the Republic as the Visitor of the Institute. With effect from 1st April, 1957, the Institute has thus become autonomous and the Board of Governors has been vested with supreme authority over the Institute in all academic, administrative and financial matters.

2. The Institute offers under-graduate courses in the following subjects leading to Bachelor of Technology (B. Tech.), Bachelor of Architecture (B. Arch.) and Bachelor of Science (B.Sc.) degrees. The annual in-take capacity for each course is also shown against each subject :

B. Tech.

(i) Agricultural Engineering	30
(ii) Chemical Engineering	15
(iii) Civil Engineering	100
(iv) Electrical Engineering	75
(v) Metallurgical Engineering	25
(vi) Mechanical Engineering	75
(vii) Mining Engineering	25
(viii) Naval Architecture & Marine Engineering	12

B. Arch.

(ix) Architecture 30

B. Sc.

(x) Geology & Geophysics 20

3. The Institute offers post-graduate courses leading to the degree of Master of Technology in the following subjects :-

- (i) Applied Botany
- (ii) Farm Machinery & Power
- (iii) Technical Gas Reactions & High Pressure Technology
- (iv) Regional Planning
- (v) Combustion Engineering & Fuel Economy
- (vi) Chemical Engineering, Plants—Design and Fabrication
- (vii) Structural Engineering
- (viii) Dam Construction & Water Power Engineering
- (ix) Electrical Machine Design
- (x) Radio Broadcast Engineering
- (xi) Ultra High Frequency & Micro-Wave Engineering
- (xii) Applied Geology
- (xiii) Exploration Geophysics
- (xiv) Non-linear Mechanics
- (xv) Production Technology
- (xvi) Industrial Engineering
- (xvii) Machine Design
- (xviii) Design of Refrigeration & Air Conditioning Plant
- (xix) Metrology

4. Normal in-take capacity for post-graduate courses is eight per course. At present there are 1320 under-graduate students and about 100 post-graduate students at the institute.

The institute has trained so far 669 graduates and 163 post-graduates in various specialised fields : the number of apprentices trained in various trades is 30. The Institute has also provided facilities for advanced work and research for about 100. The number of research papers published by the Institute during the last three years is over 450. Six research workers have received doctorate and other distinctions.

III. INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

1. The establishment of the Indian Institute of Technology in Bombay as the second in the chain of four such Institutes, has been approved by the Central Government. On the recommendations of the Planning Committee it has been decided that the Institute should start functioning from July, 1958.

2. The Government of Bombay have placed at the disposal of the

Central Government a 580-acre site near Powai lake, free of cost, for the Institute. Detailed plans and estimates have been prepared and construction of buildings etc. has started.

3. UNESCO has agreed to assist in the establishment of the institute with 15 experts, three translators and a substantial amount of equipment from the U.S.S.R. Facilities for the advanced training of 20 teachers in institutions of higher learning in U.S.S.R. will also be provided. 13 Soviet experts and three translators have already arrived in India and are now working in certain selected technical institutions pending their transfer to Bombay Institute. A non-Soviet expert in Switchgear Design was expected to arrive in India by the end of February, 1958. Two more non-Soviet experts will be provided for the Institution under the 1958 Programme. Orders for equipment costing Rs. 61.19 lakhs have already been placed with UNESCO and equipment costing about Rs. 3 lakhs has already been received. More equipment is expected during the next few months. The Institute is being planned to provide facilities for 1000 students for under-graduate courses and 500 students for post-graduate courses and research work. The following fields of study will be covered :

Under-graduate Courses

1. Civil Engineering
2. Mechanical Engineering
3. Chemical Engineering
4. Electrical Engineering
5. Metallurgy
6. Geology

Post-graduate level

1. Structural Engineering
2. Concrete Technology
3. Highway Engineering
4. Railway Engineering
5. Soil and Water Conservation
6. Public Health Engineering
7. Foundry Engineering
8. Refrigeration and Air Conditioning
9. Machine Fabrication and Machine Tools
10. Power Plants
11. Chemical Engineering, Plant Design and Fabrication
12. Instrumentation and Control and Servo Mechanisms
13. Silicate Technology
14. Cellulose and Paper Technology
15. Fuels and Combustion
16. Ferrous Metallurgy

17. Non-Ferrous Metallurgy—production of aluminium and Magnesium and light metal alloys
18. Design of Electrical Machines and Switchgear
19. Electric Traction
20. Electronic Devices
21. Radio Engineering
22. Nuclear Engineering
23. Applied Geology
24. Mineral Engineering

4. The Institute will function as an autonomous body from the very beginning and is being registered as a Society for that purpose. However, it will be incorporated as an Institution of National Importance by an Act of Parliament as soon as possible. A Board of Governors under the Chairmanship of Shri Kusturbhai Lalbhai for the administration and management of the affairs of the Institute has been set up. A provision of Rs. 325 lakhs has been made in the Second Five-Year Plan for the Institute. A Planning Officer has been appointed and Selection Committees are at work at present to recruit the teaching staff.

IV. SOUTHERN AND NORTHERN HIGHER TECHNOLOGICAL INSTITUTES

1. The Central Government have decided that the Southern and Northern Higher Technological Institutes should be set up as soon as possible instead of in the latter half of the plan period as proposed earlier. It has been further decided that the Southern Institute should be located at Madras and the Northern Institute at Kanpur. Sites for the Institutes have been chosen and Planning Committees have been appointed to prepare detailed plans, estimates, courses of study, etc.

2. A provision of Rs. 200 lakhs has been made in the Second Five-Year Plan for each Institute.

3. The Technical assistance offered by the Government of West Germany will be utilised for the Southern Institute. The draft agreement to be entered into between the two countries, is being examined by the Government of India.

V. INDIAN INSTITUTE OF SCIENCE, BANGALORE

The Visitor of the Institute (The President of India) appointed in December, 1955 a Committee under the Chairmanship of Dr. J.C. Ghosh, Member, Planning Commission to review the working and progress of the Institute. The Committee has submitted its report which is under consideration.

On the recommendation of the All-India Council for Technical Education, Central Government have approved development of facilities for post-graduate courses and research training in the following subjects :

1. Automobile Engineering

2. High Voltage Engineering
3. Electrical Measurements, measuring instruments, transmission, distribution and net work practice
4. Foundry Engineering
5. Advanced Electrics, Advanced Line-Communication, ultra-short and micro-wave Engineering, Advanced Electroacoustical Engineering

Courses in the above subjects have been started from 1953-57 session

During the session 1957-58, part-time courses in Industrial Engineering and Industrial Administration have been started in the institute. A Post-graduate course has also been started in Soil Mechanics and Foundation Engineering.

VI. LOANS TO TECHNICAL INSTITUTIONS FOR CONSTRUCTION OF HOSTELS

1. In the last two years of the current Plan period loans have been sanctioned for the construction of hostels for about 2,400 students in technical institutions. Against the Plan provision of Rs. 250.0 lakhs, loans amounting to Rs. 65,16,977 have been paid up to the end of February, 1958.

2. In December, 1957, a policy decision was taken by the Finance Ministry that no interest-free loans should be sanctioned for the construction of hostels but out-right grants-in-aid might be given for the purpose subject to the Revenue Budget capacity in each year. As a result of the representations made by the Education Ministry that the revised policy would greatly hamper the progress of Technical education in the country, the scheme of grant of interest-free loans has been allowed to continue.

3. Due to inadequate provision in the Plan for the scheme of hostels and the urgent need for funds for the expansion of technical institutions it has been decided not to implement the scheme of construction of staff quarters during the current plan period.

VII. ADMINISTRATIVE STAFF COLLEGE AND NATIONAL INSTITUTE OF MANAGEMENT

1. The Administrative Staff College started the first course on 6th December, 1957 with an enrolment of 20 students. The next course is expected to start on 15th June, 1958 with an enrolment of 60 candidates.

2. Discussions are in progress with the various regional management organisations for the implementations of the scheme of establishment of a National Institute of Management.

VIII. TRAINING OF FOREMEN AND SUPERVISORS

1. The Ministry in consultation with the Regional Committees is examining the possibility of implementing the scheme of Sandwich course in Mechanical Engineering as approved by the Council, some time back. The Scheme is included in the Second Five-Year Plan of the Central Government

and a provision of Rs. 50 lakhs has been earmarked for the purpose. The Council has estimated that for establishing a centre for the Sandwich course in association with industry, the expenditure will be as follows :—

Non-recurring

Buildings	Rs. 4.59 lakhs
Equipment	Rs. 5.70 lakhs
	<hr/>
	Rs. 10.29 lakhs

Recurring

Ultimate	Rs. 1.98 lakhs
Hostels	Rs. 5.5 lakhs

2. The Government of West Bengal in association with Birla group of industries in Calcutta has agreed to set up an institution for conducting the Sandwich course with an enrolment of 200 students. The cost of the scheme is estimated as follows :—

Non-recurring

a) Land	Rs. 6.30 lakhs
b) Institutional buildings	Rs. 4.86 lakhs
c) Equipment	Rs. 4.60 lakhs
d) Hostels	Rs. 5.60 lakhs
e) Staff quarters	Rs. 3.87 lakhs

	Rs. 25.23 lakhs
Recurring	Rs. 2.22 lakhs (Ultimate)

The Central Government has agreed to bear 66 $\frac{2}{3}$ % of the non-recurring expenditure on institutional buildings and equipment and 50% of the recurring expenditure.

3. Proposals for starting similar centres in Madras, Coimbatore and Bombay are under consideration.

IX. TECHNICAL INSTITUTIONS TO BE ESTABLISHED BY PRIVATE ENTERPRISE

1. The Council at its meeting held on 22nd February, 1957 decided that under the Second Five-Year Plan only those private agencies which fulfilled the following conditions should be assisted in the establishment of new technical institutions :

- The private agency by itself or in association with the State Government concerned should meet at least 50% of the non-recurring expenditure on the institution, the balance will be provided by the Central Government. Wherever the State Government makes a contribution that amount should be provided in its Second Five-Year Plan.
- The private agency should have adequate resources including income from tuition fees to meet at least 50% of the approved recurring expenditure. The balance will be provided by the State Government and the Central Government in agreed propor-

tions subject to the condition that the State Government concerned shall assume the entire responsibility after the current plan period.

2. In pursuance of the above decision the Regional Committees considered the proposals received from the various private agencies in consultation with the various State Governments concerned and recommended four new engineering colleges and 13 new polytechnics. The Coordinating Committee or the Chairman, All-India Council for Technical Education has approved the establishment of these institutions. The location of these institutions is shown below :—

<i>Madras</i>	One Engineering College in Coimbatore under the Rangaswami Naidu Trust and another in Madurai under the Thyagaraja Educational Trust. One polytechnic in Madras (Avadi) and one each in Pollachi, Salem, Tanjore, Annamalainagar, Virudhunagar and Talaithu.
<i>Kerala</i>	Four polytechnics one each at Quilon, Kaladi, Pandalam and Alleppey.
<i>Bombay</i>	One Engineering College at Bombay under the Bharatiya Vidya Bhavan Society.
<i>Andhra</i>	One polytechnic in Hyderabad City.
<i>Punjab</i>	One Engineering College in Ludhiana under the Guru Nanak Educational Trust.
<i>Madhya Pradesh</i>	One polytechnic in Bhilsa.

Of these, three colleges and seven polytechnics satisfied the conditions laid down by the All-India Council and State Governments agreed to accept their share of the expenditure. Wherever necessary the State Governments also under-wrote the solvency of private agencies to the extent of the latter's financial responsibility. The Central Government approved the new institutions which are as shown below :—

<i>Madras</i>	One Engineering College in Coimbatore under the Rangaswami Naidu Trust and another in Madurai under the Thyagaraja Educational Trust. One polytechnic in Madras (Avadi) and another in Pollachi.
<i>Kerala</i>	Three polytechnics—one in Quilon, one in Kaladi and one in Pandalam.
<i>Andhra</i>	One polytechnic in Hyderabad City.
<i>Punjab</i>	One Engineering College in Ludhiana under the Guru Nanak Educational Trust.
<i>Madhya Pradesh</i>	One polytechnic in Bhilsa.

The formal approval of the Government to the remaining institutions will be conveyed after the financial aspects of the schemes have been settled

with the State Governments concerned and private agencies.

X. GRANT-IN-AID TO NON-GOVERNMENT INSTITUTIONS AND GRANTS-IN-AID TO GOVERNMENT AND NON-GOVERNMENT INSTITUTIONS FOR SPECIALISED COURSES

1. During the year 1956-57, grants amounting to Rs. 65.76 lakhs were sanctioned to various non-Government institutions for their establishment or improvement and development in accordance with the schemes approved by the All-India Council and to Government and non-Government institutions for specialised courses like Mining Engineering etc. In the current year, grants amounting to Rs. 57.02 lakhs have been sanctioned up to 28.2.58.

XI. INDIAN SCHOOL OF MINES AND APPLIED GEOLOGY, DHANBAD.

1: The scheme of expansion and development of the Indian School of Mines and Applied Geology, Dhanbad which was approved by the Council some time back is under the consideration of Government. The scheme envisages the following aspects :—

- (a) Increase in the admissions from 48 students to 150 students per year.
- (b) Introduction of new courses in Petroleum Technology and Applied Geophysics.
- (c) Improvement of Instructional and other facilities.

The admissions to the school have been increased to 150 students with effect from July, 1957. The new courses viz., Petroleum Technology and Applied Geophysics have also been introduced.

2. The administrative control of the School has been transferred to the Ministry of Education and Scientific Research.

XII. REVISED PATTERN OF CENTRAL ASSISTANCE

The existing pattern of Central Assistance for the establishment and development of technical institutions has been reviewed, and a new pattern has been approved. Under the new pattern, Central Government proposes to meet the entire non-recurring and recurring expenditure for all approved schemes of post-graduate courses and research in engineering and technology and special studies such as Mining Engineering, Management studies etc. As regards first degree and diploma courses, it is proposed that for the establishment of new institutions during the current Plan period, whether by State governments or by private agencies, Central assistance will be 50 per cent of the non-recurring and recurring costs of the schemes. For the improvement and development of existing government institutions for first degree and diploma courses undertaken in the current plan period, the Central assistance proposed is up to 50% of non-recurring and recurring expenditure. The manner and extent to which the new pattern of assistance should be applied in respect of each institution is under consideration.

ANNEXURE

(Item No. 18 of Agenda)

State	Number of Engineering Colleges	Number of Polytechnics	Number of Junior technical schools
1. Mysore	—	6(*Gulbarga, Karwar, Tumkur, Belgaum Chickmagalur and Chennapatna)	—
2. Andhra	1(*Waltair)	3(*Tirupathi, *Vizagapatnam and *Warangal)	—
3. Kerala	1(Trichur)	2(Trivandrum and Cannanore)	18(Location not decided)
4. Pondicherry	—	1(Pondicherry)	—
5. Bombay	1(*Nagpur)	6(*Sholapur, *Aurangabad, *Karad, Nasik, Dohad and *Amravati)	—
6. Madhya Pradesh	1(*Raipur)	4(*Jaora, *Nowgong, *Ujjain and Rajgarh)	8(location not decided)
7. Punjab	1(*Patiala)	2(Chandigarh and Rohtak)	4(location not decided)
8. Rajasthan	—	2(Ajmer and *Udaipur)	4(location not decided)
9. Uttar Pradesh	—	2(Bareilly and Jhansi)	8(location not decided)
10. Jammu & Kashmir	—	2(Srinagar and Jammu)	4(location not decided)
11. West Bengal	—	3(*Jhargram, *Murshidabad and *Purulia)	7(location not decided)
12. Bihar	—	1(*Patna)	5(location not decided)
13. Orissa	1(*Burla)	—	2(location not decided)
14. Tripura	—	1(Agartala)	—
15. Assam	2(*Gauhati and Jorhat)	1(Nowgong)	—
16. Himachal Pradesh	—	—	—
Total	8	36	60

*Indicates institutions which have started functioning

*Item No. 19***To consider the question of holding of Supplementary Examinations by the Council**

Recently, the students of Delhi Polytechnic, Delhi went on strike. They called off the strike after the Deputy Minister for Education and Scientific Research gave *inter-alia* an assurance that the question of holding supplementary examinations for National Diploma and National Certificate in September will be referred to the Council for consideration.

In this connection it may be pointed out that the question of holding supplementary examinations for compartment and/or the failed candidates was considered by the Coordinating Committee, Engineering Board and Special Committee of the Council some time back. The Coordinating Committee, however, did not agree that the Supplementary Examinations should be held during September/October for either failed candidates or compartment candidates.

The matter is now placed before the Council for reconsideration.

*Item No. 20***To consider the recommendations of the conference of Principals of Technical Institutions regarding shortage of teachers**

A conference of the Heads of some of the Engineering Institutions was held in New Delhi on 12th and 13th March, 1958 under the Chairmanship of Prof. M.S. Thacker, Educational Adviser (Technical) and Secretary to the Government of India in the Department of Scientific Research and Technical Education. The conference was attended by the following :—

1. Shri R. N. Dogra,
Principal,
Punjab Engineering College, Chandigarh
2. Shri V. G. Grade,
Principal,
M. B. M. Engineering College, Jodhpur
3. Shri N. Das Gupta,
Principal,
Assam Engineering College, Gauhati
4. Shri B. Prasad,
Principal,
Bhagalpur School of Civil Engineering, Bhagalpur
5. Shri A. C. Roy,
Principal,
Bengal Engineering College, Sibpur
6. Shri S. P. Chakravarti,
Principal,
Govt. Engineering College, Jabalpur
7. Shri V. G. Mohan Raj,
Principal,
Government Technical College, Hyderabad

8. Shri M. V. Kesava Rao,
Principal,
College of Engineering, Trivandrum
9. Shri K. Koman Nayar,
Principal,
Kerala Polytechnic, Kozhikode
10. Prof. Hegde,
College of Engineering, Guindy, Madras
11. Shri Shanta Mallapa,
Principal,
Sri Jayachamarajendra Occupational Institute,
Bangalore
12. Shri V. Lakshminarayanan,
Principal,
Birla College of Engineering, Pilani
13. Shri A. N. Khosla,
Vice-Chancellor,
Roorkee University, Roorkee
14. Shri G. P. Sinha,
Principal,
Technical College, Dayalbagh, Agra
15. Shri B. Prasad,
Principal,
University, College of Engineering,
Burla, P. O. Hirakud Colony, Sambalpur
16. Shri B. Sen Gupto,
Principal,
Victoria Jubilee Technical Institute, Matunga, Bombay
17. Shri V. H. Acharya,
Principal,
Shri Govindram Saksaria Technical Institute, Indore
18. Shri G. R. Damodaran,
Principal, P. S. G. & Sons Charities,
Industrial Institute, Peclamedu, Coimbatore
19. Shri Narayana Iyengar,
Engineering College, Bangalore
20. Shri S. C. Sen,
Principal,
Delhi Polytechnic, Delhi
21. Shri M. Sen Gupta,
Principal,
Engineering College,
Banaras Hindu University, Banaras
22. Shri P. K. Kelkar,
Planning Officer,
Indian Institute of Technology, Bombay
23. Shri H. C. Dhall,
Superintendent,
Government Technical Institute, Ambala

Shri M. R. Kothandaraman and Shri K. L. Joshi of the Planning Commission, Dr. Laroia of the University Grants Commission, and Shri G. K. Chandiramani, Shri L. S. Chandrakant and other Officers of the Department of Scientific Research and Technical Education were also present.

2. Prof. M. S. Thacker welcomed the Heads of the Institutions and thanked them for sparing two days of their valuable time to consider the important and urgent problem of meeting the shortage of teachers in engineering colleges and polytechnics. He informed the conference that the Central Government were feeling concerned about the present situation, particularly having regard to the fact that the success of the schemes of economic development in the Five-Year Plan depended in the main on the engineering personnel of the right quality and numbers necessary for the implementation of the various programmes. He hoped that as a result of the deliberations of the conference, concrete recommendations, for remedying the present situation and for meeting the future needs, would emerge enabling the Central and the State Governments to take appropriate action.

3. There was a general discussion held on the morning of 12th March during which the various Heads of Institutions stated some of their experiences and the measures which they had taken and also suggested certain other measures which could only be taken with assistance, financial and technical, from the Government. Some of the important points made during the general discussions were:-

- i) The recruitment policy and procedures need be drastically revised particularly in Government Institutions so that appointment could be made to the vacant posts expeditiously.
- ii) Young brilliant men would be interested in availing themselves of the facilities of the Teacher Training Scheme only if the State Governments simplify their recruitment procedures making it possible for the trained teachers to be absorbed in the teaching profession immediately on completion of their training.
- iii) There is a considerable shortage of teachers with field experience and this could be made good by the Public Works Departments and other Government Departments permitting their senior staff to undertake teaching on full-time basis for a specified period, or on a part-time basis. Such arrangements would, however, be effective only if the Institutions had the final say in the selection of personnel for teaching and not the Government Departments supplying such teachers.
- iv) The disparity in the scales of pay in the various institutions resulted in migration on a large scale. While inter-change of teachers between the institutions should in fact be encouraged and not completely banned, it should not assume such long proportion as it has at present. It is, therefore, necessary that the disparity in the scales of pay in the various institutions be immediately removed.
- v) To improve the quality of teaching, teachers should be encouraged to undergo advanced courses and some form of recognition should be given to a teacher who obtains higher qualifications.

- vi) The ratio of senior posts to junior posts in teaching should be recognised so that the chances of promotion in an institution for a teacher become comparable with the chances which engineers have in the joint cadres in the Government Departments.
- vii) Even in the degree institutions, on the basis of the work to be done by the teachers, some of them should be required to possess diploma qualifications only. At present, the tendency is to prescribe degree as a minimum qualification for all posts.

4. The conference formed itself into working groups to discuss fully the measures—short-term and long-term—and met in the afternoon of 12th March in two separate groups.

5. The reports of the two groups were considered by the conference as a whole on 13th morning and afternoon. The following are the findings and the recommendations of the conference :—

- i) The in-take into the engineering courses (Civil, Mechanical, Electrical and Tele-Communication) was 5,027 for the degree courses and 9,122 for the diploma courses in 1956. The development programmes already included in the Second Five-Year Plan and the programme of expansion of existing institutions started in the Session 1957-58 plus the programme of establishment of new institutions likely to be launched during the remaining period of the Plan will raise the in-take to approximately 10,000 in degree courses and 20,000 in the diploma courses. In other words, the total enrolment in the degree colleges will have risen from approximately 18,000 in 1956 to 38,000 in 1961 and likewise in the diploma courses, the enrolment will have increased from 25,000 to 60,000. For meeting the present shortage of teachers, estimated at approximately 40% of the sanctioned cadre and the requirements of teachers for expansion of existing institutions and establishment of new institutions, it is estimated that 2,000 additional teachers will be required for the degree courses, and 2,300 for the diploma courses, on the basis of teacher-pupil ratio at 1 : 10 in the degree institutions and 1 : 15 in the diploma institutions.

It is understood that the Perspective Planning Division of the Planning Commission has made tentative estimates of the in-take into the engineering colleges and polytechnics to meet the requirements of the Third and Fourth Five-Year Plans. Indications are that a programme would require to be formulated to provide for an in-take of approximately 14,000 to the degree and 28,000 to the diploma courses. The conference suggested that pending a firm estimate being made in this behalf, the requirements of teachers may be placed at a round figure of 5,000—2,500 for degree courses and 2,500 for diploma courses. It may further be assumed that half the numbers of the teachers in the diploma institutions will require to have first degree in engineering. Thus 3,750 teachers with first degree and higher qualifications and 1,250 teachers with diploma qualifications will be required by 1961.

- ii) Immediate steps should be taken to remove the disparity in the scales of pay of teachers in the various institutions. The confer-

ence did not, therefore, favour the suggestion made by the Coordinating Committee of the All-India Council for Technical Education to equate the scales of pay of teachers to those in the Public Works Department with a special allowance.

- iii) Efforts should be concentrated on "bagging" young brilliant graduates and diploma holders for the teaching profession. The scales of pay of a lecturer with a degree qualification should, therefore, be the same as that offered in the superior Central Services such as the Railway Service of Engineers, with a provision for a higher start for suitable qualified candidates.

The scales of pay recommended by the Coordinating Committee were genuinely considered to be adequate.

- iv) Having regard to the fact that the State Governments had pledged all their financial resources for the various schemes already included in the Plan, the entire financial liability for the improvement of the scales should be borne by the Central Government during the Second Plan period. There should be gradual devolution of this financial responsibility on to the States during successive Plan periods.

- v) Amenities and incentives should be provided for teachers as given below :

- a) *Housing*—It is estimated that approximately 8,000 teachers will be working in the various institutions in 1961. To start with, provision may be made for housing of 50% of the teachers, the programme being spread over a period of time necessitated by financial considerations. The scheme of the Government of India for Low Income Group Housing, for persons drawing salaries up to Rs. 500 p.m., should be availed of by the State Governments and through them by the private institutions. In regard to the rest, the Central Government should give grants to the institutions for building houses and the income derived by way of rents should be offset against the assistance to be given by the Central Government for the improvement of the scales of pay.
- b) Travel concessions may be given to teachers for proceeding to the home town on the scale applicable to the Central Government servants.
- c) A personal pay of Rs. 75/-, Rs. 125/- and Rs. 150/- p.m. may be given to teachers on their acquiring the Master's degree, the Ph. D. degree and the D. Sc. degree respectively. This personal pay should continue to be given throughout their teaching career.
- d) The teachers should be encouraged to undertake consultative practice on a limited scale consistent with their responsibility in the institutions.
- e) The age of superannuation should be raised to 60.
- vi) Provision should be made in the Central scheme for Teaching Fellowships to place under training 500 persons with degree qualifications and 200 persons with diploma qualifications during the next three years. The 500 senior fellowships (for persons

with first degree qualifications) should include the requirements of the polytechnics also although teachers earmarked for the polytechnics would be trained in the diploma institutions. The Senior Fellowships should be of the value of Rs. 350-25-400 and the Junior Fellowships of the value of Rs. 200-20-240. The phasing may be—Senior Fellowships 150 in 1958, 150 in 1959, and 200 in 1960, and Junior Fellowships 50 in 1958, 50 in 1959, and 100 in 1960.

- vii) While the fellows selected under the Teaching Fellowships Schemes would be trained in selected institutions, the institutions in the country should themselves train further teachers and for this purpose they should be permitted to appoint as supernumerary lecturers/teachers at least 50% of their requirements three years later. In other words, they should have supernumerary posts of probationary lecturers/teachers in the scale of Rs. 300-25-350 for persons with degree qualifications and Rs. 170-15-200 for persons with diploma qualifications. After completion of three years period of probation and/or apprenticeship, these persons should be absorbed by the institutions themselves. Arrangements should be made with the selection and appointing authorities so that their appointment on the regular cadre is made on the basis of an assessment of their work during the training period. There should be no need to advertise the posts earmarked for them, subject of course to their satisfactory work during the period of training.
- viii) The additional expenditure involved in all the supernumerary posts of lecturers/teachers should be borne by the Central Government during the Second Plan period as in the case of improvement of scales of pay and there should be gradual devolution of the financial responsibility on to the States over successive plan periods.
- ix) Recruitment procedures should be simplified, particularly for appointment to teaching fellowships and probationary lecturers/teachers and subsequently to the regular cadre of lecturers and teachers. 'Ad hoc' committees may be appointed for the purpose with which members of the Public Service Commission may be associated in the case of Government Institutions. The work of brilliant students should be watched during their course for the first degree or diploma and on the basis of their performance, selections and appointments should be made as soon as possible after the completion of their degree and diploma courses.
- x) Probationary lecturers/teachers should be sponsored to the maximum extent possible (a) for the award of scholarships offered under various schemes for training abroad and (b) for undergoing post-graduate courses in the various institutions in the country.
- xi) Students undergoing post-graduate courses in the various institutions in the country should be drawn for the purpose of teaching. With the concurrence of the State Governments and the authorities of the non-government institutions, selection for appointment to teaching posts in the various institutions may be made by a Central Committee, which should go round to the post-graduate centres. The gap between the passing out of such students and their appointment to the teaching posts should be

reduced to the barest minimum, otherwise there is a danger that such students will seek and obtain appointment elsewhere.

- xii) For training in the methods of teaching, teaching practice etc., of teachers in diploma institutions, the question of setting up a Central Training College for technical teachers may be considered.
- xiii) The immediate shortage may also be eased by securing the services on deputation from Government Departments and industry of persons with aptitude for teaching. Any arrangements that may be made in this behalf should ensure that the final choice will lie with the teaching institutions.

Item No. 21

To consider proposals of the Government of Orissa for the establishment of an Engineering School at Bhadrak and an Institute of Mining and Metallurgy at Rourkela

The Government of Orissa in their letter dated 10.3.1958 addressed to the Secretary, All-India Council for Technical Education have suggested that their earlier requests for the establishment of an Engineering School at Bhadrak and an Institute of Mining and Metallurgy at Rourkela may be included in the agenda for the eleventh meeting of the Council. The present position regarding these proposals is as follows :

a) Proposal for the establishment of an Engineering School at Bhadrak

The Eastern Regional Committee earlier had consultations with the State Governments in the region on the question of implementing the recommendations of the Engineering Personnel Committee. During those discussions it was suggested by the State Government that a polytechnic may be established in Bhadrak with the offer of land by the Rural Education Society. Later on, the Eastern Regional Committee in their 12th meeting held on 25.4.57 recommended that this offer supported by the State Government may be accepted and a polytechnic at Bhadrak be established under the scheme for implementing the recommendations of the Engineering Personnel Committee. Subsequently in the concrete plan submitted by the Ghosh-Chandrakant Committee also, the establishment of a new polytechnic in Orissa was recommended. However, decision on the establishment of new polytechnics under this scheme has not yet been taken.

The Chief Minister of Orissa, Dr. H.K. Mehtab who is also the President of the Rural Education Society wrote to the Chairman of the Council and requested an early decision in the matter. The exact position was explained to the Chief Minister and it was also pointed out that while the establishment of a new polytechnic in accordance with the Ghosh-Chandrakant Committee recommendations would take some more time for a final decision, the request of the Rural Education Society for the establishment of a polytechnic at Bhadrak could be expedited if it was considered under the normal development programme. The State Government has, however, not indicated so far whether the proposal could be considered under the normal development programme.

b) Establishment of Mining and Metallurgy Institute at Rourkela

The Government of Orissa in their letter No. 2369/P dated 7.3.56 supported the proposal of the Utkal University for the establishment of a Higher Institute of Mineral Technology at Barbil or Rourkela in view of the proposed development/establishment of a steel plant, a fertiliser plant, a big cement plant, Aluminium reduction plant, Ferromanganese plant, and other heavy engineering and metallurgical industries in the area. According to the scheme, estimated to cost of Rs. 58.5 lakhs non-recurring and Rs. 5 lakhs recurring, the Mineral Technology course would be of five years' duration with specialisation in the fourth year. The fifth year would essentially be practical work in any specialised industry.

The Expert Committee for the development of Mining Education appointed by the Council, considered this scheme at its first meeting held on 5th and 6th April, 1956 but did not recommend it for the following reasons :

(i) Establishment of separate colleges for courses like mining and metallurgy without the help of supporting departments of Civil, Mechanical, and Electrical Engineering would be very wasteful. Such courses should only be added to established colleges offering Civil, Mechanical and Electrical Engineering degree courses.

(ii) The scheme is over-ambitious involving huge expenditure and the proposed training does not fit the graduates into one of well-recognised professions, such as Mining Engineer, Metallurgist or Geologist.

The Expert Committee's recommendations were accepted by the Coordinating Committee at its 23rd meeting held on 14th July, 1956.

The Expert Committee for the expansion of Metallurgical Education has also recommended that Metallurgy degree courses should only be organised in well-developed engineering colleges offering courses in Civil, Mechanical and Electrical Engineering, as single faculty institutions are not economical and efficient. The Board of Technical Studies in Chemical Engineering has also recommended similar principles for Chemical Engineering courses, which have been approved by the Coordinating Committee.

So far as Rourkela is concerned, there is no engineering college there in which Mining and Metallurgy courses could be organised at present. However at Bhubilai, not far from Rourkela, an engineering college for Civil, Mechanical, Electrical, Mining and Metallurgical courses is in the course of establishment on the approval of the All-India Council.

Item No. 22

To nominate a representative of the All-India Council for Technical Education on the Building Division Council of the Indian Standards Institution

The Constitution of the Building Division Council of the Indian Standards Institution provides for one representative of the All-India Council for Technical Education. Shri N.K. Mitra was the nominee of the Council for

the last term ending on 31.12.1957. Shri Mitra was renominated as the representative of the Council for the next term of three years ending on 31st December, 1960.

Shri Mitra has now expressed his inability to serve on the Building Division Council.

The Council is requested to nominate some one else as their representative for the current term of three years ending on 31.12.1960.

Item No. 23

To consider the recommendation of the Post-graduate Development Committee regarding the scheme of the P.S.G. & Son's Charities College of Technology, Peelamedu for starting a Post-graduate course in Electrical Machine Design

At its last meeting held on 28-9-57 the Post-graduate Development Committee considered the proposal of the P.S.G. & Son's Charities College of Technology, Peelamedu for starting M. Sc. course in Electrical Machine Design and was of the view that at present the college did not have the necessary staff for conducting a post-graduate course in the subject. Since the course had been sanctioned for a number of other institutions which have not made good progress in view of difficulties in respect of staff, the committee considered it desirable not to approve any more institution for the subject till the required staff was available. The Committee was also of the view that post-graduate course in Electrical Machine Design should be conducted in close collaboration with electrical industry and as such no new centre should be started till at least the existing centres and industry had developed a joint scheme of training. The Committee decided that Prof. M.S. Thacker and Dr M. V. Keshava Rao should discuss the scheme of the college with Prof. Damodaran from the point of view of organising research training in Electrical Engineering in the institution for which the existing staff of the college would be useful. The Coordinating Committee at its 25th meeting held on 3-12-57 endorsed the above view of the Post-graduate Development Committee.

It was accordingly arranged that Prof. Thacker and Dr. Keshava Rao would proceed to Coimbatore for the proposed discussion on 2-1-58. But due to certain unforeseen circumstances Prof. Thacker could not visit Coimbatore. It was decided that Dr. Keshava Rao should inspect the laboratories of the institution and discuss the scheme with Prof. Damodaran. Dr. Keshava Rao has reported that the college has some suitable staff and is likely to have a few more qualified persons as teachers. He has recommended that if the institution can secure the services of at least one person, who has had experience in Electrical Design it may be given an opportunity to start M.Sc. course in Electrical Machine Design as the institution has the right atmosphere for undertaking Design work. Prof. Thacker is also of the view that as the required staff would be made available and that facilities for collaborative arrangements with industry for design and manufacturing purposes would be possible in Coimbatore, the college may be approved for the post-graduate course in question.

On the basis of the above views of the Experts, the Chairman, Post-Graduate Development Committee has reconsidered the matter and recommended that the institution be approved for organising Post-graduate course in Electrical Machine Design.

Appendix 'A'

(Item No. 2 of Agenda)

SYLLABUS FOR FIRST DEGREE COURSE IN CHEMICAL ENGINEERING AND TECHNOLOGY

Subject-wise Distribution of Total Hours

Subject	1st Year		2nd Year		3rd Year		4th Year		T O T A L IN	
	Hours per year	per cent	Hours per year	per cent	Hours per year	per cent	Hours per year	per cent	Four Hours	Years per cent
General Education	64	5.9	—	—	—	—	—	—	64	1.4
Basic Sciences	576	52.8	512	47.2	64	5.9	—	—	1152	26.5
Engineering	160	14.8	384	35.2	192	17.6	—	—	736	17.0
Drawing	192	17.6	96	8.8	192	17.6	—	—	480	11.0
Workshop	96	8.8	96	8.8	—	—	—	—	192	4.4
Chemical Technology	—	—	—	—	320	29.4	160	14.8	480	11.0
Chemical Engineering	—	—	—	—	320	29.4	832	76.4	1152	26.5
Economics	—	—	—	—	—	—	96	8.8	96	2.2
TOTAL	1088	99.9	1088	100.0	1088	99.9	1088	100.0	4352	100.0

SYLLABUS FOR FIRST DEGREE COURSE IN CHEMICAL ENGINEERING & TECHNOLOGY

Duration.....4 years

Total Hours/Year.....1088

Weeks/Year..... 32

Hours/Week..... 34

SUBJECT	Hours/Week								Hours/Year							
	1st year		2nd year		3rd year		4th year		1st year		2nd year		3rd year		4th year	
	Th	P	Th	P	Th	P	Th	P	Th	P	Th	P	Th	P	Th	P
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<i>General Education</i>																
Humanities and Languages	2								64							
<i>Basic Sciences :</i>																
Mathematics	3		3						96		96					
Physics	3	4							96	128						
Physical Chemistry			3	3							96	96				
Inorganic Chemistry	3	6							96	192						
Organic Chemistry			3	4							96	128				
Advanced Physical Chemistry						2									64	

Th=Theory P=Practical

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<i>Engineering & Drawing</i>																
Applied Mechanics	3								96							
Strength of Materials & Theory of Structure			3								96					
Applied Mechanic and Material Testing (Practical)				3								96				
Metallurgy and Materials of Construction							2									64
Fuels, Furnaces and Refractories							2									64
Mechanical Engineering } (Heat Electrical Engineering } Engines			3	3	3	3					96	96	96	96		
Drawing		6		3		6				192		96			192	
Workshop		4		3						128		96				
<i>Chemical Engineering and Chemical Technology</i>																
Inorganic Chemical Technology					2									64		
Organic Chemical Technology					9									64		
Technical Analysis						9									288	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
Industrial Chemical Calculation					3								96				
Introduction to Chemical Engineering					3								96				
Unit Operation - I							3								96		
Unit Operation - II							3	12							96	384	
Chemical Engineering Thermodynamics					1		1						32		32		
Plant Design								6								192	
<i>Economics</i>																	
Factory Design and Layout								2							64		
Industrial Management								3							96		
		14	20	15	19	16	18	16	18	448	640	480	608	512	576	512	576
Total Hours	34	34	34	34	34			1088	1088	1088	1088		1088		

The institutions which wish to offer electives should allot up to about 200 additional hours during 3rd and 4th years of course.

Elective (Optional for Institution)

SCHEME OF EXAMINATION

<i>First Year</i>					
<i>Subject</i>	<i>Paper</i>	<i>Time in hrs.</i>	<i>Examina- tion Marks</i>	<i>Class Work Marks</i>	<i>Total Marks</i>
Theory					
Mathematics-I	I	3	70	30	100
Physics	II	3	70	30	100
Inorganic Chemistry	III	3	70	30	100
Applied Mechanics	IV	3	70	30	100
Practical					
Physics (Practical)	V	4	70	30	100
Inorganic Chemistry (Practical)	VI	6	70	30	100
Engineering Drawing	VII	6	70	30	100
Workshop	VIII	6	70	30	100
					800
<i>Second Year</i>					
Theory					
Mathematics-II	I	3	70	30	100
Physical Chemistry	II	3	70	30	100
Organic Chemistry	III	3	70	30	100
Electrical Engineering	IV	3	70	30	100
Strength of Material and Theory of Structure	V	3	70	30	100
Practical					
Physical Chemistry (Practical)	VI	4	70	30	100
Organic Chemistry (Practical)	VII	4	70	30	100
Applied Mechanics and Strength of Material (Practical)	VIII	4	70	30	100
Electrical Engineering (Practical)	IX	4	70	30	100
Machine Drawing	X	6	70	30	100
Workshop	XI	6	70	30	100
					1100
<i>Third Year</i>					
Theory					
Advanced Physical Chemistry	I	3	70	30	100
Mechanical Engineering (Heat Engines)	II	3	70	30	100
Inorganic Chemical Techonology	III	3	70	30	100

Organic Chemical Technology	IV	3	70	30	100
Industrial Chemical Calculation	V	3	70	30	100
Practical					
Heat Engine (Practical)	VI	3	70	30	100
Inorganic Technical Analysis	VII	6	70	30	100
Organic Technical Analysis	VIII	6	70	30	100
Equipment Design and Drawing	IX	6	70	30	100
					900
<i>Fourth Year</i>					
Theory					
Chemical Engineering-I	I	3	70	30	100
Chemical Engineering-II	II	3	70	30	100
Chemical Engineering Thermodynamics	III	3	70	30	100
Metallurgy and Materials of Construction	IV	3	70	30	100
Fuels, Furnaces and Refractories	V	3	70	30	100
Factory Design and Lay Out	VI	3	70	30	100
Industrial Management	VII	3	70	30	100
Practical					
Chemical Engineering (Practical)-I	VIII	6	70	30	100
Chemical Engineering (Practical) - II	IX	6	70	30	100
Plant Design)	200
Project report)	150
Viva-Voce			50)	
					1100
Elective					
Theory			70	30	100
Practic			70	30	100
					200

SYLLABUS FOR FIRST DEGREE COURSE IN CHEMICAL ENGINEERING AND TECHNOLOGY

FIRST YEAR

Humanities and Languages

Languages

Principles of effective written communication. Precise and Coherent expression of facts and opinions. Preparation and presentation of business reports, simple memoranda, business letters, research papers, journal articles and abstracts. Selected pieces from eminent writers.

Lectures-2
hours per
week •

Social and Moral Sciences

Principles, structure and function of community life—its influence on personality formation. Individual and social behaviour. Social and moral codes. Social evolution and progress. Impact of science and technology on social changes.

History of Civilizations

Ancient Assyria, Babylonia, Egypt, India, China, Greece and Rome.

Medieval Rise and expansion of Islam. Europe between the fall of the Roman Empire and the rise of the national States in 15th Century. Renaissance and Reformation. Muslim India. Influence of Hindu and Muslim Cultures on each other.

Modern Europe since the 16th Century. Discovery of new lands. Colonial wars. Industrial Revolution. French Revolution. Ideals of Nationalism and Democracy. Formentation in the 19th Century. World War I. New Ideals and rise of new forces. World War II.

Impact of European Colonial Policy on the East-Dutch English and French Empires. Regeneration of the conquered peoples in the 20th Century.

Near and Middle East from the fall of Constantinople to the first World War; Regeneration after 1919.

Opening up of China and Japan by the West. Reorganisation of Japan and Sino-Japanese relations.

U.S.A.—Colonial days. Independence, Munro Doctrine. Development in the first half of the 19th Century. Civil War. Rapid Developments in the second half of 19th Century. Entry into the Colonial field. Dollar Diplomacy and Dollar Empire.

The Russian Revolution and the Soviet Union.

Mathematics

Principles of differential and intergral calculus. Differentiation and integration of algebraic and trigonometric functions. Applications. Maxima and Minima. Tangents and normals. Areas, volumes, arc length, areas of surfaces of revolutions.

Lectures-3
hours per
week.

Principles of determinants. Solution of a system of linear equations. Complex numbers and De Moivre's theorem. Gregory's series. Hyperbolic functions. Summation of trigonometric series. Plane Analytic geometry of the straight line and the conic section. Curve tracing.

Ordinary differential equations including principal of first and second order equations. Linear equations with constant coefficients. Applications to physics and mechanics.

Physics

Properties of Matter : Moment of Intertia. Calculation of moment of Intertia and Radius of Gyration in some simple cases. Elasticity. Youngs Modulus. Bulk Modulus. Modulus of Rigidity. Poissen's Ratio. Relation Between Elastic constants. Viscosity. Poiseuille's Flow Method. Surface Tension. Pressure Inside soap bubble. Rise of liquid in capillary tube.

Heat

Expansion of gases. Absolute Temperature. vander Waal's equation. Gas Thermometer. Measurement of high and low temperatures. Kinetic theory of gases. Two specific heats of gas. Characteristic equation of gases and gas constants. Heat and energy. First law of Thermodynamics. Determination of Mechanical Equivalent of Heat. Continuity of state Andrew's and Amagat's experiments. Critical temperature. Liquification of gases. Joule-Thompson effect. Relation between pressure, volume and temperature of vapours. Humidity-absolute and relative. Hygrometers and Hygrometry. Mixture of gases and vapour, Dalton's law of partial pressure. Conduction of heat. Radiation of heat. Laws relating to heat radiation. Heat transference and coefficient of heat transference.

Light

Geometrical and Physical optics. Laws of Reflection and Refraction. Some of optical instruments and appliances, e.g. Telescope, Microscope, sextant, optical lantern. The refractometer (Pulfrich and Abbe.) Wave theory of light: Emission and Absorption spectra ; Polarisation and Double Refraction. The polarimeter. X-rays and their applications.

Electricity and Magnetism

Electrostatics. Electric charge. Potential. Force between charges, energy of charge, intensity of electrostatic field. Electrostatic units. Dielectrics. Condenser, Capacity of condensers, condensers in series and parallel. Electrometers, comparison of capacities. Dielectric constants and their measurements. Conductors, Sizes and types of conductors, Effect of temperature on the resistance of conductors. Laws and units of electric current, potential and resistance. Work done by electric current. Series and parallel circuits. Kirchhoff's laws and their applications. Controlling resistance and their current carrying capacities. Magnet and magnetic field, Magnetic moment, Magnetometer, Magnetic potential, Forces between magnet, Vibrating magnet, Magnetic properties of material, intensity of magnetisation, magnetic susceptibility, permeability, magnetic induction. magnetic effect of current in conductors and coils. Solenoid. Force on current in a magnetic field. Electro-magnetic induction. Self and mutual induction. Lenz's law and Fleming's rules.

Induction coil, choke-coil and inductance. Resistance, reactance and impedance. Thermoelectricity. Thermo-couple and thermo-junction. Description and use of Ammeters and Voltmeters of the moving iron, moving coil. Elementary principles of telegraphy and photo-electric cells, X-ray appliance, Thermo-ionic valves and radio communication.

Physics (Practical)

Determination of the specific heat of a solid with radiation correction.

Practical-4 Determination of the latent heat of vaporisation of water with
hours per radiation correction. Determination of volume of coefficient
week. of air. Determination of pressure coefficient of air. Determination of relative humidity of atmospheric air. Measurement of high temperature by Pyrometers and Thermocouple. Measurement of thermal conductivity of metal. Measurement of Refractive Index by microscope. Adjustment and use of spectrometer. Measurement of indices of refraction by spectrometer. Using an interferometer for light. Determination of the rotation of plane of polarisation by sugar solution. Comparison of moments of bar-magnets by Tan A and Tan B methods of Gauss. Determination of H in the laboratory. Measurement of resistance by Wheatstone's Bridge and Post Office Box. Determination of resistance of a Galvanometer. Determination of resistance of a battery, by Mance's method and Ammeter and Voltmeter method. Measurement of low resistance. Measurement of resistance of an electrolyte. Comparison of E.M.F. by Potentiometer. Determination of temperature coefficient of resistance. Verification of Fleming's rule. Determination of Electrochemical equivalent of a metal. Determination of Mechanical equivalent of heat. Comparison of light intensity by Photo cell.

Inorganic Chemistry

Structure of Atoms. Electronic concept of Valency. Modern methods of determination of Atomic Weights. Periodic Table and Lectures-3 Group study of Elements. Inert Gases. Transitional Elements.
hours per Group study of Elements. Inert Gases. Transitional Elements.
week. Radio Activity and Isotopes. Heavy Hydrogen and Heavy Water. Peroxides and Per-acids. Boron and Silicon. Nitrogen, Phosphorous, Arsenic, Antimony and Bismuth. Sulphur, Selenium, and Tellurium. Halogens. Alkali Metals and Alkaline Earth Metals. Copper, Silver, Gold, Beryllium. Magnesium, Zinc, Cadmium, Mercury, Lead, Tin, Aluminium. Rare Earths. Vanadium, Chromium, Molybdenum, Tungsten, Manganese, Iron, Cobalt, Nickel.

Inorganic Chemistry (Practical)

Qualitative Analysis of Inorganic Mixtures containing not more than six radicals. Selected volumetric and Gravimetric Analysis. Practical-6 Preparation and Purification of Typical Inorganic substances.
hours per
week.

Applied Mechanics

Elementary vector algebra ; composition and resolution of forces ; Lectures-3 parallel forces ; moments ; couples ; equilibrium of forces ;
hours per friction ; principles of virtual work with applications to frame
week. work ; centre of gravity ; stable and unstable equilibrium ; strings.

Speed and velocity ; acceleration ; force ; momentum and laws of motion ; work, power and energy ; impulsive forces, impact of elastic bodies, projectiles, motion in a circle, small oscillations ; motion in a resisting medium ; tangential and normal accelerations ; constrained motion on simple curves ; moments of inertia ; products of inertial ; motion about a fixed axis ; compound pendulum ; applications to problems in engineering. Singular impulse and angular momentum. Impulse and momentum in Plane motion.

Centrifugal forces and balancing of revolving masses, transformation of energy, power and efficiency, gear trains, pulley block spindles, self locking. Graphic representation of forces, resolution and composition of forces. Equilibrium, funicular polygon, three hinged arch, determination of static forces in simple disc frames, mechanism and rod frames. Loads, and forces of structures and trusses. Moments and forces of girders : Vibrations of damper and precid system with one degree of freedom, torsional vibrations with two degrees of freedom, critical speed of shafts.

Determination of B.M. and S.F. diagrams for cantilever and simply supported beams under static loading with or without end restraint. Elastic curves for beams of constant depth and variable moments of inertia for simply supported and cantilever beams. Elastic lines for fixed beams of uniform cross section under symmetrical loading. Reciprocal figures for trusses of more complicated type with or without wind load.

Engineering Drawing

Practical-6 hours per week. Lettering, scales, mathematical curves, isometric and oblique views, orthographic projection, sketching. Machine drawing. Convention and dimentioning, lines and planes, representation of plane figures and solids, edge views and true shapes. Location of planes, traces, inclination of planes, distance of lines and planes, intersection of planes. Section and interpretation of bodies. Development of surface.

Workshop

Practical-4 hours per week. *Carpentry* ; Tools and equipment. The detection of faults in Timber. The use of different kinds of wood. Sawing, planing, squaring and gauging. The making of the various joints used in construction work.

Fitting : Names and uses of different kinds of fitter's tools and measuring instruments. Care and maintenance. Practice in chipping, filing, scraping and fitting.

Sheetmetal Work : Use of simple tools, marking, circumference rules, stakes and punches. Uses of sheetmetal working machines. Different types of sheetmetal joints. Soldering and brazing. Drawing of sheetmetals. Development of surface.

SECOND YEAR

Mathematics - II

Analytic geometry of three dimensions. Standard equations of conoids. Rolle's Meanvalue. Taylor's and Maclaurin's theorems. Lectures-3 Indeterminate forms. Asymptotes. Partial differentiations. hours per week. Fourier series. Multiple intergral, line intergral. Simultaneous differential equations, linear equations with constant and variable coefficients. Partial differential equations. Applications—vibration of strings and membranes, heat flow, Diffusion flow of electricity in a cable. etc.

Organic Chemistry

Nature of Organic Compounds and their nomenclature. *Aliphatic Compounds*—Alkanes, Alkenes and Alkynes. Alcohols, Ethers. Lectures-3 Indeterminate forms. Asymptotes. Partial differentiations. hours per week. Fourier series. Multiple intergral, line intergral. Simultaneous differential equations, linear equations with constant and variable coefficients. Partial differential equations. Applications—vibration of strings and membranes, heat flow, Diffusion flow of electricity in a cable. etc.

Stereo Chemistry—Optical Isomerism. Racemic Modifications. Racemization. Walden Inversion. Geometrical Isomerism. Configuration of Maleic and Fumaric Acid.

Carbohydrates—Structure of Hexoses. Osazones. Configurations. Oxide Structure. Synthesis of Glucose and Fructose. Sucrose. Cellulose. Starch.

Aromatic Compounds—Structure of Benzene. Hydrocarbons. Aromatic Substitutions. Nitro Compounds. Sulphonic Acids. Amines. Phenols. Halogen Compounds. Carboxylic Acids. Aldehydes and Ketones. Quinones. Naphthalene, its structure and Derivatives. *Polynuclear Hydrocarbons*—Phenanthrene and Anthracene. *Heterocyclic Compounds*—Pyrrole, Pyridine, Quinoline, Isoquinoline, Furan and Thiophene. Elementary study of Alkoids, Terpenes and Synthetic Dyes.

Books Recommended

1. Organic Chemistry by Fieser & Fieser.

A. Organic Chemistry (Practical)

Identification of the following organic compounds:—*Hydrocarbons*—Benzene, Toluene, Naphthalene and Anthracene. *Alcohols*—Methyl Alcohol, Ethyl Alcohol and Glycerol. *Acids and Anhydrides*—Formic, Acetic, Oxalic, Tartaric, Citric, Lactic, Benzoic, Salicylic, Phthalic and Succinic Acid. Phthalic Anhydride. *Phenols*—Phenol, *alpha*- and *beta*-Naphthol, Resorcinol. *Aldehydes and Ketones*—Formaldehyde, Acetaldehyde, Acetone and Benzaldehyde. *Carbohydrates*—Glucose, Lactose, Sucrose and Starch. *Nitrogen Compounds*—Nitrobenzene, Aniline and Urea.

B. Organic preparations

Ethyl Iodide. n-Butyl Acetamide. Iodoform Nitrobenzene. Aniline. Acetanilide. Sodium Benzene Sulfonate. Acetophenone. Methyl Orange. Sulfanilamide. Aspirin. Benzalacetophenone. Benzyl Alcohol and Benzoic Acid. Malachite Green. Para Red. Benzoin and Benzil. Cinnamic Acid. Benzilic Acid. Para-Nitro Aniline.

Books Recommended

1. Handbook of Organic Analysis by H.T. Clarke.
2. Identification of Pure Organic Compounds by H.S.P. Mulliken.
3. Systematic Identification of Organic Compounds by R. L. Shriner and R. C. Fuson.
4. Identification of Pure Organic Compounds by E.H. Huntress and Mulliken.
5. Laboratory Experiments in Organic Chemistry R. Adams and J.R. Johnson.

Physical Chemistry

Gases—Kinetic Theory of Gases. P.V.T. Relationship of gases. Deviations from the Ideal gas laws. Mixture of gases. Van der Waal's Equation. *Thermochemistry*—Heats of Formation, Combustion and Reaction. *Thermodynamics*—First law of Thermodynamics. Reversible Processes. Isothermal and Adiabatic Expansion Heat Capacity. Second Law of Thermodynamics. Entropy. Free Energy. Gibbs—Helmholtz Equation. *Liquids*—Liquifaction of Gases. Continuity of states. Corresponding state. Vapour Pressure. Clausius—Clapeyron Equation. Surface Tension. Viscosity. *Solution*—Ideal and Non-Ideal Solutions. Raoult's Law and Henry's Law. Maximum and Minimum Boiling Points. Fractional Distillation. Immiscible Liquids. Heat of Solution. Lowering of Vapour Pressure. Elevation of Boiling Point. Lowering of Freezing Point. Osmosis and Osmotic Pressure. *Colloids*—Preparation and purification. Optical. Kinetic and Electrical Behaviour of Colloids. Stability of Colloids. Precipitation of Colloids by Electrolytes. Protective Colloids. Gels and Emulsions.

Chemical Equilibria—Law of Mass Action. Equilibrium Constants. Dissociation of Gases. Free Energy changes in Chemical Reactions. Activities and Fugacities. Effect of Temperature on Chemical Equilibrium. *Phase Rule*—One and Two component systems. Solid Solutions. Alloys. Three component systems.

Surface Chemistry—Adsorption. Adsorption of Gases and Solutes. Fraundlich and Langmuir's Adsorption Isotherm.

Physical Chemistry (Practical)

Practical-3
hours per
week.

1. Vapour Density—M.Wt. by Victor Meyer's apparatus

2. Vapour Pressure of liquids by Ramsay-Young's apparatus and verification of Clausius-Clapeyron's equation
3. To draw the boiling point diagram for the distillation of binary liquid mixtures
4. To draw the freezing point diagram for Pb-Sn system
5. M.Wt. determination by F.P. and B.P. Methods
6. Distribution coefficient
 - (a) Where the solute exists in normal state
 - (b) Where the solute associates in one solvent
7. Kinetics of uni- and bi-molecular reactions
8. Viscosity of liquids and mixtures, by
 - (a) Absolute Methods
 - (b) Ostwald's Viscometer
 - (c) Falling sphere method
9. Surface tension by
 - (a) Dn Nuoy balance
 - (b) Capillary rise
 - (c) Drop weight
 - (d) Bubble pressure methods
10. Heats of neutralisation, solution etc.
11. Verification of Fraundlich's Absorption isotherm
12. Preparation of some Colloidal suspensions and emulsions
13. To compare the coagulative powers of electrolytes Hardy-Schulz' Law.
14. Conductivity of electrolytes : Determination of
 - (a) the dissociation constant of a weak acid
 - (b) solubility of sparingly soluble salts
15. Conductometric titrations
16. E.M.F. Measurements ;—the use of hydrogen, quinhydrone calomel and glass electrodes.

Measurement of

 - (a) E.M.F. of a cell by Poggendorf's method
 - (b) Single electrodes potentials
 - (c) Oxidation—reduction potentials
 - (d) Hydrogen ion concentration and pH
 - (e) Potentiometric titrations
 - (f) Preparation of Buffer solutions and determination of pH by the use of indicators
17. Determination of transport numbers of cations and anions
18. Optical measurements

Uses of

 - (a) Polarimeter
 - (b) Refractometer-Abbe' and Pulfrich
 - (c) Colorimeter, Turbidimeter, refractometer, Fklyxro-photometer
 - (d) Spectroscope—Absorption and emission spectra

Strength of Materials and Theory of Structures

Lectures-3
hours per
week.

Strength of Materials
Stress, strain, Hooke's law, temperature stresses. Analysis of stress and strain: Stresses in various planes, Circle of stresses, principal stresses and planes. Principal strain, strain-circles, volume strain, moduli of elasticity, theories of elastic failure. Stresses in Beams: Bending moments and shear forces in statically determinate beams, bending stresses, shear stresses due to bending, shear stress in rectangular and circular sections. Deflection of beams: Differential of the elastic line, area, moment, conjugate beams, and superposition methods, carriage springs, statically indeterminate beams, continuous beams, equation of three moments. Torsion: Torsion of cylindrical rods, combined bending, torsion and axial force, coiled springs. Columns: Euler's and empirical formulae, combined bending and direct stress, eccentric loading of short struts.

Theory of Structures

Moving loads and influence lines for simply supported beams and girders. Continuous beams. Deflection of frames structures, Williot-Mohr diagrams. Castigliano's theorems redundant frames. Design of rivetted and welded joints under eccentric loading: columns and built-up beams. Design of rivetted and welded trusses and plate-girder bridges. Theory and design of simple reinforced concrete structures. General principles of soil mechanics stability of slopes and retaining walls; consolidation and settlement, Design of footings, rafts and pile foundations. Drainage and deep excavation work.

Practical-3 **Applied Mechanics and Material Testing (Practical)**
hours per
week.

Applied Mechanics

Exercises illustrating the main principles dealt with in the lectures.

Strength of Materials

Tests on mild steel, cast iron, brass, copper, gun metal, wood, etc. for tension, compression and torsion. Determination of elastic constants. Use of strain measuring device Tests on fatigue of metals—Bending, hard and impact tests—Tests on wires, ropes, springs, chains and insulators. Tests on columns, Elements of micrography and radiological testing and crack detection.

Electrical Engineering

Direct current circuits; use of Ohms and Kirchoff's law in electrical
Lectures-3
hours per
week.
Magnetic pull. Lifting and holding magnets. Cranes and clutches. Brakes.

Direct current generators and motors; Armature reaction, characteristic curves. Regulation and over-compounding. Parallel operation and load division. Switch boards of D.C. generators and feeders including air-

break circuit breakers and horn gap lightning arresters. Motor starters and controllers. Losses and efficiency of D.C. Machines. Illumination. Relative advantages of various types of illumination. Interior and exterior illumination. Cost of lighting. Different types of internal wiring systems. Calculation of size of wire, wiring rules and regulation. Distribution board. Testing of wiring and electrical fittings.

Earthing of metal parts of installation; protection from shocks; alternating current circuits; Phase and phase difference, frequency, maximum, average and effective values. Inductance and capacitance. Impedance. Power and power factor. Choke coils. Series, parallel and combined circuits.

Poly phase systems; star and mesh connections. Vector diagram for balanced circuits. Measurement of power by two-wattmeter method. Symbolic vector representation, alternating current machines.

Alternators :—Winding, star and delta connections. Behaviour on load. Synchronising parallel operation and load division.

Transformers :—Construction. Equivalent reactance, resistance and impedance. Equivalent circuits and vector diagrams.

Induction Motors :—Theory and construction. Squirrel cage and wound motors. Characteristics and Methods of starting.

Synchronous Motors :—Theory of action. Characteristics, Starting methods. Application to power factor improvement.

Rotary converters :—General principle. Current and voltage relation. Method of starting.

Fundamental principles of Electrical measurements. Voltmeter, Ammeter, Wattmeter Watthour-meter, meggar, synchroscope, frequency meters and energy meters; direct and alternating current power systems; electronic tubes and circuits; heating; welding and electrochemical processes; electrical illustrations; electric motor applications and control; industrial wiring systems; electric power economics.

Electrical Engineering (Practical)

Experimental laboratory work illustrating the principles of operation, Practical-3 devices, and equipment studies in the theoretical classes hours per week mentioned above.

1. Magnetisation curve of a separately excited D.C. Generator
2. Magnetisation curve of a shunt excited D.C. Generator
3. Load tests on D.C. Generators-shunt and compound
4. Running of D.C. motors-shunt, series and compound
5. Study of an A.C. series circuit
6. Study of an A.C. parallel circuit

7. Measurement of power in a single phase. A.C. Circuit
8. Measurement of power in three phase circuit by means of two wattmeters
9. Load tests on a transformer
10. Open circuit characteristics of an alternator. Synchronising an alternator
11. Transformer connections, single phase, three phase Scott connection, Determination of the ratio of transformation
12. Running of an induction motor
13. Running of a rotary convertor

Machine Design & Drawing

Gastenings :- Rivets—Riveted Joints—screw Threads—screws—Nuts, Keys—Bolts—Bolted Joints—expansion joints—Knuckle joints—cottered joints.
 Practical-3 hours per week.

Shaft and shaft fittings :- Shaft—Keys. Couplings—Pulleys—Levers—Crank—Eccentrics.

Bearings :- Pedestal bearings—Foolstop Bearings—Ring oiled bearings—White metal bearings—Ball and Roller bearing—Michell Thrust Bearing.

Gearing :- Wheel teeth—spur gearing—strength of Teeth—Helical Gearing—Bevel gearing—Worm gearing.

Valves :- Flap valves—Lift valves—Slide valves.

Engine details :- Pistons, Piston rods—Glands and tuffing Boxes—connecting Rods—cross heads cylinders.

Factors Influencing Design.

Workshop

Smithy :- Tools—names, care, use and maintenance, construction of forge and maintenance of fire. Practical exercise involving the processes of jumping, drawing cutting bending and Welding.
 Practical-3 hours per week.

Foundry :- Use of tools : simple exercises in moulding and casting.

Machine Shop :- Simple exercise in turbing ; taper turning, thread cutting (internal and external) surfacing, knurling ; gear cutting, key way and slot cutting ; use of the shafting machine and drilling machine.

Preparing a brass oil feed cup from a casting made by the students.

THIRD YEAR

Advanced Physical Chemistry

Lectures-2
hours per
week. *Chemical Kinetics* - Reaction Mechanisms. First and second order Reactions. Determination of the order of a Reaction. Activation. Effect of Temperature on Reaction. Rate and Activation. Catalysis. Chain Reaction. *Thermodynamics* - Third Law. Absolute values of entropy and Free energy.

Electrochemistry—Electrolytic conductance Kohlrausch's Law and its applications. Transport Number. Ionic Equilibria - Ionization of weak Electrolytes. Acids, Bases and pH values. Common Ion-effect. Hydrolysis. Buffer solutions. Indicators. Solubility product. Electromotive Force - Relation between electrical and Chemical Energy. Reversible and Irreversible cells. Single Electrode Potentials. Electrolysis and Polarization. Over-voltage. Decomposition Voltage. Current Voltage. Energy efficiency. Electrolytic Oxidation and Reduction. Primary cells. Secondary cells. Conductometric and Potentiometric Titration and Analysis. Principles of Electroplating. Extraction and Refining of Metals. Electrolytic preparation of compounds.

Books Recommended

1. Text Book of Physical Chemistry - Glasstone.

Mechanical Engineering (Heat Engines)

Lectures-3
hours per
week. *General Theory*-Laws of Thermodynamics. Carnot's cycle and efficiency. Properties of steam. Throttling. Entropy. Temperature entropy and total heat entropy charts for steam and other vapours.

Boilers - Description of various types such as Lancashire, Cornish vertical, Cochran and water tube. Their advantages and disadvantages, feed arrangements; Description of Duplex feed pump and injector. Boiler mountings; stop valve, pressure gauge, water level gauge and safety valves. Performance and efficiency of boilers.

Steam Engines—Mechanical details of a single cylinder steam engine with eccentric and D- slide valve, materials used, system of lubrication; expansive working; use of high pressure steam and effect on work done; initial condensation and re-evaporation; governing.

Indicator and indicator diagrams. Determination of mean effective pressure; I. H. P. and B. H. P.; mechanical and thermal efficiencies.

Condensers—jet and surface type; air and extraction pumps, Air ejectors. Advantage of compounding. Determination of cylinder dimensions. Flow of steam through nozzles. Critical Pressure. Calculations for velocity at throat and discharge. Design of Nozzles. *Steam turbines* - Impulse and reaction type compounding. Velocity Diagrams for single and Multi-stage turbines. Bleeding turbines.

Internal Combustion Engines :—A general knowledge of internal combustion engines. Gas, Petrol and Oil Engines with their Indicator Diagrams. Tests for Thermal Efficiency. Engine cycles. Ideal, Actual and Relative Efficiencies. Power and efficiency.

Air Compressors—Theory of Air Compressors and Vacuum Pumps. Volumetric efficiency. Effect of Clearance. Multi-stage Machines. Intercoolers and Aftercoolers. Turbo compressors.

Heat Engines Practical

Practical-3 hours per week. Exercises illustrating the main principles dealt with in the lectures.

Equipment Design and Drawing

Practical-6 hours per week. Functional Design. Elementary Structural Design and Drawing of Typical Process Engineering Equipment. Pipe joints. Tanks. Reaction Vessels with stirring gear. Heating coils and jackets. Tubular Heat Exchangers and Condensers. Evaporators. Bubble Caps and packed columns. Filters. Pressure vessels.

Inorganic Chemical Technology

Lectures-2 hours per week. Water conditioning and Industrial Waste water treatment. Industrial gases - Hydrogen, Oxygen, Carbon dioxide and Acetylene. Glass and ceramics. Lime and cement. Sulphuric acid and sulphates - Ferrous sulphate, Copper sulphate, sodium sulphate and aluminium sulphate. Fertilizers. Urea, Nitric Acid, Soda Ash, Salt, Sodium Bicarbonate, Caustic Soda, Chlorine Bleaching Powder Hydrochloric Acid, Potassium Permanganate and Potassium Dichromate, Calcium Carbide and Silicon Carbide, Activated carbon and Graphite, Paints and varnishes Rare-Earth Compounds.

Organic Chemical Technology

Lectures-2 hours a week. Coal Carbonization, Coal Tar Distillation, Petroleum Refining, Synthetic petrol, Wood Distillation, Paper Industries, Synthetic Fibers, Plastics, Natural and synthetic rubber, Sugar and starch Industries, Oils, soaps and Glycerine, Leather, Gelatine and Glue, Insecticides - D.D.T. Fermentation Industries - Alcohol, Acetone, Acetic Acid, Citric Acid and penicillin.

Books Recommended

1. Chemical Process Industries by R. N. Shreve
2. Industrial Chemistry by E. R. Riegel
3. Roger's Manual of Industrial Chemistry Vol. I & II by C. C. Furans.
4. Industrial Chemistry - W. T. Reed
5. Industrial Chemistry - Martin

Technical Analysis

Inorganic

Analysis of water, iron and steel, Cement, Ores, Alloys, Pigments and Fertilizers.
 Practical-9
 hours per
 week.

Organic

Alcoholysis. Analysis of Coal - Moisture, Volatile Matter, Ash, Sulphur. Calorific value. Analysis of oils - Acid value, Iodine value and Saponification value. Analysis of soap - Moisture, Total Fatty Acid, Free Alkali. Gas Analysis. Analysis of Mineral Oils - Flash point and viscosity. Sugar Analysis.

Industrial Chemical Calculation

Stoichiometric and composition Relations. Behavior of Ideal Gases
 Lectures-3 Vapour pressure. Humidity and saturation. Solubility and
 hours per Crystallization. Material Balance. Thermophysics. Thermo-
 week. Chemistry. Adsorption. Fuels and Combustion. Heat and
 Material Balances of a few Chemical, Metallurgical Petroleum
 and Ceramic Processes.

Books Recommended :

1. Chemical Process Principles - Part I
 Material and Energy Balances - O. A. Hougan, K. M.
 Watson and R. A. Ragatz.
2. Industrial Stoichiometry - W. K. Lewis
 A.H. Radasch and H. C. Lewis.

Introduction To Chemical Engineering

Chemical Engineering Profession. Basic Principles underlying the
 Lectures-3 Unit Operations.
 hours per
 week.

Flow of Fluids—Properties of Fluids. Principles of fluid flow and Mass Transfer. Energy Relationships. Friction in pipes. Flow Measurement. Pumping and compressing. Transportation of Fluids. High pressure Gas Transmission. Storage of liquids and gases.

Heat Transfer—Principles of Heat flow. Steady and Transient conduction. Heat Transfer Co-efficients. Natural and forced convection. Condensing vapours and Boiling liquids. Heat Transfer by Radiation. Heat Exchangers. Packed and Fluidized system.

Books Recommended

1. Elementary Chemical Engineering by M. S. Peters

2. Introduction to Chemical Engineering by W. L. Badger and J. T. Banchero
3. Principles of Chemical Engineering by W. H. Walker, W. K. Lewis, W. H. Mc Adams
4. Heat Transmission by W. H. Mc Adams

Chemical Engineering Thermodynamics

Principles of Chemical Engineering Thermodynamics. Quantitative Development of the Fundamental Laws. Thermodynamic Potential Functions. Thermodynamics of solutions. General Equations of Equilibrium. Phase Equilibria. Chemical Equilibrium. Pressure - Volume-Temperature Relationship of Fluids. Compression and Expansion of fluids. Thermodynamics of fluid flow. Heat transfer. Refrigeration and steam power generation.

Lecture-1
hour per
week.

Books Recommended

1. Chemical Engineering Thermodynamics - B. F. Dodge
2. Introduction to Chemical Engineering Thermodynamics - J. M. Smith
3. Principles of Chemical Engineering Thermodynamics - E. D. Wilson and H. C. Ries
4. Thermodynamics for Chemical Engineers - H. C. Weber
5. Chemical Process Principles - Vol. II Thermodynamics - O. A. Hougen and K. M. Watson

FOURTH YEAR

Unit Operations - I

Principles of vaporization. Evaporation. Drying. Crystallization. Principles of diffusions. Absorption. Adsorption. Extraction. Distillation. Humidification. Air-conditioning and Refrigeration.

Lectures-3
hours per
week.

Unit Operations-II

Properties of solids. Size Reduction and separation. Mixing. Flotation. Sedimentation. Filtration. Centrifuging. Fluidization. Separation of solids from Gases. Conveying. Storage of solids. Instrumentation.

Lectures-3
hours per
week.

Books Recommended

1. Unit Operations of Chemical Engineering by M. L. McCabe and J. C. Smith
2. Unit Operations by G. G. Brown
3. Mass Transfer Operations by R. E. Treybal

Chemical Engineering Practical

Flow of Fluids—Measurement of flow of Fluids through Orifice meters, Venturimeters, Rotameters, Weirs and Pitot tubes
 Practical-12 Calibration of Flow Meters. Flow of Fluids through Bends.
 hours per Calibration of Flow Meters. Flow of Fluids through Bends.
 week. Loops and other Fittings. Estimation of Friction losses. Veri-
 fication of Fanning's Equation. Measurement of Approxi-
 mate Critical Velocity of a liquid. Pressure Drop of Fluid through
 packed Beds. Efficiency of Centrifugal, Rotary and Diaphragm Pumps.

Heat Transfer—Between Condensing vapours and cooling liquids in a single and Two pass Heat Exchangers. Between Hot and Cold liquids flowing both counter-current and parallel. Between steam and boiling liquids in open Jacketted pan. Between cold water in coil and hot liquid in a tank under transient state. Radiation and convection losses from bare and lagged pipes. Heat balance in inclined tube evaporator. Determination of the efficiency of coal fired boilers.

Evaporation—Operation of double and triple effect evaporators under forward feed, backward feed and mixed feed.

Drying—Rate of drying in a tray drier under atmospheric pressure and vacuum. Operation of Rotary, double drum and Spray Driers.

Crystallization—Operation of a crystallizer and study of Heat and Material Balance.

Absorption—Diffusion of liquids in a current of Air. Study of Absorption in packed column.

Extraction—Continuous liquid extraction. Leaching operation.

Distillation—Batch Distillation. Verification of Raleigh Equation. Rectification in Bubble cap plate column. Distillation in packed column. Steam distillation Detailed study of water Distillation plant - Estimation of steam efficiency and overall Heat Transfer Co-efficient in evaporator and condensor.

Size Reduction and Separation—Crushing and grinding of substances of different hardness in Jaw Crusher, Disc Crusher, Crushing Roll, Ball Mill etc. Determination of Relationship between Energy consumption and screen analysis. Verification of Grinding laws.

Mechanical Separation—Mineral Separation by Wilfley Table and Hydraulic Jig. Elutriater. Concentration of minerals by Froth Flotation.

Filteration—Filteration at a constant pressure and constant Rate, compressibility of the cakes. Coefficient of plugging. Study of Valler Filter, Oliver filter, single-leaf filter, plate and frame press, centrifuge.

Mixing—Power Requirement for different mixture. Operation of thickner.

Conveying—Screw conveyer and Bucket elevator.

Books Recommended

1. Chemical Engineer's Hand Book by J. H. Perry
2. Chemical Engineering Laboratory Equipment - Zimmerman and Levine.
3. Applications of Chemical Engineering by H. Mc Cormack

Chemical Engineering Thermodynamics

Lectures 1 Continuation from third year.
hour per
week.

*Fuels, Furnaces And Refractories**Fuels*

Industrial Fuels. *Solid fuels* : Coal, its origin, composition and classification. Size and storage of coal. Coke. Combustion of coal and coke - its theory and practice.
Lectures 2
hours per
week.

Liquid fuels : Petroleum, its origin, Composition and classification. Petroleum produce. Combustion of liquid fuels.

Gaseous fuels - Production properties and combustion.

Furnaces

Types. General Design and construction. Fuel Economy. Strength and durability. Movement of gases in Furnaces. Temperature control. Design and construction of Chimneys. Thermal Efficiency. Waste Heat Recovery. Pyrometry.

Refractories

Classification. Raw materials. Manufacture. Properties. Action of slag. gases and vapours on Refractories. Influence of Refractories on fuel Economy. Insulating Materials. Methods of constructing. Refractory structures and Insulating walls. Uses of Refractories and Insulating Materials in Chemical Industries.

Books Recommended

1. Efficient uses of Fuel - His Majesty's Stationery Office, London
2. Fuels, Combustion and Furnaces by J. Griswold
3. Industrial Furnaces - Vol. I & II by W. Trinks
4. Refractories by F.H. Norton

Metallurgy and Materials of Construction*Metallurgy*

Lectures -2 Engineering metals, their properties and structures. Thermal
hours per Equilibrium Diagrams. Structure of Alloys. Carbon Steel.
week Manufacture of pig iron. Different grades and their uses.

Sound casting Design. Malleable cast Iron. Wrought Iron. Creep. Fatigue and Fractures of Metals in various states and their appearance under the microscope. Steel manufacture - Bessemer and open Hearth. Crucible and Electric Furnace Methods. Quality of product structures. Effects of hot and cold working. Effects of various elements. Classification of plain carbon steels and Alloy steels according to their uses.

Heat Treatment - Annealing, Normalizing, Quenching and tempering. Effect on Microstructure. Corrosion and Mechanical Properties. Case Hardening and Nitriding. Alloy Steel, Stainless steel, Tool steel and other Tool materials. Non-ferrous Engineering Alloys (especially of Copper, Aluminium and Zinc) - Specification, properties and uses. Hot and cold working. Die castings. Bearing Alloys. Light Alloys. Malleability of Metals. Mechanical working process - Hot stamping and forging. Press work. Welding. Extrusion.

Materials of Construction

Materials used in Chemical plant. Methods of construction. Corrosion Resistance, Mechanism and protection.

Industrial Management

Lectures - 3 Industrial structure with special reference to Chemical
hours per Industries. Government's Industrial Policy and Five-Year
week. Plans. Current Economic problems and Taxation. Industrial
Organisation and Management. Labour Relations. Finance.
Insurance. Costs and Accounts. Buying and selling control. Production
control. Industrial Efficiency and Planning. Factory acts and Legislations.

Books Recommended

1. Industrial Management by W.R. Spriegel
2. Structure of Indian Industries by Menon

Factory Design and Layout

Surveying and levelling of a factory site. Foundation. Drainage. Piping.
Lectures -2 Pumping. Building. Source of Power and its Transmission.
hours per Development of the Design project. Flow Diagrams. Selec-
week tion of process Equipment. Plant layout and construction.
Pre-construction cost accounting. Economic Evaluation.
Location of the Plant. Safety and Fire protection

Books Recommended

1. Chemical Engineering Plant Design by F.C. Vilbrandt
2. Pilot Plants and scale-up methods in Chemical Engineering by R.E. Johnstone and M.W. Thring
3. Chemical Engineering Economics by C. Tyler
4. Chemical Engineering cost estimation by R.S. Aries and R.D. Newton

Plant Design (Project Work)

Each student is required to submit a project report on the Designing Practical 6 of a complete Chemical Plant, selecting the best process with optimum equipment sizes and operating conditions. Subject hours per week. matter of the report will be assigned to each student and the report should be prepared on the line discussed under the course of "Factory Design and Layout".

The objects of this Project Work is to test the ability of the student to coordinate the entire knowledge of Chemical Engineering to measure his selection and retention of the Chemical Engineering principles, to judge his originality and capacity in the application of Laboratory data in the designing of Chemical plant and to determine the level of his profession at the end of the course.

Appendix 'B'

(Item No. 17 of Agenda).

UNIVERSITY GRANTS COMMISSION

Report of the Joint Committee of the University Grants Commission and the All-India Council for Technical Education for the Development of Geology and Applied Geology

The University Grants Commission, at their meeting held on 1st November 1955, decided that a Joint Committee of the All-India Council for Technical Education and the University Grants Commission be appointed for the development of Geology and Applied Geology on the following terms :—

- (a) to examine the present position in respect of facilities for education and research in Pure and Applied Geology in Universities and other institutions,
- (b) to examine the nature and scope of development of these facilities with special reference to Post-graduate training in Applied Geology having regard to the requirements for trained personnel for the development of mineral and coal industry and for other projects,
- (c) to prepare a coordinated and comprehensive plan for the improvement and development of Universities and other educational centres for advanced training and research in Geology and in Applied Geology, and
- (d) to recommend the order of financial assistance, which should be given by the Central Government/University Grants Commission for this purpose.

2. Consequently, the Chairman of the Commission nominated the following to constitute the above Committee :—

1. Dr. D.N. Wadia,
Geological Adviser to the Government of India (Chairman)
2. Dr. M.S. Krishnan,
Mineral Adviser to the Government of India
3. Dr. C. Mahadevan,
Professor of Geology, Andhra University

4. Dr. W.D. West.
Professor of Geology, Saugor University
5. Dr. N.N. Chatterji.
Professor of Geology, Calcutta University
6. Mr. H.O.G. Humphreys,
Indian Mining Association, Calcutta
7. Shri D.K. Samanta.
Vice-President, Indian Colliery Owners' Association, Dhanbad
8. Shri V.R. Khedkar,
Director, Indian Bureau of Mines, New Delhi, and now Super-
intending Geologist, Geological Survey of India.
(Nominee of the A.I.C.T.E.)
9. Dr. B.D. Laroia,
Development Officer, University Grants Commission
(Secretary)

3. The Committee held three meetings, two at Delhi and one at Calcutta. A Sub-Committee was appointed at the Calcutta meeting to prepare in broad outlines syllabi for post-graduate courses in Geology and Applied Geology. The Committee was also to take into consideration the recommendations made by the Soviet experts regarding the uniformity of syllabi in the various Indian Universities. The recommendations of the Sub-Committee as approved by the Geology Committee are attached as Annexure-I.

4. These syllabi are meant to indicate the broad outlines on which the detailed syllabi may be based, and the Universities are free to modify the same according to their needs as determined by the Industrial environment and the facilities available in allied subjects as Engineering, Chemical Technology and Geophysics, etc. etc. The Committee is not in favour of drawing inflexible and uniform syllabi for Geology and Applied Geology for all Universities. An unalterable syllabus imposed by a Central authority, such as that suggested by the Soviet experts may not be welcomed by the Universities and the Geology teachers. The Committee believes that if the Universities take into consideration the broad outlines suggested in the Annexure-I, the syllabi drawn will serve the purpose of toning up the standard of training. The syllabi suggested should give the desired bias towards field training and practical work.

5. The only other aspect which the Committee desires to emphasise with a view to raise the standard of teaching in Geology and Applied Geology is the quality of the teaching personnel. The Committee feel that no post-graduate training in Geology should be started unless provision has been made for the appointment of a Professor and at least two Readers so that there should be a qualified senior teacher in each one of the following sections :—

- a) Stratigraphy
- b) Mineralogy and Petrology
- c) Economic Geology and Structural Geology

For Applied Geology an additional Reader will be needed for Mining Geology.

5.1 The other method of raising the standard is to invite specialists

in Mining Geology and Applied Geology from abroad as Visiting Professors. The Visiting Professors should spend at least six months in this country though it will be preferable to have them for a year. If the Commission could help in arranging Refresher courses for teachers in Geology specially during the summer time, it will help to maintain a high standard of teaching by keeping the teachers well-informed of new developments in the subject.

6. In september 1953 a Conference of leading Geologists had been held under the auspices of the Ministry of Education to explore measures necessary for the improvement and development of facilities of Geological Education and training in the country. In view of the importance of the subject in the context of the Geological Survey and mineral development of the country, it was felt that such deficiencies as lack of field training should be made good and the facilities for training then existing be consolidated and improved in preference to expansion programmes. Although this Conference did not suggest any concrete steps to be taken, it focussed attention on field training as an essential part of Geological Education and suggested a healthy collaboration in field work between the Universities and the Geological Survey of India. The Conference also suggested the development of special facilities at well-established centres only for training in selected fields of study or branches of Geology which may be considered important from the point of view of both teaching and research.

7. Later, at the instance of the Ministry of Natural Resources and Scientific Research, a team of Soviet experts visited this country from December 1955 to February 1956 to examine the present position regarding the training of Geologists, Geophysicists and Mining Engineers in India and to recommend the lines on which the training facilities might be improved and developed. Although the Soviet experts were generally well impressed with the facilities available for training in Geology at various Universities, they found that "the Universities in India train specialists of a very general nature (theoreticians without distinct specialisation)". They also felt the lack of a "centralised coordination of the academic activities of the Universities", which resulted in variation in the qualifications of the University graduates some of which did not conform to the modern industrial standard. They therefore recommended setting up of Inter-University Academic Boards in various branches of knowledge to prepare model curricula, "the discussion and elaboration of which must be widely participated in by University teachers and representatives of Industrial and research organisations".

7.1 It was suggested that for better satisfaction of the demands from Industrial and Research Organisations for qualified personnel, the training of Geologists should be channelled in a number of specialities, as for example:—

1. Geological Mapping and Searching for Mineral deposits
2. Geology and prospecting for mineral deposits with sub-specialities as :—
 - (a) Geology and prospecting for solid fuels
 - (b) Geology and prospecting for metallic and non-metallic minerals

3. Geology and prospecting for Oil and Gas
4. Hydro-Geology and Engineering Geology

7.2 With a more precise organisational scheme for practical training of studies in field and industry, it should be possible to produce specialists capable of functioning as experts immediately after they graduate, which is not the case at present.

7.3 It is estimated that just over 800 qualified Geologists are available in India. On the average about 150 Pure Geologists and about 30 graduates in Applied Geologists are produced annually by the Universities and other institutions. It is noticed that some of the Universities have just a few (1-5) students enrolled for post-graduate studies. This is not satisfactory as facilities available in these Universities are thus only partially utilised and there is a higher rate of expenditure incurred for every person trained. The more economical unit according to the Russian experts for training should be 20. It would be advisable therefore to confine training in Geology to those centres only where there is a real demand. There does not seem to be a great need at present for expanding training facilities in Pure Geology though the number of graduated specialists in Applied Geology may be considerably increased.

8. The Committee agreed that in its purview it should cover both Pure Geology and Applied Geology. In Pure Geology, should be included a good course in general Economic Geology, Geological Mapping and the principles of prospecting. For a Complete course of Applied Geological Education, the following subjects should be included:—

- (a) Mining Geology including mineral prospecting, sampling under-ground Geological Surveying, mineral economics; principles of mineral beneficiation and processing, elements of mining, metallurgy and assaying; and mineral legislation
- (b) Principles of Geophysical and Geochemical prospecting
- (c) Ground-water Geology
- (d) Economic Palaeontology
- (e) Engineering and Soil Geology
- (f) Utilization of minerals in Industry

9. The Committee resolved that the normal M. Sc. course in Geology should cover a training period of two years after B. Sc. degree, and for those taking Applied Geology an additional one-year course should be prescribed after M. Sc. In the alternative an integrated course of three years after B. Sc. leading to M. Sc. degree in Applied Geology may be started if a University so desires.

9.1 For the Associateship in Applied Geology at the I.S.M. and A.G. the course should be of five years' duration, to be considered equivalent to the M.Sc. in Applied Geology of the Universities.

9.2 Students admitted to the course in Applied Geology, should have qualified in two of the allied subjects i.e. Physics, Chemistry or Mathematics in the B. Sc.

9.3 The Committee also resolved that the award of M. Sc. Degree by thesis only should be discontinued forthwith.

10. The Committee recommends that the following criteria be adopted by the University Grants Commission for assigning grants to the Universities for post-graduate teaching in Geology and Applied Geology.

10.1 The number of admissions in post-graduate classes (M. Sc.) in Applied Geology should ordinarily be 12, but should not exceed 15.

10.2 No University should start post-graduate teaching in Geology unless it possesses the following :—

- (a) *Standard Equipment*—Standard as well as research type microscopes, refractive index liquids, goniometer; equipment for mineral separation e.g. electro-magnetic separator, standard sieves; ore microscopes, polishing apparatus, Also a small chemical laboratory, furniture with adequate modern physical and chemical apparatus for routine and special ore analysis.
- (b) *Equipment for field Work*
 - (i) Topographical surveying should include plane table and general surveying, triangulation, prismatic compass, level and theodolite and also the use of Burton compass and Abney level ;
 - (ii) *For camping*, tents and camping furniture (camp cots and camp chairs and some camp equipment) will be needed. For field surveying the instruments required are a plane table, prismatic compass, theodolites, etc.
 - (iii) For a unit of 12 students under training in the field the following field equipment would be required :

15 servants/pals for students and servants
 1 Mess Tent
 1 Kabal Pal 9' x 8' for each teacher
 14 Camp tables
 14 Camp beds
 14 Folding chairs

10.3 Field training should be an integral part of Geological Education in Universities both at the under-graduate and post-graduate levels and that the training should be organised and carried out under qualified Supervisors.

10.4 For a unit of 12 students under training in the field there must be at least two teachers to supervise and guide the work. Minimum period of field training for M. Sc. in Geology should be six weeks during the two years' course and a period for four months during the three years' course in Applied Geology. This should be over and above the instructional tours to places of Geological interest.

10.5 After the work is done, the students should be required to submit a report and a *Geological Map*, which will be considered as part of their practical work.

10.6 Expenditure incurred on field training should be considered as approved expenditure. This will also include railway fare, transport charges of tents, camp furniture, rock specimens, and the wages of staff engaged during the camp.

10.7 The Committee recommends that following the practice of the All-India Council for Technical Education for the post-graduate course in Engineering and Technology, 50% students going in for one year's course in Applied Geology or studying in the third year of the integrated three years' course in Applied Geology should receive stipend of Rs. 150/- per month per head. An *ad-hoc* grant be paid to the University on this basis leaving option to the Institution to disburse this amount to as many students as it likes but this number should not be less than one half of the number on roll.

10.8 The Committee recommends the following order of priorities for giving financial assistance:—

1. Rehabilitation
2. Improvement and expansion of existing facilities
3. Fresh proposals
4. Buildings

(The Committee recommends a floor area of 15,000 sq. ft. for the post-graduate teaching including Applied Geology).

11. The Committee recommends that the Geological Survey of India should arrange for special training camp for teachers in Geology and Applied Geology. The Committee feels that it should be possible for the Geological Survey of India to take teachers every year in training Camp.

12. In the light of the general principles enunciated above the Committee has examined projects and development schemes submitted by various Universities to the University Grants Commission for the development of facilities for training and research in Geology and Applied Geology during the Second Five-Year Plan period. The Committee desires to emphasise that during Second Five-Year Plan, higher priority should be given to strengthen and improve the facilities available for training in Geology and Applied Geology. The Committee is of definite view that it is not the proper time to extend training in Geology as not more than 150 Geologists are needed every year. The pure Geologists cannot be of much service in exploration work. The training in this subject, therefore, is purely of academic nature and hence it should be of a high standard as in the case of Physics, Chemistry, Botany or Zoology. The opening of new centres should not be encouraged unless the local circumstances are very much in favour of starting training in Geology. Regarding the development of research work, selected University centres should be helped to undertake work in certain selected fields which are considered important from the point of view of Geological local environment or other facilities in equipment or personnel.

13. So far as training in Applied Geology is concerned, the Committee is of the view that certain selected centres should be given generous

assistance to raise the standard particularly in field work. The limited financial resources which are available for Post-graduate work should not be dissipated in supporting too many centres of training. An economic unit for training should be a class of 15, although the practical batch should not be bigger than eight in number. Centres with only four or five students are too uneconomical to be maintained. Nevertheless while recommending the centres for training in Applied Geology the Committee has kept in view the principle that each region should have a centre of training in this subject. The following centres are recommended for Applied Geology :

- (1) Indian Institute of Technology, Kharagpur
(has also facilities for Geophysics)
- (2) Indian School of Mines and Applied Geology, Dhanbad
(has also facilities for Geophysics)
- (3) Andhra University (has also facilities for Geophysics)
- (4) Banaras Hindu University (has also facilities for Geophysics)
- (5) Saugor University (has a donation of 6.5 lakhs)
- (6) Nagpur University (has a donation of 5.6 lakhs)
- (7) Mysore University

13. 1 The request of Calcutta University for starting post-graduate classes in Applied Geology be reviewed when the construction of the new building now sanctioned has been completed. The cases of Rajasthan and Jammu & Kashmir Universities be re-examined in the beginning of the Third Five-Year Plan.

14. The Committee recommends that grants may be given to the Universities in accordance with the usual formula for sharing approved expenditure between the University Grants Commission and the University and/or the State Government. Amounts of approved expenditure for various University centres under such heads as Building, Equipment and Staff etc. are given in Annexure-II. The Committee understands that the University Grants Commission gives adequate grants for Library books and journals in block sums for all Science Departments. It is, therefore, expected that the Departments of Geology and Applied Geology will get their due share from these grants. Hence, no special recommendations are made under the head 'Library'. Similarly, it is expected that the Geology Departments will be able to get help from Central Workshops which are being provided by the University Grants Commission at various University centres. But the Committee feels that small grant of Rs. 5,000 to 15,000 may be given to the Departments of Applied Geology for developing departmental workshops to maintain efficiently the implements needed for field work.

Sd/-
(B.D. Laroia)
Secretary

Sd/-
(D.N. Wadia)
Chairman

Annexure—I*(to Appendix 'B' of item 17)*

UNIVERSITY GRANTS COMMISSION

*Joint Committee for the Development of Geology and Applied Geology***Courses in Applied Geology**

In addition to the normal courses in Pure Geology for M.Sc. degree, the following subjects should be specially taught for Applied Geology.

Mining Geology : The working of the different types of deposits; the principles of Ore-search and Ore-appraisal, mine valuation and mining laws.

Mineral Economics : Economics of the mineral industries. The distribution of the world's minerals with particular reference to India.

Ore-Benefication and processing : Design and operation of the machinery employed for breaking, crushing, sizing, washing and concentrating.

Ore-microscopy and micro-chemical methods

Assaying : Wet and dry methods

Surveying : Topographic, subsurface and aerial surveying

Prospecting : Geological, Geophysical and Geochemical prospecting

Engineering Geology, Hydro-Geology and Soil-Geology

Practical field training : In the three-year course there should be four months' training in topographical and Geological surveying, mining and drilling.

Annexure—II

(to Appendix 'B' of item No. 17)

UNIVERSITY GRANTS COMMISSION

OLD MILL ROAD, NEW DELHI.

JOINT COMMITTEE FOR THE DEVELOPMENT OF GEOLOGY AND APPLIED GEOLOGY
STATEMENT OF APPROVED EXPENDITURE AND SCHEMES FOR THE DEVELOPMENT OF GEOLOGY
AND APPLIED GEOLOGY

S. No.	Name of University	Scheme	Buildings	Scientific Equipment	Additional staff	Remarks	Schemes not approved	
1	2	3	4	5	6	7	8	
1.	Aligarh	General develop- ment facilities for research in Coal, Petrology and Palaeontology.	(3.44 lakhs already sanction- ed by the Com- mission)	1.0 lakh	1 Lecturer	Rs. 13,500	—	Ore-dressing Laboratory.
2.	Banaras	Development of existing facilities and construction of a new building.	(a) 18,000 sq.ft. @ Rs. 13/- per sq. ft. Rs. 2,34,000 (b) Services & Furniture Rs. 1,10,000	2.0 lakhs	1 Reader 1 Lecturer	Rs. 21,600 ,, 13,500 <hr/> ,, 35,100	—	
			Rs. 4,35,000					

1	2	3	4	5	6	7	8	
3	Andhra	Additional facilities for existing course in applied Geology and conversion of M.Sc. degree by Research to M.Sc. by papers.	Floor area 14,500 sq. ft. @Rs. 16/- sq. ft. Rs. 2,32,000 Services and furniture Rs. 78,000	1.25 lakhs	2 Readers 1 Demonstrator	Rs. 43,200 Rs. 5,000 Rs. 48,200	—	Military & Engineering Geology
			Rs. 3,10,000					
4	Annamalai	Starting M.Sc. courses in Geology.	(Rs. 1.53 lakhs sanctioned previously by the Commission	0.75 lakhs	1 Professor	Rs. 36,000	—	Starting B.Sc. Hons.
5	Baroda	Starting M.Sc. courses.	—	—	—	—	—	Starting Post-graduate courses.
6	Gauhati	Development and improvement of existing facilities.	12,000 sq. ft. @Rs. 22/- per sq. ft. Rs. 2,64,000 Service and furniture. 88,000	0.60 lakhs	1 Professor 1 Reader	Rs. 36,000 Rs. 21,000 Rs. 57,600	Subject to the confirmation by Visiting Committee, which is expected to go for all Science departments.	x
			Rs. 3,52,000					
7	Jammu & Kashmir	Development of facilities for Post-graduate training in Geology	18,000 sq. ft. @Rs. 15/- sq. ft. Services & furniture	2,70,000 90,000 Rs. 3,60,000	0.75 lakhs	1 Professor 1 Reader Rs. 36,000 Rs. 21,600 Rs. 57,600	-do-	

1	2	3	4	5	6	7	8
				Rs. in lakhs			
8	Karnatak	Starting M.Sc. in Geology	(Science Block already sanctioned)	0.60	1 Reader Rs. 21,600 1 professor .. 36,000 <u>Rs. 57,600</u>	—	Specialisation in Geo-morphology, Pleistocene, Geology or Hydrology etc.
9	Lucknow	Developing existing facilities	Alternation and minor additions to the existing building	20,000	0.60	1 Reader Rs. 21,600	(Under consideration of the Commission as a part of the Visiting Committee)
10	Mysore	do				(To be assessed by a Visiting Committee)	Micropaleontology and Petrology
11	Nagpur	Development of Post-graduate training and Research in Geology and Applied Geology		Rs. 3.27 lakhs	1.00	Scheme has already been sanctioned by the Commission and expenditure is to be met from C.P. Manganese Ore Co.'s Donation of Rs. 6.5 lakhs and that of Subheddar trust of Rs. 1,00,000/-	Applied Geophysics
12	Saugor	Development of Post-graduate training and Research in Applied Geology	(For an additional wing in the existing buildings for Geology department) (Services, furniture and other special equipment for Applied Geology	Rs. 65,000 40,000 <u>105,000</u>	Rs. 1,99,000 (Already sanctioned Additional Rs. 38,000 <u>Rs. 2,37,000</u>	Rs. 2,93,000 (Already sanctioned Geo-15,000 Chemist additional) <u>Rs. 3,08,000</u>	—

1	2	3	4	5	6	7	8	
				Rs. in lakhs				
						Rs. 6.5 lakhs. Re- curring expenditure to be entirely born by the University after the donation fund is exhausted.		
13	Osmania	Improvement and development of facilities for Post- graduate training and research.	2.0 lakhs 10,000 sq. ft. @ Rs. 15/- per sq.ft. Services and furniture	Rs. 1.50,000 Rs. 50,000	1.2	1 Reader 21,600	—	Starting Geo- Physics.
				Rs. 2,00,000				
14	Patna	General improve- ment.	Additions and alterations to the existing building	Rs. 50,000	0.75	1 Reader 21,600	—	Introducing geo- Physical pros- pecting and Ore-dressing.
15	Poona	General improve- ment in equip- ment.	—	—	0.50	1 Lecturer 13,500	—	
16	Rajasthan		(4,13,750 already sanctioned by the Commission for building cover- ing 20,600 sq. ft. area)		1.20	1 Reader 2 Lecturers 75,000 1 Mechanic	This scheme has been sanctioned by the Commission on the recommen- dation of the Visit- ing Committee.	Applied Geology and Detailed Mineralogical investigation of pegmatites of Rajputana. (This should be done by the Geological Survey of India)

1	2	3	4	5	6	7	8	
17	Madras	Development of existing facilities	—	1.1	1 Reader	21,600	—	Preparation of detailed maps of selected area (This is the work of Geological survey of India).
18	Calcutta	Provision for new Building and development of existing facilities	18,000 sq. ft. Rs. 20/- per sq. ft. Rs. 3,60,000 Services and furniture. Rs. 1,20,000 <hr/> Rs. 4,80,000	2.0	2 Readers	43,200	On R for stratigraphy and one on Palaeontology.	Applied Geology (To be reviewed when new building is ready)
19	Jadavpur	Post-graduate training in Geological Sciences.	—	—	—	—	—	Post-graduate training in Geological Sciences including Engineering and Applied Geology.

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