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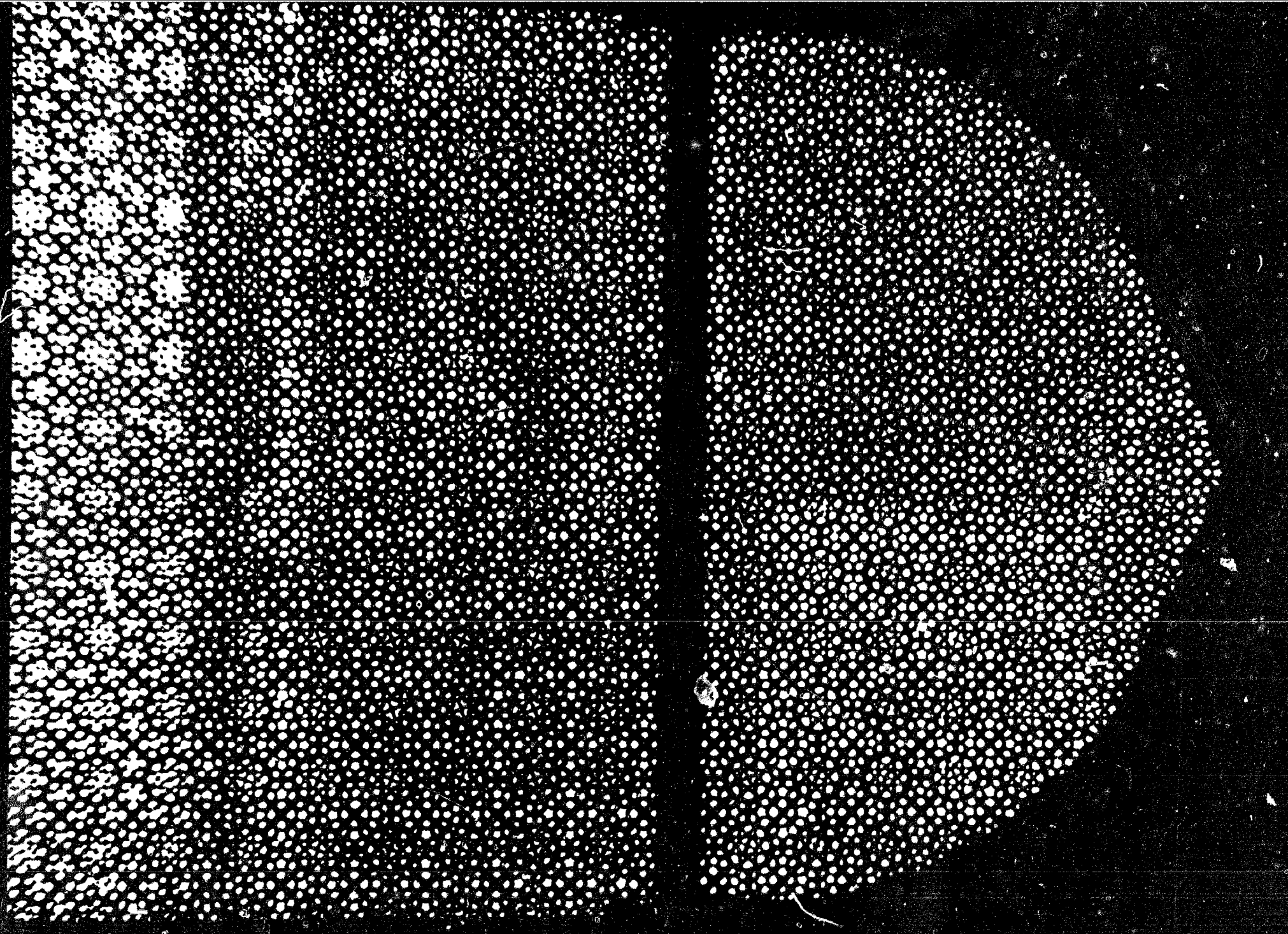

kanpur indo-american program

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The Kanpur Indo-American Program (KIAP) has been a group effect in which a Consortium of U.S. educational institutions assisted in the development of the Indian Institute of Technology in Kanpur (IIT/Kanpur). The Institute is a leading center in India for the education of engineers and scientists, and for research inengineering and science. During KIAP's ten year operation at IIT/Kanpur, it played significant and changing roles in the dynamics of the growth of IIT. Two key elements distinguish the KIAP from any other institutional program, (1) the U.S. field staff constituted a seperate administrative and operational entity Staff members reported directly to Program Leaders for providing advisor or consulting services desired by IIT officials, (2) from the beginning the Indians exercised full responsibility for the administration of IIT/Kanpur.

The final analysis of KIAP is presented in the form of five different theme papers. The reports are written by former Program Leaders, who participated in the continuing operational interactions of KIAP. The papers present a coherent report of some of the most significant aspects of the history and style of the Program.

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final report

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- November, 1961 -

Prime Minister Nehru (right) discussed IIT/Kanpur
with group from Consortium in his office
in the Parliament Building, New Delhi

Facing the camera, from left to right: E.A. Pearson, UC, Berkeley;
S. Brooks, EDC; R.S. Green, Ohio State; N.C. Dahl, MIT; A.H. Benade, Case;
G.K. Chandiramani, Joint Educational Advisor and ex-officio Joint Secretary,
Ministry of Scientific Research and Cultural Affairs

INTRODUCTION

The Kanpur Indo-American Program (1962-1972) has been a group effort in which a Consortium of U.S. educational institutions assisted in the development of the Indian Institute of Technology in Kanpur, India. The members of the Consortium are California Institute of Technology, Carnegie-Mellon University, Case Western Reserve University, Education Development Center, Massachusetts Institute of Technology, The Ohio State University, Princeton University, Purdue University, University of California, and The University of Michigan.

The United States supported the Program through the Agency for International Development (AID) by means of a contract with EDC and supplementary agreements that EDC made with the nine other members of the Consortium.

EDC administered the Program under the policy direction of a Steering Committee to which the President of each institution had appointed a representative.

By 1972, the Indian Institute of Technology (IIT/Kanpur) had beome a leading center in India for the education of engineers and scientists, both undergraduate and graduate, and for research in engineering and science.

Kanpur is a growing industrial city with a population of more than a million, located about 300 miles from New Delhi on the South Bank of the River Ganges.

For ten years, the Program (KIAP), which is the subject of this report, was in operation at IIT/Kanpur; and, in the course of those ten years, has played significant and changing roles in the dynamics of the growth of IIT/Kanpur.

As originally conceived early in 1971, the basic text for this Final Report was to have been based on the proceedings of the Indo-American Symposium about IIT/Kanpur and KIAP that was to have been held at the Institute in March, 1972.

Participants in that Symposium were to have been interested representatives of the four agencies that had been involved in the project - that is: the Ministry of Education, Government of India (MOE/GOI); IIT/Kanpur; the United States Agency for International Development (USAID); and KIAP.

The outline for the Symposium/Workshop Study/Conference called for twelve different sessions over a period of seven days. For each session there was to have been a major theme paper, and several written commentaries - all of which were to have been distributed in advance - and a discussion. Assignments for the various sessions were to have been along the following lines:

I. Opening Session
Ministry of Education/The Director, IIT/K

II. The Collaborative Program
Theme papers by the first Director, IIT/K, and the first Program Leader

III. The Educational Program at IIT/K
Theme papers by an IIT/K Department Head and a KIAP Staff Member who had been involved in the early development of the educational program.

IV. Faculty Development
Paper by the Dean of Faculty, IIT/K

V. Academic Facility Development
Author to be selected by Director, IIT/K

VI. Academic Leadership and the Support Services at IIT/K
(This theme paper has been written jointly, as originally planned, by R.S. Green, Program Leader (1964-1966) and J. Mahanty, Department of Physics, IIT/K).

VII. Problems of a Residential Campus
Paper by a Department Head heavily involved in the topic.

VIII. Student Affairs
Paper by the Assistant Dean for Students

IX. Operational Interactions
Theme paper by G. Oakley, Jr., Program Leader, 1968-1971

X. The Role of IIT/K in Education in India
Paper by a Dean

XI. The Role of IIT/K in Industry
Paper by a Department Head

XII. Wind-up Session/Highlights of the Symposium
Selected rapporteurs from MOE, IIT/K, USAID and KIAP

Had it been held, the Symposium might have met needs that would not have been fulfilled otherwise. However, with the sudden deterioration of Indo-American relations, early in 1972, the original hopes of both the Indians and Americans for a full-dress Symposium began to falter for lack of Indian participation. In March, the Symposium was reduced theoretically to becoming a "low-key Workshop Study Group", to be limited to no more Indians and Americans than could be accommodated in the living room of a Type V house on the IIT/Kanpur campus.

At that point, back in the U.S., the Consortium Committee decided against sending any representatives to India to participate. Plans for that Symposium/Workshop in India were then promptly tabled - and remained tabled through the end of the Program in June.

Chapters I-IV of the Final Report were written for the Symposium by former Program Leaders. Each paper was intended to serve initially as background material, and was to have been discussed and reworked in the light of any modifications or additions that might have been suggested in the Symposium by representatives of the MOE, IIT/K, USAID.

Together with Chapter V, written by the final Program Leader, these papers constitute a coherent report of some of the most significant

aspects of the history and style of the Program. While written predominantly by Americans, with the exception of Chapter III which was written jointly with an IIT/K Professor, we hope that they will strike a sympathetic note with both Indians and Americans with whom we have worked on the Program; and that others may find them both interesting and useful in planning future activities of a similar nature.

In terms of general interest, it is in order to point out that this major technical assistance project, which was referred to in November, 1961, as President Kennedy's gift to Prime Minister Nehru, has been a success in that IIT/Kanpur has become an outstanding technological institute in India. That, though, is the achievement of IIT/K and individuals concerned. The achievement of the Program as such, and of the visiting Staff Members and their families, is that they both gave and they received, and then went home having made what are likely to be many life-long friendships and professional associations with Indians.

These achievements, on both personal and institutional levels, seem likely to survive the current sad state of official Indo-American relations.

In Chapter I, The Collaborative Program, Dahl shows that from the beginning the Government of India had intended that the Indian Institutes of Technology (the IIT's) should become "Institutes of National Importance", and that the IIT's should seek opportunities to benefit from the experiences of the industrialized countries that assist them. In this respect, one of the key resources of IIT/Kanpur has been the presence on campus of visiting professors and other KIAP Staff Members who went to Kanpur with their families to live and to work for periods of from one to three years. (Ref: Appendix B)

Two of the several elements that distinguish KIAP from other institutional programs are:

i. That the U.S. field staff constituted a separate administrative and operational entity in which Staff Members were directly responsible to the Program Leader for the provision of advisory or consulting service desired by the IIT/K;

ii. That from the beginning, the Indians exercised full responsibility for the administration of IIT/Kanpur.

Hence, IIT/Kanpur was always free to modify or reject advice in a way that it could not have done if the KIAP staff had been built into the operation of the Institute. This meant, in turn, that from the beginning, the IIT/K had to develop its own teaching staff for all the courses that it offered without being able to rely on visiting professors to fill in the gaps.

The set-up also served as a damper to latent desires that any U.S. Staff might have had to deliver themselves of the "we-make-it, you-take-it" kind of intellectual imperialism that inhibits collaboration, or even worse, fosters dependence.

While Dahl stresses to two-way collaboration at IIT/Kanpur, Oakley (Chapter IV), places his initial emphasis on the relationships of all four agencies that were directly involved - i.e., The Ministry of Education, USAID, IIT/Kanpur and KIAP, and the different ways in which each of these - once agreements and understandings had been reached as to who would do what and how - worked towards the achievement of the goals for IIT/Kanpur.

In particular, Oakley notes that before the Contract was signed, USAID defined its role in relation to KIAP in a way that was designed to encourage KIAP in the exercise of KIAP's professional responsibilities.

He also notes that AID, under a Preliminary Contract, supported the exploratory phase of this Program before the Definitive Contract was signed. The Preliminary Contract, or contract-to-make-a-contract, as it was dubbed, was in effect from August, 1961, until February

1962.

Its cost was modest in relation to its critical contribution to the success of a Program that in the following ten years was going to expend thirteen and one half million U.S. dollars, and twenty-three million Indian rupees - from the U.S.-owned PL 480 Wheat Loan funds.

Both Dahl and Oakley stress KIAP's insistence that academic appointees to the KIAP Staff be faculty members of Consortium Institutions, regardless of other considerations.

While Oakley emphasizes institutional relationships, Dahl underlines the critical role in the early days of one individual, Dr. P.K. Kelkar, IIT/K's first Director. In fact, there is a strong implication that the MIT group that first recommended the formation of a Consortium would not have done so but for the enthusiasm and perception of Dr. Kelkar.

The evolution of the idea of a consortium which would take collective responsibility for the Kanpur collaboration, and the discussion that led to the selection of an outside institution to administer it, are described on pp. 7-9.

Because of its significance for KIAP, there is a brief report of the Preliminary Contract in Appendix A along with excerpts from the Definitive Contract. For the Contract Scope of Work, AID agreed to the inclusion of a bucket paragraph to "cover such other activities as may be conducive towards a realization of the fundamental purpose of the project."

The bucket paragraph subsequently facilitated the extension of the Contract to cover several obviously desirable and relevant activities that had not been specifically provided for in the original Contract. The most important of these was the Contract provision that permitted the use of U.S.-owned rupees to pay for the passage to India from abroad of newly appointed IIT/Kanpur faculty

and their families. (Ref: A-3)

The process by which laboratory equipment was selected for purchase in the U.S. by KIAP is described on pages 19 and 20 - and major items of equipment purchased that cost $5,000 or more are listed in Appendix E. The Kafkaesque labyrinth of red tape that was involved in the acquisition of a gismo under both USAID and GOI regulations, and its shipment to India - destination IIT/Kanpur - beggars description by words or charts or even combinations of both. However, it is worth pointing out that KIAP activities contributed little, if anything, to the problem of the unfavorable U.S. balance of payments that is still with us. In so far as possible, U.S.-owned surplus rupees were used for international travel and transportation, as well as for all Program expenditures in India. All equipment purchased with U.S. dollars was purchased in the U.S. in accordance with strict USAID procurement regulations; and when shipment was paid for with dollars, shipment was by U.S.-flag carriers.

Furthermore, the dollars that were used for training IIT/K faculty at Consortium Institutions were all spent in the U.S.

In India, under U.S. Embassy regulations, the U.S.-owned supply of rupees was the sole source of local currency for individual Staff Members and for the Program.

Hence, while KIAP expended thirteen and one-half million U.S. dollars in ten years, very few of those dollars - perhaps less than 1% - were circulated abroad.

As the collaboration proceeded, it became evident that in order to achieve the educational and research goals of IIT/Kanpur (Ref: Dahl, Chapter I, p. 21-22), the administrative structure of the Institute and its support services would have to be improved. Consequently, while the curriculum was still in its early stages of development (Ref: Halfman, Chapter II), the scope of KIAP was broadened to include Staff who would be assigned to work in those areas.

Here, according to Green and Mahanty, Chapter III, "Semantic differences intrude themselves." To cover those differences, they "use the euphemism 'academic leadership' to characterize the broader role of educational administration: namely, identification of goals and the marshalling of total resources to meet those goals."

"The problem that this Institute (along with most similar institutions) faces is to build a bridge between faculty and students.... and the other...." (Chapter III, p. 4).

Even a glance, at the broad professional interests of KIAP Staff Members, will reveal evidence of KIAP's bridge-building efforts, efforts which may be somewhat akin to those which began some years ago in the Consortium Institutions themselves.

Chapter IV, OPERATIONAL INTERACTIONS (Oakley) is an overview of the Program, from the '<u>Pre-contract Phase</u>', and through the '<u>Operational Phase</u>' with reports on <u>Intra-KIAP Relations</u>, <u>Relations with the Ministry of Education</u>, <u>USAID-KIAP Relations</u>, <u>IIT/Kanpur-KIAP Interactions</u>, and <u>Conclusions</u>.

Appendix F deals with the MID-POINT ASSESSMENT (1966) - whereby a qualified team of eight engineering educators from eight different Consortium Institutions made reports to the Steering Committee on the then state of IIT/Kanpur, in American terms; and recommendations concerning KIAP activities for its remaining years. The Report of this Team, and the activities at IIT/Kanpur that preceded its preparation constituted something of a self-assessment by IIT/K. This helped to reassure both IIT/K and KIAP that their efforts so far had been productive - and confirmed a developing feeling that additional emphasis should be placed on the continuing improvement of IIT/K support services under developing academic leadership.

For the future, it is recommended that provision be made at the beginning of any long term development program for some sort of consideration at the five-year mark of how the Program has been going, and to what extent its procedures should be modified or

re-directed during the ensuing years. Provided good working relationships between the agencies involved have been maintained, there should not be an absolute need for the negotiation of a new contract at the five-year mark. On the other hand, if good working relationships have not been maintained, a better contract might not serve to resolve the pre-existing problems, anyway.

Appendix G lists individuals who were invited to IIT/Kanpur from overseas - to participate in short courses and conferences - with travel paid for with U.S.-owned rupees allocated to KIAP. Visitors under invitational travel were guests of IIT/Kanpur.

In Chapter II (Halfman) for the general reader, it is suggested that after reading the first few pages particular attention be given to pages 61-66 - including Assessment of the Early Education Program, and A Look to the Future, "Perhaps the key idea is that technology is no longer science limited. Instead, it is limited by social science... While accumulating skills, facts and techniques, the student's maturation is proceeding apace. He listens to what the faculty says but is more impressed by what it does."

Recommendations? Perhaps Halfman is saying that today we all have some more homework to do.

Dahl, on the other hand, is more direct in his Retrospective Look at the Collaboration (pp. 26-31)"from the middle distance of Delhi", when he challenges the IIT/Kanpur faculty as a group to recognize "the necessity for social relevance to co-exist with academic excellence....", and predicts that "in the context of (India's) new emphasis on self-reliance, IIT/Kanpur will have to earn any special treatment that it receives in its second decade."

Chapter V, KIAP at the End of the Program (Fox) begins with a brief report of Program activities that were frozen out by the 1972 chill in Indo-American relations.

In his first four pages, Fox reports that KIAP's two major recommendations to USAID have been shelved for the duration. The

first is the proposal for a Senior Faculty Fellowship Exchange Program, introduced by KIAP five years ago, and subsequently watered down to a relatively modest lump sum grant to IIT/Kanpur to promote exchange of IIT/Kanpur faculty between Consortium and other U.S. institutions; and to provide funds for spare parts needed for U.S. equipment that had already been provided by KIAP. This proposal which has been discussed extensively with USAID/New Delhi and with AID in Washington, has KIAP's highest priority. It should be defrosted and acted upon as soon as possible to help IIT/Kanpur to keep in touch.

KIAP's second major recommendation is the establishment of the proposed IIT/K Endowment Fund, which would utilize PL 480 rupees for additional development of all five IIT's in new directions.

Fox then reports on the status of the much-discussed Electronics Park - that was to have been adjacent to IIT/Kanpur; Regional Computer Centers; and an Advanced Center for Electronics Systems being set up in the IIT/K Electrical Engineering Department.

Perhaps equally significant, for IIT/K in the next decade, have been a series of encouraging administrative developments that followed the settlement of a worker's strike that shut down IIT/K for a fortnight in the Spring of 1972; and the impact of eight new members and a new Chairman to the IIT's thirteen-man Board of Governors. Encouraged by the Chairman, the Director is re-submitting a proposal for completion of IIT/K's building program, suspended for several years for lack of funds.

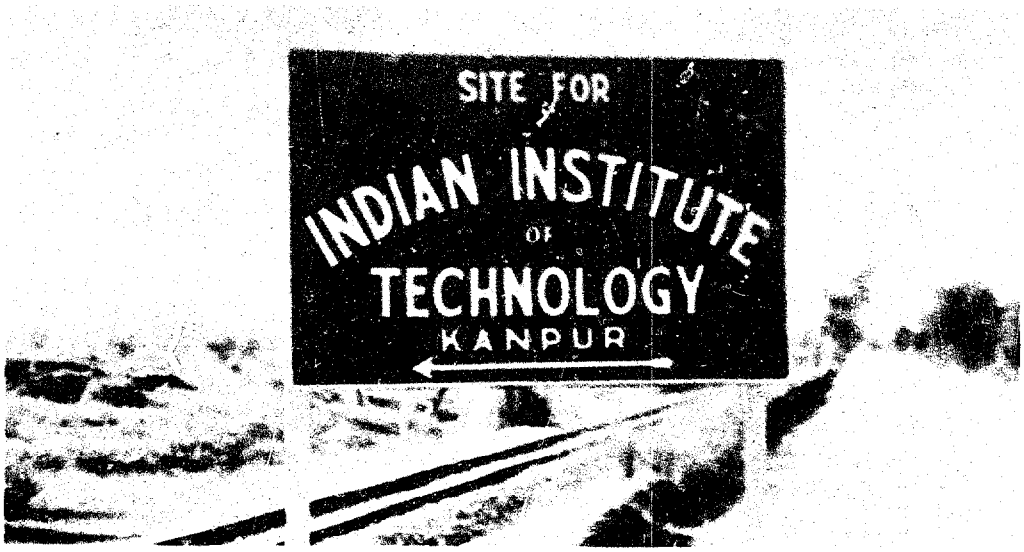
On page 114 of Chapter V, Fox begins a "Brief Decentenary Retrospect" in which he reports on placement of IIT/K graduates; why able faculty prefer IIT/K to any other institution in India; and need for better supervision of support staff. One important beneficial consequence of the advisory or consultant status of all KIAP Staff was that the transition of the Institute through the phasing out of KIAP has been smooth. IIT/K's significant attention, to date, to

services for education and industry, are summarized in a section entitled "Reaching Out" (page 120). This section ends with the statement "IIT/K has come a long way in 10 or 12 years. It is by general off-campus agreement the best of the five IIT's".

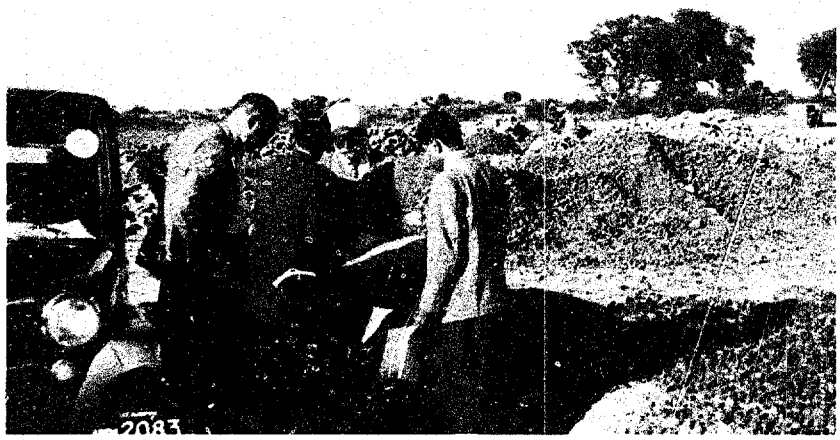
Finally, Fox states "IIT/K has attained adequate maturity at just the right time....to contribute importantly to India's industrial increase; and in the process, to its own growth."

Each of the chapters that follow was written on an assigned topic. In reading the report, it may be worthwhile to realize that each of the authors, as a former Program Leader, has participated in the continuing operational interactions that have characterized KIAP from the beginning.

Shepherd Brooks
Program Administrator
EDC, 23 June 1972



The IIT/Kanpur Campus is at Kalyanpur, 10 kilometers west of Kanpur, and adjacent to the legendary Grand Trunk Road (right) that extends from Calcutta to the Khyber Pass.



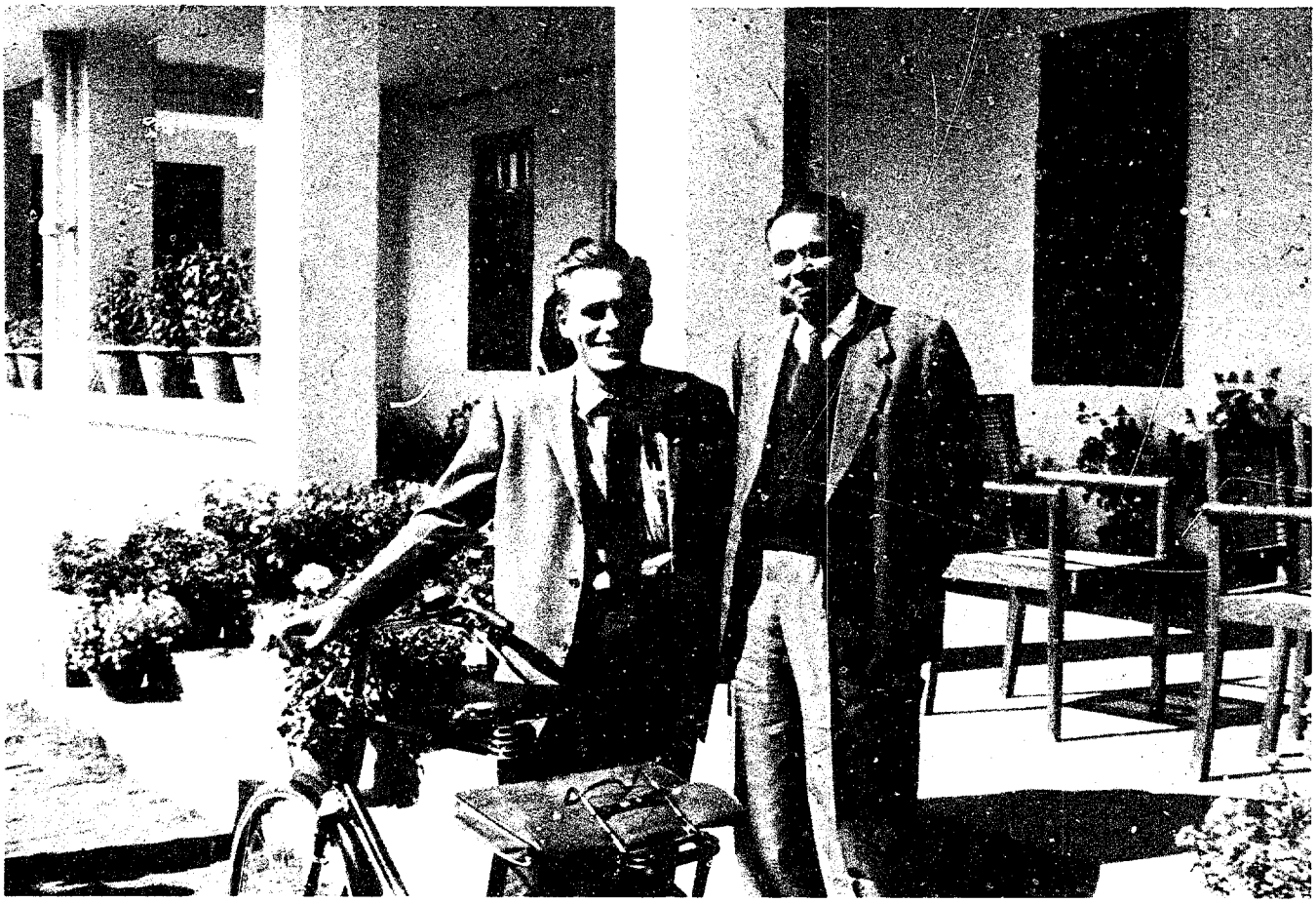
Mounds of aggregate, made from bricks baked on the site, are ready for use. Engineers show G. Oakley (left), EDC, plans for beginning construction.

CHAPTER I

THE COLLABORATIVE PROGRAM
AT THE
INDIAN INSTITUTE OF TECHNOLOGY/KANPUR

by

Norman C. Dahl



N.C. Dahl (MIT), Program Leader, and P.K. Kelkar, Director,
At IIT/K temporary location in
Harcourt Butler Technological Institute, Agricultural Gardens, Kanpur.

Organization of the Collaboration

Sometime in the late 1950's the Government of India and the United States Government agreed in principle on a program in which the U.S. would aid in the development of the Indian Institute of Technology to be established in Kanpur. The GOI welcomed this assistance, not only because it was short of the foreign exchange needed for equipping such an institution but also because it was genuinely interested in bringing to India and adapting to its needs the patterns and practices which had made U.S. engineering education so productive and dynamic during the post-war years. This arrangement with the U.S. was part of a strategy of the GOI to introduce into India the best elements of the technical education of different countries, a strategy based on the assumption that the optimal total technical education system for India was likely to include elements from several countries. Similar agreements for assistance had been reached with two other countries who also are preeminent in their engineering education and industrial capacity: the Soviet Union which began assistance to the IIT/Bombay in 1958, and West Germany which began assistance to the IIT/Madras in 1959.

The U.S. Agency for International Development (then the U.S. Technical Cooperation Mission to India) engaged a team of six engineering educators, chosen by the American Society for Engineering Education, to visit India for discussions with Indian educators and officials and prepare a report to AID which would recommend how U.S. engineering education might be incorporated into the IIT/K. Meanwhile, a Director was appointed to organize a provisional staff and faculty and to begin operations, and the IIT/K began classes in 1960 in temporary quarters in the Harcourt Butler Technological Institute in Kanpur. The curriculum and methods of instruction with which the institute began operations were not influenced by the ASEE study team or its report. However, the newly

appointed Director was very interested in and knowledgeable about engineering and scientific education throughout the world, having read widely and travelled extensively, and the curriculum reflected many of the current practices in the U.S., particularly in an emphasis on the engineering sciences.

With the ASEE report serving as a framework for discussions, AID and the GOI were able to define the general scope and nature of the aid and come to a firm decision that AID should proceed to find a U.S. university to undertake contractual responsibility for the program, as was the common practice of AID at that time. The Massachusetts Institute of Technology was approached for this purpose and the President of MIT appointed a three-man faculty committee to investigate the matter and advise him. On the basis of information available to them in the U.S. the committee gained the impression that undergraduate engineering education in India was very similar to that in the U.S. (as one committee member said after reading the catalogues of a number of Indian engineering colleges, "They pray to the same gods we do!"). The committee questioned whether India would gain much from establishing an institute along the lines outlined in the ASEE report; perhaps, alternatively, India might more effectively use the U.S. assistance in establishing a completely graduate engineering institution.

The committee felt that in order to resolve these issues it would be necessary to go to India and acquaint themselves with the actual nature of undergraduate engineering education and to have discussions with a cross-section of people, including GOI officials and educators. Support for such a trip was obtained from the Ford Foundation and the committee visited India in January 1961. The undergraduate engineering education described in the catalogues they did not find on the ground; the form was there but the substance and practice were absent. What they saw as they travelled

about India prior to going to Kanpur convinced them that there was need for a modern, scientifically oriented engineering institute, with an undergraduate component which could set achievable standards for entrance into a graduate program and thereby influence undergraduate education throughout India.

However, not until the committee went to Kanpur and met the Director, Dr. P.K. Kelkar, did they find an educator who both understood and shared their views. Dr. Kelkar had devoted much study and thought to the question of how science and technology might contribute vigorously to the growth of India. He had concluded that an essential element was the development of universities in which there would be a total involvement of students and faculty in intellectual and scholastic pursuits relevant to the national goals and aspirations of India. He understood that in order to create such an environment there would have to be a psychological climate which would induce individuals to grow and intellectual space in which growth could occur. These conditions could not be attained under the rigid, hierarchical structure of the traditional Indian university system and, therefore, in building the IIT/K Dr. Kelkar planned to make substantial departures from established practices. His studies of education had convinced him that many of the intellectual and psychological conditions he sought for IIT/K were present in U.S. technical education and thus he welcomed U.S. collaboration.

Dr. Kelkar's perception and enthusiasm were contagious and the committee left Kanpur convinced that an institution of significant importance to India might be created at Kanpur under the leadership of Dr. Kelkar. Further, they knew that Dr. Kelkar shared their view that the chances of such an institution coming into being would be considerably enhanced if there could be developed a U.S. assistance program which was genuinely collaborative in nature, clearly first-rate in quality and sufficient

in quantity.

When the committee discussed the specific means through which MIT would carry out the responsibilities for mounting such a collaborative program, it became evident that it would be impossible to secure from the MIT faculty the range of expertise and the number of resident U.S. faculty likely to be required in Kanpur over the life of the Program. As the committee members thought realistically about the individual faculty members in their own departments, they realized that only a very few of them would be likely to be interested in going to Kanpur for a period of one or two years. The available faculty were reduced to a small fraction of the total faculty by such factors as departmental teaching responsibilities which could not be undertaken easily by others, research interests and the danger of "getting behind" in fast moving research fields, research responsibilities such as graduate students and contract research groups, promotion and tenure questions which hinged largely on research output, health and schooling requirements of children and, finally, the need for the sife, certainly, and the children, preferably, to share a faculty member's enthusiasm for a family experience in an unheard of, provincial city in far-away India. Positive factors also would be working, such as the desire to be of assistance to India, the professional satisfaction in developing new education and research programs in India, and the adventure of living in a totally different environment. It was these which the committee felt would motivate the few who would be attracted to Kanpur.

One possible strategy would be for MIT to undertake the total responsibility from AID and to recruit faculty from other institutions when it was impossible to supply the needs from the MIT faculty. Two experiences led the committee to reject this mode of operation as not being able to meet the needs of the Kanpur collaboration. The first related to the experience MIT had when it undertook in

the early 1950's to organize the Lincoln Laboratory for work on U.S. defense problems. Assuming that the same conditions would prevail as during World War II when faculty members from many institutions came to MIT to work in the Radiation Laboratory, MIT expected to staff Lincoln Laboratory with faculty from many other universities as well as from MIT. Very few faculty members from other universities were interested in coming to work at MIT under these arrangements and those that did found their own University generally unsympathetic to giving them leave. The second experience related to some U.S. faculty then in India on AID contracts. The committee had observed that, broadly speaking, the faculty from the U.S. university holding the AID contract for assistance to a particular engineering college were performing in a more effective and responsible manner than faculty hired by the U.S. university specifically for the purpose of working overseas on this contract. The committee felt that this difference resulted from two factors: the effectiveness of the outside professor frequently was reduced by his lack of knowledge and understanding of the contracting university's educational programs and practices, and he sometimes felt less responsible for the success of the project since he would not be returning to the contracting university when he finished his overseas assignment.

The committee assumed that the difficulties which they foresaw for MIT would also be experienced by any university undertaking full responsibility for the Kanpur collaboration, and out of their discussions they evolved the idea of a consortium of universities which would take collective responsibility for the Program. They reasoned that a group of about 10 institutions would be needed to furnish a faculty pool large enough so that the quality and diversity of faculty needed for the collaboration at Kanpur could be obtained. Further, with each institution being actively committed to the collaboration with IIT/K, it was felt that the faculty who went to Kanpur would be more responsible in their commitment to the

Program and the university would be more responsible in considering work at Kanpur as equivalent to work on the home campus with respect to promotion and tenure. Returning to Delhi from Kanpur, the committee discussed with AID and the GOI the suggestion that a consortium of universities be organized to do the job. After thorough exploration of this concept, AID, the GOI, and Dr. Kelkar agreed that it would be worthwhile exploring whether such a consortium could be organized. The committee returned to the U.S. empowered to undertake such an exploration.

Acting on the committee's report, MIT formally notified AID that it would not undertake sole responsibility for the AID support for IIT/K, but that it was willing to attempt to organize a consortium to do the job if requested to do so by AID. Although AID had some misgivings about the operational effectiveness of a consortium of universities, it agreed that the proposal was worth serious exploration. In May 1961, in response to invitations from the President of MIT, representatives of the following universities met at Cambridge: California Institute of Technology, Carnegie-Mellon University (then Carnegie Institute of Technology), Case Western Reserve University (then Case Institute of Technology), Princeton University, The Ohio State University, Purdue University, and the University of California. All of these institutions had strong engineering and science education and research programs. Furthermore, as a guard against parochialism in the assistance to IIT/K, there were represented both universities and institutes of technology, both public and private and both small and large institutions, with geographic distribution across the U.S. Representatives of AID were observers at the meeting. Also present at this meeting were representatives of Education Development Center (then known as Educational Services Incorporated) since one aspect under discussion was the proposal that the basic contract with AID not be held by any one of the universities but, rather, by an outside institution which would represent the

consortium in all formal dealings with AID and, in turn, contract with the consortium universities for services in support of the development of the IIT/K. Such an arrangement was seen as meeting AID's need for a single contracting agency to fix legal and financial responsibility and, also, as ensuring that each of the consortium universities would continue over time to take seriously its responsibility for the consortium's effectiveness, a responsibility it might not feel so strongly if the primary contract were held by another university.

At the conclusion of the meeting the representatives agreed that there existed at IIT/K a remarkable opportunity for U.S. universities to participate in a development in Indian education which could be significant for Indian university education as a whole as well as for technical education. It also was agreed that the proper way to carry out the project would be through a consortium with an institution such as EDC providing the legal and administrative framework within which the universities could pool their resources for the purpose of carrying out the assistance to Kanpur. It was anticipated that the Program would be a long one, perhaps ten years. During the meeting, there was evolved a plan of action which subsequently was agreed to by all the institutions represented at the meeting, plus The University of Michigan.

The substance of the plan was that, within the consortium, policy would be established by a Steering Committee to be composed of one member from each of the participating universities and one member from EDC, and policy execution would be the responsibility of a Program Leader to be selected by the Steering Committee and resident in Kanpur, returning to the U.S. for consultation with the Steering Committee when necessary. EDC undertook the responsibility to negotiate with AID for contract provisions which would make it possible to carry out the policies of the Steering

Committee, and the universities undertook to encourage participation in the Kanpur project of faculty whose professional competence was complemented by outstanding personal qualifications for service on the project and to treat this participation as regular faculty service with respect to promotion, salary increases and other matters. The plan of action also recognized the necessity for both the consortium and the IIT/K to explore fully and mutually, prior to embarking on the collaboration, what would be involved in the program of assistance. As a consequence, in August 1961 EDC and AID entered into a preliminary contract - the first such for AID - which provided funds for EDC and the universities to meet and explore matters in the U.S. and for members of the Steering Committee and of the EDC staff to go to India to develop a work plan with the Indian authorities and with AID/Delhi.

In August 1961, Mr. G.K. Chandiramani, Joint Educational Advisor and ex-officio Joint Secretary of the Ministry of Scientific Research and Cultural Affairs, Government of India, and Dr. Kelkar came to MIT for a meeting with the Steering Committee and representatives of AID. This Cambridge meeting was exploratory, with Mr. Chandiramani and Dr. Kelkar putting forth their concepts of what might be developed at Kanpur and the role that American institutions might play in this program, without having had any first-hand experience with American education, and with the Americans, on the other hand, having views of how the IIT/K should be structured and the collaboration should be organized, without having had first-hand experience with Indian education. Following this meeting, Mr. Chandiramani and Dr. Kelkar, in company with the writer who was Chairman of the Steering Committee and the Program Leader designate, visited all of the Consortium Institutions and, a month later, met again with the Steering Committee at the University of California, Berkeley.

During the course of these visits both the Indians and the Americans had learned a great deal about the projected collaborative program which, at the suggestion of Mr. Chandiramani, now was called the Kanpur Indo-American Program (KIAP). Faculty and administrators at the Consortium Universities had come to realize that Dr. Kelkar understood and appreciated the dynamic nature of American engineering and scientific education, that he was sympathetic to American educational practices aimed at placing increasing responsibility on students for their own learning, and that he aimed at creating at the IIT/K an environment which was intellectually open for both students and faculty, an environment found in few institutions in India. They also found that Mr. Chandiramani fully supported the idea of the consortium collaboration and that he was prepared to exert his influence within the GOI to give the IIT/K the administrative space it would need in order to make departures from current Indian educational practice in such matters as curriculum structure, use of textbooks, hours of classroom instruction, and faculty selection committee procedures to allow selection of qualified Indian residing outside of India. For their part, Mr. Chandiramani and Dr. Kelkar had come to recognize that there were differing patterns of organization in the Consortium Universities and different procedures by which each worked toward the same general educational goals. From this it became clear to them that since the Consortium Universities were each being effective with somewhat varying administrative structures, often highly dependent upon the personalities of the major administrative and faculty personnel involved, it would not be necessary to abandon current Indian administrative practices in order to reach similar educational goals but, rather, the sensible course would be to have an open attitude toward changes in these practices as IIT/K developed and changed and as personnel became available.

The meeting at Berkeley resulted in a more definite understanding of what would be involved in the collaboration at Kanpur. In

November a subcommittee of the Steering Committee went to India to complete this process of reaching a thorough understanding and, also, to work out details of the administrative arrangements with AID/Delhi and the GOI. The subcommittee met with officials of AID, various administrators in the GOI and Indian industrial leaders, and visited a number of engineering colleges and institutes prior to going to Kanpur for discussions with faculty, students, Dr. Kelkar, and members of the Board of Governors. Officials of both AID and the GOI were very supportive of the consortium idea and willing to make adjustments in their operating procedure where either the subcommittee or Dr. Kelkar, or both, could make a clear case that these changes were necessary for the successful and timely development of the IIT/K. Many of these innovations became standard procedure in later assistance programs.

Both AID and the GOI agreed that the responsibility for the selection of equipment would rest jointly with the IIT/K and KIAP staff at Kanpur, agreeing to forego veto procedures they previously had exercised in collaborative assistance programs with Indian engineering colleges. Both governments also conceded that the judgment of the IIT/K and the KIAP would prevail with respect to the professional qualifications of consortium personnel nominated for service at IIT/K. It was also agreed that in some situations U.S. faculty would teach classes as a natural part of the collaborative development of courses and curricula but that the U.S. faculty would be supplemental to the Indian faculty in the sense that it would not undertake routine teaching duties as a consequence of shortage of Indian faculty. The GOI and the Director agreed that the U.S. faculty would be called Visiting Professors and that they would not hold, even temporarily, any administrative positions within the IIT/K although they might be invited to be members of committees or to attend meetings of the Senate. As part of the same arrangement it was also agreed that the U.S. faculty would be

responsible administratively to the Program Leader and in matters relating to them, the Director would exercise his institutional responsibility and authority through and in consultation with the Program Leader. During this visit detailed arrangements also were worked out with AID for a Work Program which covered questions of logistics and support of U.S. staff in Kanpur, the training of IIT/K faculty in Consortium Institutions and procedures for the selection, procurement and shipment of laboratory equipment to India. A meeting of the Steering Committee in December approved the proposals the subcommittee brought back from India and instructed EDC to begin negotiations with AID for a contract embodying these arrangements. A contract was signed in February 1962, and the Program Leader and his family arrived in March to take up residence in Kanpur, looking over their shoulder to see if anyone else from the Consortium Universities was following them.

Almost two years elapsed between the time AID asked MIT to undertake the contract and the time when the Program Leader arrived in Kanpur. Obviously, it would have been better had it been possible to begin the assistance to IIT/K earlier. However, in retrospect it seems quite clear that, to the extent that the delay was lengthened by the process of mutual exploration and growing understanding associated with establishing the idea of a consortium and organizing it, the time was well spent. There seems little doubt that against the backdrop of ten years of collaboration, this extra investment of time at the beginning has paid off handsomely, although no one would presume to argue that either the IIT/K or the KIAP Consortium understood or anticipated all the complexities they would encounter during their ten years of close association.

Functioning of the Collaboration

At the Steering Committee meeting in Berkeley, Dr. Kelkar observed that "There is a stability in change in American institutions where change is not made just for change itself, that the 'steady

state' conditions is one of continuous change." This could equally well describe the process of collaboration at the IIT/K: a constantly growing IIT/K faculty has been in interaction with a sequence of KIAP faculty and staff in residence, for the most part, for periods of one or two years, all of this in the context of growth and change in all aspects of the IIT/K, frequently in unexpected manner, with the rewards, tensions, joys and frustrations always attendant upon individuals involved in processes of rapid social change. So the collaboration has varied as different people have coped with different problems at different times.

A crucial element in the collaboration has been the relationship established between the Director and each of the Program Leaders. In addition to being influenced by the personalities and interests of the different Program Leaders and those of the Director, this relationship has also been a function of the state of development of the Institute and of the range of problems which both the Director and the Program Leader saw as being of high priority at the time. At the outset, when there were only a limited number of IIT/K faculty, and there were a large number of policy questions which had to be given at least temporary answers, the Director discussed with the Program Leader a wide range of questions relating to all aspects of the institution and its growth. Throughout the years as the Institute has grown in size and strength of faculty and administrative experience and capability, the Director has increasingly delegated to this growing structure of the Institute many of the matters on which he had earlier consulted with the Program Leader. Thus, as the academic administrative structure of the Institute has grown and taken over responsibilities formerly exercised by the Director, the Program Leaders have devoted more and more of their time to working with the Deputy Director, the Deans, the Department Heads, and the Faculty Committees.

The Director and the Program Leader were jointly responsible for identifying priority areas for U.S. faculty collaboration and

for submitting, to the KIAP Steering Committee, job specifications which would aid the Committee in identifying likely U.S. faculty and staff and persuading them to accept the assignment. It became plain very early that even with nine universities in the Consortium, it was not going to be a simple job to recruit people with specific interests and skills and of high quality, and, therefore, it became a practice to request more personnel than the AID contract provisions allowed for, with the expectation that the Consortium would not be able to find faculty or staff for all positions. Throughout the course of the collaboration, there has always been in residence at Kanpur a few faculty and staff of the highest quality and several who were very good, but it must be acknowledged that there have been present some faculty and staff at Kanpur who have not met the Consortium's original goals of high quality - the overall picture probably being a fair reflection of the faculty quality distribution at the Consortium Institutions. The faculty, long-term and short-term, resident in Kanpur also was representative of all of the Consortium Institutions: out of a total of 71 faculty (average of about 8 per institution) no institution furnished fewer than 6 or more than 14; and the relative distribution among the faculty ranks was, respectively, professor (3); associate professor (2); and assistant professor (1). Clearly, in faculty participation the Consortium was a truly collaborative effort.

The initial emphasis in 1962 was on problems related to the curriculum and to the recruitment of faculty. The story of the collaboration in the curriculum development is well told in "The Development of the Educational Program at IIT/Kanpur", by R.L. Halfman*. In his planning for faculty recruitment the Director recognized that the Mission assigned to the IIT/K would require a faculty structure and a faculty competence different from that in existing engineering institutions. The Director also concluded

*Chapter II

that a large percentage of the faculty would have to be found among Indians studying and working abroad, primarily in the U.S., because there were few faculty in India, particularly in engineering, who had the viewpoint and training necessary for the kind of educational and research program being developed at IIT/K. He realized that it would be impossible to bring these men to India for interview by selection committees and that, therefore, it would be necessary to provide documentation of such comprehensiveness and professional authority that the selection committees would feel that they had sufficient information to compare the absentee candidates with those who appeared for interviews and to make selections with confidence. The KIAP staff at Kanpur undertook to assist the Director in preparing for the meetings of the selection committees and in the name of the Consortium Program sought candid and comprehensive evaluations from the outside-India references given by applicants for faculty posts, both those applying from within India and from abroad. The responses to these inquiries gave the Director the sort of information and evaluation he had hoped to obtain.

In addition to getting the selection committees to consider absentee applicants on a par with those present for interview, the Director was successful in getting the selection committees to establish beginning salary rates which were realistic from the standpoint of attracting these men back to India. The Director had the funds to offer higher starting salaries because, consistent with his aims to have fewer contact class hours and more independent work by students, he was building a faculty structure which would have few members at the lecturer and associate lecturer levels. As a result, he could afford somewhat higher starting salaries in the professorial grades with the same total teaching salary budget as another IIT which had a large number of faculty in these lower two ranks. It is to be noted that although the IIT/K had the legal autonomy to take these steps the Ministry had the de

facto power to slow down or modify the Director's faculty recruitment process through the asking of formal questions concerning the appropriateness of his procedures or the level of the starting salaries. That the Ministry permitted a new kind of faculty structure to be created at the IIT/K was a reflection of Mr. Chandiramani's promise at Berkeley to exert his influence within the GOI to assure that the IIT/K had the administrative space it needed to make departures from current Indian educational practice.

After the first selection it became evident that the faculty who were selected in absentia had financial problems in getting to India to accept the proferred positions. For many of them the cost of passage to India for themselves and their family was roughly equivalent to their total first year's salary at the IIT/K. The KIAP undertook to find money for this purpose and obtained initial support from The Ford Foundation for eleven faculty, and subsequently was successful in getting AID to include in the contract provision for use of U.S.-owned rupees for this purpose, another innovative "first" for KIAP.

The Participant Program was another element of the collaboration aimed at strengthening the faculty. At the outset this Program was designed to give IIT/K faculty an opportunity to gain specialized teaching or research experience in one of the Consortium Institutions and during the life of the Program a number of faculty gained such experience. As time went on, it developed that there were two other needs which should be served by the Participant Program and both of these were incorporated. The first of these was aimed at upgrading the qualifications of promising young IIT/K faculty who had joined the Institute in its early years and at a time in their own career when they had little formal advanced training; a limited number of such faculty went to Consortium Institutions on academic study programs which led to advanced degrees. The second addition arose from the shortage of qualified

technicians to maintain and repair the sophisticated equipment imported for the teaching and research laboratories; a number of technicians on the IIT/K staff went to Consortium Institutions, each on a special program designed to increase his technical capability in a specific area.

When the curriculum planning and the faculty recruitment processes were well under way the Director appointed a Committee on Committees, composed of IIT/K and KIAP faculty, and charged this Committee with making proposals for the structure and organization of the Senate committees and the rules of procedure and ordinances of the Senate. The Institutes of Technology Act of 1961, as is common in Indian university legislation , set forth the general responsibilities of the Senate and specified certain membership, but left to the IIT's the choice of structure and procedures for discharging these responsibilities and, also, allowed the IIT's to add other members to those specified in the Act. Most new institutions faced with this task of establishing a Senate have replicated the traditional and hierarchical Senate organization and structure which exists in most Indian universities. At the IIT/K, over a period of many months this Committee on Committees led the IIT/K faculty in a far ranging and vigorous search for a committee structure and Senate organization which would allow the academic business of the Institute to be carried out through faculty interaction rather than through administrative procedures. As a result, the IIT/K Senate is organized in a manner different from any other university in India, with a structure which gives full responsibility to committees, and through committees to individuals, irrespective of the hierarchical structure. This Senate organization, in which the checks and balances are the product of mutual interaction between faculty and internal public opinion, is a unique experiment in Indian university management.

It probably is fair to say that the Senate structure which evolved was influenced greatly by the interaction of the faculty

in generating the undergraduate academic program with its common three-year core. It probably also is fair to say that the postgraduate program which has evolved at the Institute has been influenced greatly by the Senate committee structure in which the Postgraduate Committee has overall responsibility for the general form of the postgraduate programs in all departments. In most Indian universities a student proceeds from the master's degree to his doctoral research without any evaluation other than that of his research professor. At the IIT/K the Postgraduate Committee has adopted a philosophy similar to that prevelant in the U.S. in which all doctoral aspirants must pass a general examination before beginning their research, an examination which is of such depth and breadth that normally a student will require further formal study beyond the master's level. These arrangements have given the IIT/K faculty the means for faculty control of the quality of the doctoral programs across the entire Institute, another innovation in India higher education.

A major area of collaboration between the IIT/K faculty and the KIAP faculty, particularly during the first five years of the Program, was the identification of equipment needs for teaching laboratories and for research and the specification and procurement of equipment to fill these requirements. It is perhaps not surprising that high tensions were sometimes generated, both between Indian and American faculty and among Indian faculty, over questions relating to the appropriateness of particular items or categories of equipment and the priorities accorded in the procurement program - this despite the availability of very substantial amounts of money for equipment. At the outset of the Program the Director and the Program Leader were involved directly in the equipment selection process, with their decision being final as to which specific items on the lists submitted by the departments would be procured. As time went on, there was established an Equipment Committee which had responsibility for allocating equipment funds

among the departments and to the overall teaching and research needs of the Institute. In each of the later years of the Program there was a considerably reduced amount of money available for equipment and, consequently, increased difficulty in allocating it, especially to meet the requests for research equipment from faculty who had joined the Institute after the early and middle years of large equipment purchases.

There were a few large areas of equipment purchasing which were initiated primarily on the initiative of KIAP. The first of these was the IBM 1620 Computer System. Other areas were the Closed Circuit Television System, the Low Temperature Laboratory, the Language Laboratory, and the flight facilities of the Aeronautical Engineering Department. Also included in this category should be the book procurement program of Purdue University Libraries, in which each time books in certain fields were ordered, duplicates were purchased, catalogued, and sent to the IIT/K Library.

From the beginning there was an attempt by the Director to create in the Institute an attitude which would view expensive pieces of equipment as an institutional facility and not as the property of any particular department or individual. To give physical expression to this concept many of the larger units of equipment were located in one building which was called the Central Research Laboratory. Although this attitude did not become established as well as hoped, there did develop - aided in particular by the example of open access to the computer - a general climate of cooperativeness about the use of equipment, shared by all faculty except a few who were extremely possessive.

With the development of the Program on the new campus at Kalyanpur, the requirements for more systematic and detailed planning of the space requirements for the emerging educational and research programs of the Institute brought the Director and the Program

Leader to the realization that this was another area where collaboration might be fruitful. In 1963 the KIAP brought an architect to Kanpur to work with the faculty and administration to determine future space needs and, in turn, to interpret these needs to the Institute's architect in terms which would aid in the design of functionally appropriate space. Since that time the planning, development and effective utilization of space and facilities on the campus has continued as one aspect of the collaboration.

After the initial push of getting the new curricula under way, of getting new faculty selected and a large number of them in residence, of getting equipment in hand and research under way in a number of areas, it became evident that the service facilities and support staff of the Institute would have to be augmented and considerably improved in performance if the educational and research goals of the Institute were to be met. As a consequence, the area of collaboration was enlarged to include KIAP staff to work with various of the technical support and administrative units of the Institute. These collaborative efforts were indifferently successful, due in part to a mutual lack of understanding of each other's authority and reward structures but, more importantly, because of a general reluctance on the part of the Institute faculty and administration to devote the time and effort needed to train this staff and to create the necessary psychological climate in which the staff would be motivated towards high quality performance.

As the Institute grew in size and complexity, problems of academic management intruded themselves and there was much interaction of questions of faculty structure, administrative structure, faculty committee structure and related matters. At first there was considerable reluctance on the part of the Institute faculty to adopt any organizational or procedural changes different from those they had known previously, a behavior which seems to be universal and not culturally determined. However, the needs of the new

environment which had been created at IIT/K had their own dynamic and the faculty came to realize that the level of academic and research activity at the IIT/K required more and better academic middle management than the traditional Indian university structure provided. One way of providing the required additional management would have been to augment the office of the Registrar, i.e., to strengthen the traditional university management scheme. However, such a solution would have been contrary to the overall philosophy of having the faculty both responsible for and in effective charge of the academic operation of the Institute. The solution arrived at was the creation of two new positions, Dean of Faculties, and Dean of Research and Development, which were to be filled on a rotating term basis by faculty from the Professor rank. At the same time, the principle was established that the position of Headship of Department was to be rotated among the senior faculty of each department. From these beginnings active faculty participation in the academic management of the Institute has increased and a new style of faculty involvement in the Institute is emerging, a style which presents a potentially useful model for experimentation by other institutes and universities in India.

With the arrival of an increasing number of newly recruited IIT/K faculty it became apparent that the problem of schooling for their children would be a critical issue in retaining them and further recruiting of faculty. The limited availability in Kanpur of good schooling which could be afforded, combined with long travel time from the campus, made the establishment of good schools on the campus a matter of high priority. At the invitation of the Director, wives of KIAP faculty worked closely with IIT/K faculty and wives in developing plans for a campus school which would serve the children of all of the IIT/K employees and in getting the school under way. KIAP wives have continued this collaboration in the development of the campus school and the KIAP Program has recruited

a succession of staff members to work full-time on school development.

The overall plan for the IIT/K included the building of a medical center and the provision of medical services to the several thousand students, staff, and faculty who would be living on the campus. The primary aims of these services were to be to provide out-patient treatment with modest hospitalization capacity, using the large hospitals in Kanpur for major illnesses. Discussions between IIT/K and KIAP faculty and staff concerning the proposed scope of IIT/K's medical services and their common problems of obtaining adequate medical care led to the conclusion that collaboration on the design of the medical center and on the medical services program might be fruitful. Accordingly, the associate director of the health services in one of the Consortium Institutions came to Kanpur for an extended period. Out of this collaboration there has evolved a new design for the medical center such that it is equipped and arranged and of sufficient size so that it can handle a large range of the illnesses of the sizable population on campus. Further, the medical services program has added a focus on preventive health - tuberculosis screening, immunizations, physical examinations, etc. Here again, the collaboration has resulted in the introduction of a new concept and a physical and organizational embodiment of that concept, thus giving India the opportunity to test whether and in what form the concept may be useful in the Indian scene.

From the outset of the Program there has been a continuing, sometimes sporadic, discussion as to how IIT/K should and could interact with other educational institutions and with government and industry in India. As the Institute gained in faculty strength and competence a number of collaborative programs directed toward these ends have been carried out. The first to be undertaken were short courses in computer programming, conducted at first almost

entirely with KIAP faculty but quickly taken over the IIT/K faculty. A number of short courses have been organized on subjects of current technological importance and KIAP faculty have participated in several of these, either faculty who were on one or two year assignments at Kanpur or faculty who came especially for a specific short course. KIAP faculty also have been active in the Institute's program to establish summer jobs for IIT/K faculty in industry and in establishing contacts with Indian industry for the purposes of student job placement after graduation.

The foregoing outlines the more important formal aspects of the collaboration between the IIT/K and the KIAP. Of course two organizations cannot collaborate except through the individuals who make up the organizations and thus the substance and reality of the collaboration was between individuals. It was carried out in many ways on many levels and with many tempos, as one would expect since the two groups came from such different cultures and, moreover, within each group there was a wide variety of style and mind set. Some individuals found themselves in almost perfect empathy with their opposite numbers while others found themselves in almost total confrontation. In most cases the intellectual capabilities and interests were well matched but there were cases of obvious imbalance, on both sides. The years were not without tensions, some of which erupted into passion but most of which were kept in check with civility and grace. For the great majority involved, both Indian and American, it was a rewarding and productive experience.

There can be no doubt that the collaboration - and thus the development of the IIT/K - was greatly enhanced by the fact that the AID contract for assistance was with the Consortium rather than with a single university. As indicated earlier, the faculty who went to Kanpur were representative of all the Consortium

Institutions, and there were only a limited number of instances when the Consortium was unable to respond to a particular request from Kanpur. Further, during the ten years there were many situations in which specialized resources of one of the Consortium Institutions proved to be of unique value to the IIT/K. There was, in fact, a synergistic effect. It is difficult to state with certainty what made the Consortium continue to function effectively as a consortium over the entire decade. Certainly the mutual respect and peer relationships of the Consortium Institutions was a factor, and the regular meetings of the Steering Committee provided an effective mechanism for the maintenance of these relationships. Another significant factor was that the educational goals of the IIT/K were congruent in many respects with those of the Consortium Institutions and thus of interest to both the institutions and their faculty members, and this interest was augmented by the high quality of the IIT/K faculty and facilities. And, most importantly, throughout the entire period the Consortium was sustained by the extremely effective support provided by EDC. In summary, one can only observe that the Consortium itself was a collaboration: the institutions did consort.

A Retrospective Look at the Collaboration

The first two sections of this paper have been mainly descriptive and, I hope, reasonably objective. This section will be interpretive, my assessment of the outcome of the collaboration - and more suitable, therefore, for the first person style. I shall attempt to maintain objectivity but I recognize that one man's objectivity is another man's subjectivity and hence do not expect all my interpretations will find universal acceptance. The observations I make here are based not only on my direct involvement in the collaboration while I was on the faculty of MIT but also on my subsequent three years in India with the Ford Foundation during which time I had an opportunity to view the IIT/K in the larger context of the overall development of India and to keep abreast of activities at Kanpur from the middle distance of Delhi.

In looking at the IIT/K today one must conclude that, based on performance to date, the IIT/K has achieved an outstanding success in the academic sphere. At no other university or institute in India which combines undergraduate and graduate education does there exist as open and as intellectually stimulating an environment as exists today at the IIT/K. The creation of such an environment has been one of the central goals of the Institute and of the collaboration, and its existence is to be celebrated. In designing its undergraduate program the IIT/K took as its jumping off point the curricula and teaching methods being used in the first-class universities in the U.S. The success of IIT/K graduates in the graduate engineering programs of these U.S. universities attests to the fact that the IIT/K has created an excellent science based undergraduate engineering program. These are substantial achievements, widely recognized throughout India and not to be minimized - but also achievements not to be immune from questions relating to their ultimate significance for India.

I was one of the early proponents for the undergraduate engineering program which has been developed at the IIT/K. Questions

were raised at the outset, and continue to be asked, as to whether this program is appropriate for India at this stage in its development. Usually the question has been posed in the form of "Is the program not too theoretical?", carrying with it the implication that "theoretical" is an opposite alternative to "practical", where practical is thought of as relating primarily to knowledge of current engineering and industrial practices. I have replied to this question by asserting that the proper description of the IIT/K program was not "theoretical" but "science based", and have argued that nothing could be more practical for an engineer than to have a thorough working knowledge of science, in its theoretical as well as its empirical base. I have emphasized that India cannot look to the rest of the world for technical solutions to problems unique to itself and, therefore, will need some men who understand the working of the basic forces of nature very well - i.e., are "practical" about these forces - so they can find the required technical solutions.

Ten years later I still hold this view, but now that the IIT/K curriculum exists I would like to know whether, in fact, it is "science based" or "theoretical" (where I use theoretical in the pejorative sense of the opposite of practical). I don't know the answer but I think this is a question which can be answered empirically. The key to the question lies in the emphasis on "working knowledge" (of science). Do the students emerge from the curriculum with the idea that they can use their knowledge of the physical world to attack any problem or do they see themselves as able only to cope with that limited subset of problems which they have studied in some detail? Or to put the question in another way, as they go into practice will the graduates look for the problems that need to be solved or the problems that they think they can solve?

Part of the answer to this question can be obtained by looking closely at the educational process that is going on at the IIT/K.

As Professor Halfman points out in his paper on the development of the educational program, the faculty must look at this not only from the curricular point of view but within the context of the total environment in which the students exist at IIT/K - that environment which appears to outsiders to be so open and intellectually stimulating.

The other part of the answer will have to come from what the IIT/K graduates actually do. It is clear that they are capable in the trade that they practiced at the IIT/K, as is demonstrated by the performance of those who went to U.S. graduate schools. However, a U.S. graduate school is not India, and furthermore, whether this success is due to the high quality of the undergraduates who entered IIT/K or whether it is due to something inherent within the IIT/K educational process cannot be answered with certainty (although I think the IIT/K effect is substantial). Thus, the answer as to what the graduates actually do will be forthcoming only ten or twenty years hence when it will be possible to see what IIT/K graduates are contributing to the life of India in their mature professional years. Will it then be possible to discern any differences between the graduates of the various IIT's?

The question of what the graduates do will be influenced markedly by what the faculty are doing professionally. I am disappointed that so few IIT/K faculty are engaged in current problems of India, both because of what they might contribute to the solution of these problems and because of the professional and psychological benefits which would accrue to their students, both undergraduate and postgraduate, through the faculty's involvement in such problems. Who can blame graduates for responding to the excitement of postgraduate study abroad when they see no opportunity in postgraduate work at IIT/K to work on problems which matter to India or to their future career in India?

This situation results from the fact that thus far the IIT/K

has been an irrelevant factor in the industrial and social progress of India. At present the Institute is a kind of isolated island of academic excellence but not a part of the main stream of India's development. The faculty, as a group, has not yet recognized the necessity for social relevance to coexist with academic excellence.

Perhaps it was too much to expect the Institute to do more than it has during its first decade - indeed, the establishment of a firm intellectual and academic base was a necessary and substantial first step. However, now that it has largely achieved this first step the faculty must make a change towards generating a new type of capital which is gathered not in terms of published papers or academic excellence but in terms of application of its intellectual capital to India's problems. The IIT/K will not continue to receive special support from Indian society unless it also concerns itself with problems which matter to India. This is particularly true in the context of the new mood in the country of confidence and emphasis on self-reliance; IIT/K will have to earn any special treatment it receives.

I don't underestimate the difficulties of getting "engaged". Good problems are hard to find, as any researcher knows. However, they're not going to be found unless they're looked for, and thus far only a few IIT/K faculty have looked, some successfully, some unsuccessfully. And to repeat a refrain, the faculty should search for problems which need to be solved and not only those that they think they can solve. In other words the faculty must be science based and not only discipline based: they must have faith in the premises of the IIT/K educational program. I would emphasize that important problems come in many guises, some of them pretty mundane, and there is nothing demeaning in applying rigorous scientific thinking to any problem; the demeaning factor enters only when the rigor leaves.

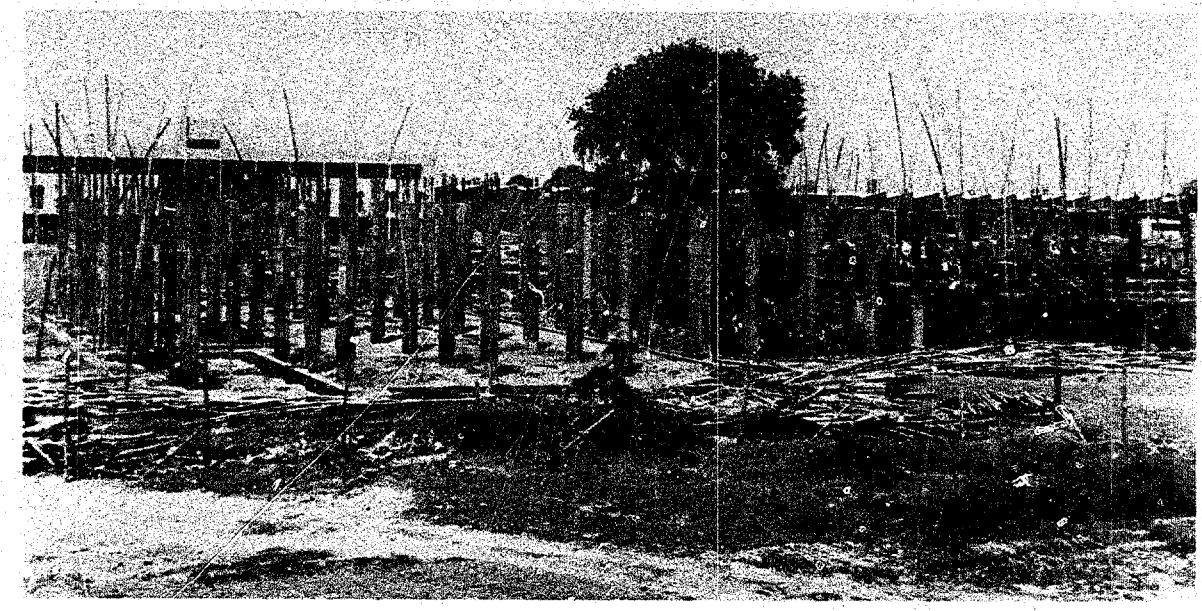
In addition to this major problem of getting engaged with Indian society the IIT/K carries some other potentially large problems with it as it enters its second decade on the Kalyanpur campus. One of these stems from the fact that the IIT/K faculty as a group are characterized by the following two factors: first, all are very well qualified in their field of specialization and, second, they are distributed in a relatively narrow age band, roughly from the middle twenties to the early forties. The first factor is characteristic of the faculty at every first rate institution, but the second factor is unusual and will require special attention if it is not to be a source of difficulties for the Institute and for the faculty. Given the educational and research aims of the IIT/K it was inevitable that such an age distribution would result, although I think it is correct to say, at the outset, the complication this might cause was not anticipated. The complication stems from the fact that in the normal course of events there will not be available enough promotion openings to satisfy the (largely, but not fully, justified) aspirations of the faculty. Since the euphoric stage of expansion is complete there is little likelihood that the IIT/K will be able to add substantially to its cadre of associate professors and professors; an exception to this might result if in the years ahead the IIT/K faculty were to contribute effectively to several problem areas of critical national concern. If a solution is not achieved through internal growth based on social relevance the resolution of the difficulty will be left to movement of faculty to other institutions or to faculty remaining at IIT/K in ranks lower than they consider they deserve. Some scheduled resolution of this problem should be planned with the faculty involved; the problem won't go away by being ignored.

There are yet some unresolved questions as to what will be the character of the IIT/K as it "matures". Although Indian visitors

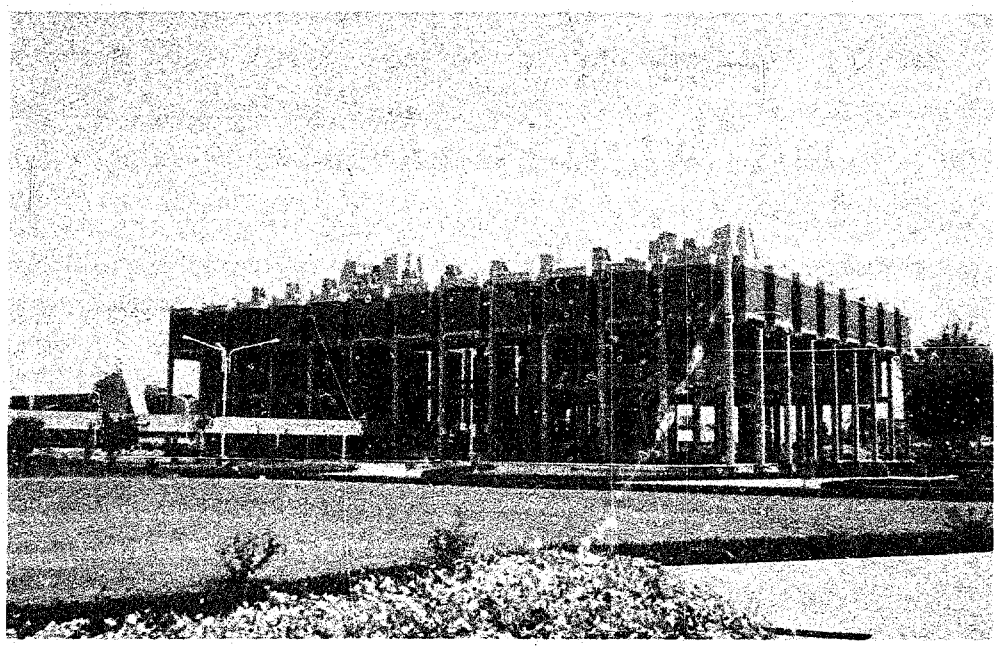
to IIT/K report finding there a unique openness and intellectual stimulation, this environment does not yet have the robustness which comes with decades of tradition and still needs care and nurturing. The faculty are all modern in the sense that they are skilled in the latest knowledge and techniques in their individual fields. However it remains for them to discover whether they are modern in the sense of being able to respond to changing conditions with an objectivity which includes a concern for the larger values of IIT/K. If they prove not to be modern in this sense then at the end of this decade they may discover one day that they are as hierarchical and rigid as their own professors whom they pilloried for this, different only in that they are technically more sophisticated by a quarter of a century. I hope this thought is chilling enough to convince all faculty that they have a stake in nurturing the openness and spirit of inquiry which today is present in the IIT/K environment.

I have focussed this retrospective assessment on problem areas which I see to be critical with respect to the future growth of the IIT/K. That future is worth being critical about because the remarkable achievements of the past decade have situated the Institute so that it can, if the faculty so chooses, achieve an equally remarkable performance during the next decade. While wishing the Institute success in seizing this opportunity, I wish to close by saluting Dr. Kelkar for the qualities of intellect, vision and leadership which contributed so much to poising the Institute for this future growth.

Construction at IIT/Kanpur began in 1962.
By 1972 80% of construction originally planned
for the thousand-acre IIT/K Campus had been completed.



Illustrations show beginnings of the Library (above), and the completed building (below). Original site plan was moved thirty feet to preserve precious tree at center of internal court yard.



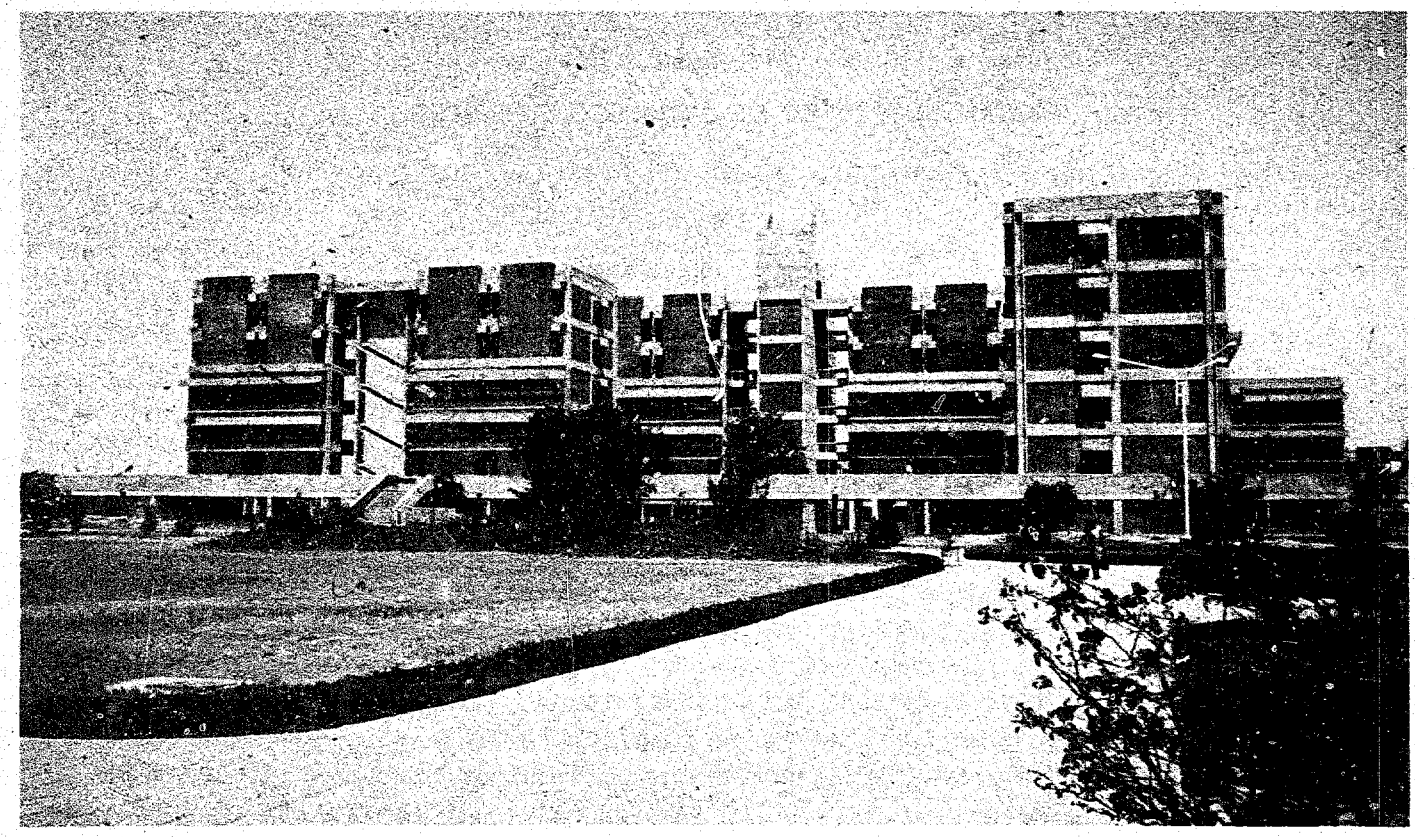
CHAPTER II

THE DEVELOPMENT OF THE EDUCATIONAL PROGRAM AT THE INDIAN INSTITUTE OF TECHNOLOGY/KANPUR

by

Robert L. Halfman

Six-story Faculty Building under construction above; completed, below.
Academic buildings are connected by two-level walkways.
The lower level provides shade from the sun.



The basic patterns of the educational program at IIT/K evolved through relatively open and direct interactions between American and Indian counterparts during the early negotiations preceding the arrival in Kanpur of the visiting staff. The minutes of the Second Joint Conference, Berkeley, California, 4-5 October 1961, make it clear that the pattern of education at IIT/K would reflect both India's distinct and cultural traditions and its changing educational needs while at the same time being innovative and drawing strongly from Western experience. In particular it was agreed that the pattern of learning would include the use of good textbooks, reduced class hours per week, regular testing in each subject with less emphasis on comprehensive final examinations, and experimental laboratory work with a creative emphasis. The organizational framework was to have traditionally named engineering departments with strong interdisciplinary orientation, departments of physics, chemistry and mathematics with their own graduate programs, and a substantial component in the humanities and social sciences.

Open consideration of the merits of various existing educational practices and their applicability to IIT/K continued intensively throughout the early years of collaboration, encouraged by the informal style of interaction which developed between Indian and American staffs. Yet the process was by no means clear and straightforward. The understandings of various practices inevitably related to the fundamentally different cultural backgrounds and world views.

The Americans represented a new, rapidly changing society dedicated to growth and progress which were often expressed in materialistic terms. Although the fundamental drives toward useful and practical activity leading to salvation in finite time

can be traced to religious roots, the technological revolution was characterized by the rational, scientific way of thinking and flowered profusely in the context of the democratic ideal. Particularly in the years around 1960 technology was ascendant, promising unlimited progress based on the ever more rapid revelation of natural truth through science.

In India a much older stable, even static, culture was beginning to sense the deep stirrings of the technological revolution and to perceive the dimensions of the inevitable conflict ahead. Traditionally in India the search is for security, permanence and continuity. It is carried out through individuals striving to realize truth within themselves but in a society which is timeless and unchanging. Indian technologists are revolutionaries torn by the conflict between the old and the new.

In 1960 American technological education was built firmly on the successful exploitation of science across the bridges of engineering science. Evolutionary changes in the engineering arts were being overshadowed by rapid shifts based on relatively new science. Technological education on a massive scale was aimed toward developing competence in handling technical areas barely visible on the horizon. The anticipated leadership role for the technologist demanded significant acquaintance with the humanities and social sciences as well as the physical sciences, and post-graduate education in engineering had flowered in conjunction with massive involvements with research and development.

With few exceptions, Indian technological education aimed much more at narrow competence in traditional state-of-the-art engineering. Partly because of the tremendous educational

expansion after independence with slim resources there was a preoccupation with keeping up standards in a rigid hierarchical system. Institutions and staffs were largely not organized for, nor sensitive to, rapid and continuing change. The curricula made few connections to science and even fewer to the social sciences and the humanities. The IIT's represented an attempt to break out of this dominant pattern, and IIT/K had the opportunity of learning from the experiences at Kharagpur, Bombay and Madras.

In looking at the development of the academic program at IIT/K it is helpful to have a dynamic changing model of IIT/K and its problems, processes and limitations. During the start-up phase qualified people were in extremely short supply yet basic decisions were required, the core curriculum had to be developed, and the academic process had to be operated for the initial classes. The relative influence of the American professors was large because few Indian faculty were yet on hand and fewer still had Western experience. Although the educational program was the central focus, much time and effort was necessarily expended on recruitment of Indian faculty and on the daily problems of learning to live in Kanpur and work productively in the temporary quarters at the Harcourt Butler Technological Institute (HBTI). The initial months for each American staff member involved primarily learning enough about India and its problems to gain the confidence needed to become productive professionally.

Early interaction between the Indian and American faculty required the development of a common base of concepts and language and sufficient understanding of roles and needs to permit normal open communication. Thus the first substantive interchanges on curricular matters took place in evening meetings in faculty homes amid maneuverings and misunderstandings. Key decisions were

not as much subject to faculty vote as to influencing the director and were often postponed. The American faculty was accustomed to general faculty control of most academic matters through a committee system with relatively open and free discussion. The pattern familiar to most Indian faculty was far more hierarchical and less open and the judicious use of personal influence was far more important than skill in committeemanship and finding the path to a consensus. The Indian faculty had their careers on the line with promising prospects for rapid advancement; the Americans had short term commitments to India and felt the need to quickly demonstrate competence and produce results. Yet there was much early progress and a pattern for effective cooperation was established.

In the growth phase of the middle sixties, the interactions concerning the academic program were dominated by the growing departmental structure and the shift of curricular concern in engineering to the fully professional level. This was a period in which the faculty, through departmental groups and the Senate and its committees, was struggling to establish the modes of academic operation suitable to the growing, less personalized institution. New Indian and American faculty were arriving every month, introducing numerous shorter personal transients into the larger still rapidly changing operation. A central theme was the understanding of the interplay between academic freedom and academic responsibility in both broad and very specific terms. The expectations of the relatively more experienced American faculty certainly did not coincide with those of the younger Indian faculty who, though well qualified technically, had little experience in operating an educational program, let alone a whole institution. The American group was larger, more diverse, but relatively less influential than earlier on broad academic matters because the Indian faculty had grown even faster and had demonstrated in a number of

instances very considerable competences. Not only did Americans disagree among themselves (and have their own operational problems), but on institutional matters they often helped represent the conflicting departmental views. In a few relatively underdeveloped departments they still played a very major role.

In the final phase around 1970, the further development of the academic program was dominated by the leadership of the Indian faculty and most of the American effort was devoted to other areas. However, the American faculty continued to participate in the Senate and the committee work and made many individual contributions, largely based on specific professional competences. By 1970 the first major review of the undergraduate curriculum was undertaken by a Senate sponsored committee composed of seven senior Indian Faculty and no Americans.

In visualizing the IIT/K as a dynamic changing institution it should be noted that the environment also changed during the same decade. In both India and the United States higher education had a high national priority and was expanding rapidly when IIT/K was founded and KIAP began. Technologists were in short supply in both countries and students, particularly in technology, appeared to have confidence in their educational programs and their futures. Now the pendulum has swung much the other way and a period of consolidation, reexamination, and perhaps renewal of confidence is underway.

Early Curriculum Development

The first American staff arrived in Kanpur during the spring and fall of 1962 when the third batch of 100 students began their first year program. Barely enough Indian faculty were on hand

to carry the teaching load and they included a few who were to become leaders and a number who were simply available and adequate to the immediate task. The first Program Leader of KIAP summarized the state of curriculum planning as follows:

23 May 1962

TENTATIVE SCHEME OF UNDERGRADUATE COURSES
AS PRESENTLY AGREED UPON BY THE FACULTY

The following is a brief summary of the scheme of undergraduate courses as presently agreed upon by the faculty. In July 1962 the Institute will begin its third year of operation and will take in its third class of one hundred students. Thus, during the academic year 1962-1963, the first three years of this curriculum will be taught.

The five year undergraduate program leads to bachelor's degrees in chemical, civil, electrical, metallurgical and mechanical engineering; undergraduate degree programs in science are not included at present. The general plan is to have the first three years completely common, to have about half of the fourth year common and to have the fifth year completely specialized.

It will be noted that there is an emphasis on engineering sciences; in planning this aspect of the program the faculty leaned heavily on the A.S.E.E. "Report of the Follow-up Committee (ad hoc) on Evaluation of Engineering Education", 1956-1958. There is an effort being made to have faculty from several departments collaborate in the development and teaching of the engineering science subjects. Because of the relatively small staff on hand real collaboration is possible now in only one or two subjects, but with the contemplated rapid build-up of the staff over the next year it is hoped to extend this type of collaboration to the other subjects.

At present the academic year is divided into 3 terms, each term consisting of 10 weeks of teaching plus 1 week for end-of-term examinations. In addition, there is another week set aside for end-of-year examinations in the spring following the end of the third term.

Both closed book and open book examinations are being used. At present all examinations are prepared by the IIT faculty; the question of external examiners will be reviewed at a later date. The total marks in each subject are made up in roughly equal

proportions from the student's performance in class during the term, in the end-of-term examination and in the end-of-year examination.

The students spend 33 hours per week in formal teaching classes - i.e., in lectures, tutorials or practicals (Laboratory or workshop). The students in each year are divided into three groups, the size of each group then being slightly more than 30. The students attend lectures as a group, and for tutorials each group is divided into two sub-groups of approximately 15 students each. At any one time the three groups take different sets of subjects; the difference between the sets increases successively as the students progress to the second and third years.

There are seven different subjects in the first year and eleven in the second and third years. Some of the subjects, namely physics and chemistry are concentrated into one term. For example, during the term he takes physics a student has 8 hours of lecture, 4 hours of tutorial and 6 hours of laboratory each week. This is an experiment to see whether the student learns more by concentrating very heavily on the subject - i.e., practically "living" it - as opposed to taking the same amount of material spread throughout three terms.

In summary, it must be emphasized that this scheme is very much in a tentative state. It is a first approximation prepared by a relatively young and inexperienced faculty. However, even in its present state it represents a bold departure in philosophy from existing undergraduate programs in India.

DISTRIBUTION OF HOURS BY FIELD AND SUBJECT OVER THE FIVE YEARS

Field and Subject	1	2	3	4	5	Field Total
Humanities						
English	90	60	-	-	-	
Logic	60	-	-	-	-	
History	-	20	-	-	-	
Sociology	-	-	60	-	-	290
Science						
Mathematics	180	120	90	100*		
Physics	180	150	100		-	
Chemistry	180	120	-		-	1220
Engineering Science						
Mechanics of Solids	-	90	-	-	-	
Mechanics of Fluids	-	-	100	-	-	
Thermodynamics	-	60	-	-	-	

Transfer and Rate Processes	-	-	100	-	-	
Nature and Properties of Matter	-	-	100	-	-	
Electromechanics	-	40	-	-	-	
Electrical Sciences	-	-	100	-	-	
Engineering Analysis & Design	-	-	-	100	-	
Systems Engineering	-	-	-	100	-	790
Service Subjects						
Drawing	120	120	-	-	-	
Workshop	180	120	-	-	-	
Surveying	-	90	50	-	-	
Engineering Economics	-	-	-	100	-	
Organization and Planning	-	-	-	100	-	880
Common Technology						
Heat Power Engineering	-	-	100	-	-	
Hydraulics and Hydraulic Machines	-	-	-	100	-	
Theory of Machines	-	-	-	50	-	
Engineering Materials	-	-	-	100	-	
Theory and Design of Structures	-	-	100	-	-	450
Departmental Technology						
Required	-	-	-	240	890	
Elective	-	-	-	-	100	1230
TOTALS	990	990	990	990	990	4950

*Elective in any science

During the next year intensive efforts involving most of the American and Indian faculty present led to a substantially modified program which was officially communicated to the faculty by the newly arrived Deputy Director. It is included in its entirety because it represents rather closely the curricular framework within which the undergraduate program operated for the next seven or eight years.

INDIAN INSTITUTE OF TECHNOLOGY, KANPUR

May 13, 1963

To All Members of the Faculty

As you are aware, in the early part of the academic year a number of informal discussions took place between different groups in relation to the development of curriculum in this Institute for the various branches of technology and science. At a somewhat later stage the Ad Hoc Committee and the Steering

Committee were formed to focus attention on curricular problems and to recommend appropriate decisions.

Curricula in Engineering have now taken definite shape and, although they continue to evolve, conform to certain broad patterns. They are represented here in two forms. The first is the present estimate of the five engineering curricula for the class of 1968 which enters in July 1963. The second is the transition arrangement for the coming year for classes now enrolled. The broad patterns seem well established but minor changes occur almost daily as new problems are perceived and resolved. These curricula have been based on certain decisions and also certain assumptions of which some are quite apparent and others merely implied. Among them are the following:

1. The undergraduate engineering program shall be of five year's duration and the first three years shall be common.

2. The calendar shall be based on a semester system with final examinations held at the end of each semester.

3. The basic unit of student effort is represented by the average work week of 55 hours. In the attached curricula the contact hours including lectures, tutorials and laboratory range from the low twenties to the low thirties depending partly on the degree to which the student is expected to take responsible initiative in the learning process and partly on the concentration of laboratory and shop hours.

4. The student should be expected to take five, or at the most six, subjects per semester.

5. It is implied that academic credit for a particular subject will be in proportion to the total hours allotted to it, rather than merely to contact hours.

6. It is implied that appropriate system of examination will be evolved relevant to the new pattern of curriculum. In due course it will be possible to permit promotion of students subject by subject rather than year by year. This degree of flexibility presupposes the necessity in a few instances for making certain subjects prerequisite to the studying of certain other subjects.

7. A statement of the minimum requirements of the institute for a bachelor's degree in engineering may well have two major parts:

(a) The Basic Institute Requirements relating to the common first three years, the further registration in humanities, and the minimum total number of credit hours (which might be 550).

(b) The Departmental Requirements which are normally met in the fourth and fifth years and amount to about 200 credit hours.

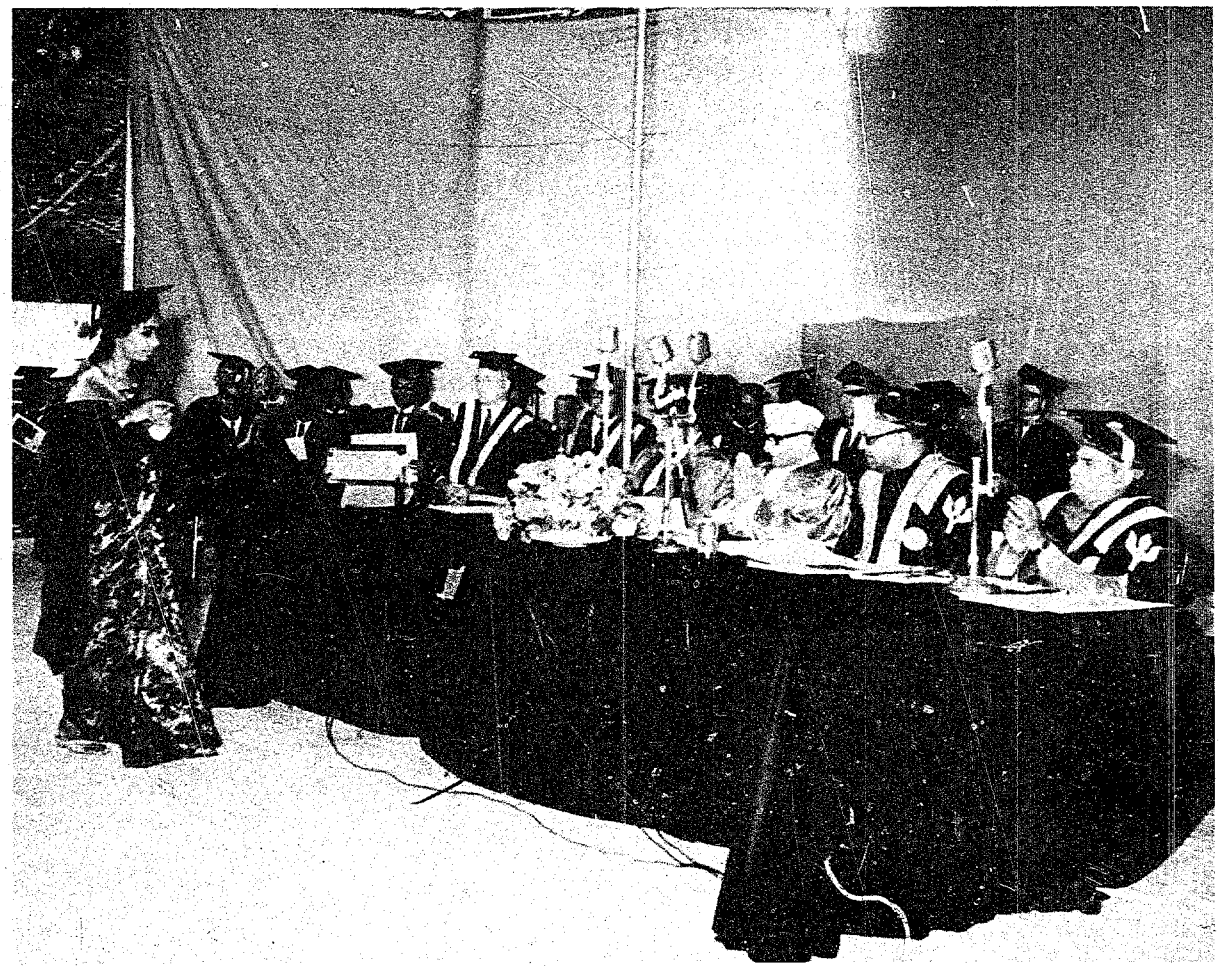
8. In the curricula for the class of 1968 the credit hours for English and Humanities represent 14% of the total for the five year program. The Technical Arts, although concentrated in the first three years, represent 10% of the five-year total.

9. The curricula for the class of 1968 represent the present estimate of the best five year coordinated program in engineering which should remain unchanged in its broad pattern for a number of years to permit its evaluation. A trial of the first year will, of course, begin in July.

10. The transition curricula for the second and third years beginning in July represents simply a change from the current three-term to the new two-semester system. Only minimum changes in content and teaching procedures are planned so that efforts may be concentrated on the new first year and the new professional fourth year subjects.

11. The transition curricula for the professional fourth year in most departments seem to be not very different in content and arrangement from the curricula for the class of 1968.

M.S. Muthana
Dy. Director
Indian Institute of Technology
Kanpur



Present Estimate for the Curriculum for the Class of 1968

First Year

First and Second Semesters

	Lecture	Tutorial	Laboratory	Home	Total
Physics	2	2(1)*	2(3)	6	12
Chemistry	2	1(2)	4(3)	6	13
Mathematics	2	2	0	7	11
English	0	4	0	7	11
Technical Arts	1	0	5	2	8
	7	9	11	28	55

*Parentheses indicated a desired flexibility in the use of contact hours from week to week.

Second Year

	First Semester		Second Semester
Physics	13	Mechanics of Solids	13
Mathematics	11	Mathematics	11
Thermodynamics	13	Chemistry	13
Humanities	8	Humanities	8
Technical Arts	10	Technical Arts	10
	55		55

Third Year

	First Semester		Second Semester
Physics	12	Mathematics	11
Fluid Mechanics	13	Engineering Science**	13
Electrical Science	13	Engineering Science**	13
Humanities	8	Humanities	8
Technical Arts	9	Technical Arts	10
	55		55

**The decision on the content of these Engineering Science subjects may well be deferred for about a year until the needs of the professional areas in the last two years are more clearly defined. It seems probable that the two which will be chosen are among the four subjects Material Sciences, Rate Processes, Electrical Science II, System Dynamics.

Chemical Engineering

Fourth Year

First Semester

Humanities	2	0	4
Molecular Structure	3	0	5
Mechanics of Fluid Flow	3	3	6
Indus. Chem. Proc.	3	3	5
Prin. of Thermo.	3	0	6
Indus. Chem. Calc.	3	0	6
	23		32

Second Semester

Humanities	2	0	4
Science Elective	3	0	6
Heat Transfer	3	3	6
Princ. of Kinetics	3	0	6
Indus. Chem. Proc.	3	3	5
Meth. of Eng. Math.	3	0	6
	23		33

Fifth Year

First Semester

Humanities	2	0	4
Diffusional Oper.	3	3	6
Process Design	1	5	6
Prin. of Combustion	3	2	5
Chem. Eng. Thermo	3	0	5
Chem. Eng. Kinetics	3	0	6
	25		32

Second Semester

Humanities	2	0	4
Chem. Engrg. Design	1	5	5
Chem. Proc. Dynamics	3	3	4
Mic. Unit Operation	3	0	4
Petrochem.& Patrol Eng.	3	0	6
Project	2	0	5
Elective	3	0	5
	23		33

Civil Engineering

Fourth Year

First Semester

Humanities (Econ.)	2	0	4
Computer Math.	2	0	6
Hydraulics	2	3	4
Soil Mech. & Found.	3	3	6
Structural Anal. I	3	0	6
Surveying I	2	6	4
	26		30

Second Semester

Humanities	2	0	4
Geology	2	2	5
Hydrol.& Appl. Hydraul	2	3	4
Sanitary Eng. I	2	3	4
Reinforced Concr. Theory	3	0	6
Structural Model Anal	1	3	2
Surveying II	2	2	5
	27		30

Fifth Year

First Semester

Humanities	2	0	4
Sanitary Eng. II	2	3	4
Spec. & Contracts	2	3	4
Structural Anal. II	2	3	4
Concrete Lab.	0	3	0
Transportation	3	2	7
Prf. Elective	3	0	6
	25		29

Second Semester

Humanities	2	0	4
Sc.or Tech. Elective	3	0	6
Construction Planning	3	0	6
Struct.Members & Dyn.	3	0	6
Prf. Elective	2	3	4
Project or Thesis	0	5	6
	21		32

Electrical Engineering

Fourth Year

First Semester

Humanities	2	0	4
Electrical Materials	4	0	7
Electromagnetics	4	0	7
Linear System Theory	4	0	7
Fields & Circ. Lab.	0	3	3
Advanced Math	6	0	4
	23		32

Second Semester

Humanities	2	0	4
Electronic Circuits	5	0	8
Elect. Circuits Lab	0	3	3
Energy Conversion	5	0	8
Feedback Control	4	0	7
Energy Conv.& Cont.Lab.	0	3	3
	22		33

Fifth Year

First Semester

Humanities	2	0	4
Communication Systems	5	0	8
Communication Lab.	0	3	3
Electives	9	3	18
	22		33

Second Semester

Humanities	2	0	4
Adv. Measur. Lab.	2	3	3
Project	0	3	8
Electives	9	3	18
	22		33

Mechanical Engineering

Fourth Year

First Semester

Humanities	2	0	4
Machine Elements I	3	2	6
Modern Energy Conv. I	3	2	6
Heat Tr.Gas Dyn.,Combus.I	3	2	6
Instrument. & Control	3	2	6
Manuf. & Production	3	0	5
	25		33

Second Semester

Humanities	2	0	4
Machine Elements II	3	2	6
Modern Energy Conv. II	3	2	6
Heat Tr.Gas Dyn,CombusII	3	2	6
Engineering Design I	3	4	6
	24		28

Fifth Year

First Semester

Humanities	2	0	4
Engineering Design II	2	4	5
Experimental Anal. I	3	2	6
Elect. in ME Systems	3	1	6
Elect. in ME Systems	3	1	6
Science Elect.	3	0	6
	24		33

Second Semester

Humanities	2	0	4
Engineering Design III	2	6	7
Experimental Anal. II	3	3	7
Elect. in ME Systems	3	2	6
Science Elective	3	0	6
	24		30

Metallurgy

Fourth Year

First Semester

Humanities	2	0	4
Phys. Met. I	4	3	8
Proc. Met. I	4	3	8
Anal. Chem. I	2	6	6
Computer Math.	3	0	6
	27		32

Second Semester

Humanities	2	0	4
Phys. Met. II	4	3	8
Proc. Met. II	4	3	8
Anal. Chem. II	3	3	6
Crystallography	2	3	4
	27		30

Fifth Year

First Semester

Humanities	2	0	4
Mech. Met. I	4	3	8
Phys. Met. III	4	0	8
Proc. Met. III	4	3	8
Met. Project I	1	4	2
	25		30

Second Semester

Humanities	2	0	4
Mech. Met. II	4	3	8
Met. Thermo.	4	0	8
Met.Mgt. & Proc. Design	3	0	6
Met. Project II	1	3	2
Heat Tr. of Alloys	2	3	2
	25		30

Present Estimate for Transition Curricula for the Academic Year Beginning July 1

Second Year

First Semester

	Le	Tu	La	Ho
English	0	3	0	3
Physics	3	1	1	5
Mathematics	3	1	0	5
Thermodynamics	4	2	0	6
Surveying I	2	0	4	2
Workshop	4	0	4	2
		32		23

Second Semester

	Le	Tu	La	Ho
English	0	2	0	2
Physics	2	1	1	4
Mathematics	3	1	0	5
Chemistry	3	1	4	5
Mech. of Solids	2	4	0	6
Drawing	0	8	0	1
		32		23

Third Year

First Semester

	Le	Tu	La	Ho
Chemistry	2	0	1.5	3
Physics	3	1	2	4
Mathematics	4	1	0	4
Mech. of Fluids	2	4	0	4
Elect. Science	3	1	2	4
T.&D. of Struct.	3	3	0	4
		32.5		23

Second Semester

	Le	Tu	La	Ho
Humanities	0	4	0	4
N. &P. of Mater.	3	3	0	5
Heat Power Eng.or System Dynam.	2	4	0	5
Tr. & Rate Proc.	4	2	0	5
Electronics	3	1	2	5
Surveying II	1	0	2	1
		31		25

Fourth Year in Chemical Engineering

No change from Class of 1968 Curriculum

Fourth Year in Civil Engineering

Interchange semesters for Computer Math and Geology
Replace Surveying I with Engineering Materials (taken with M.E.)

Fourth Year in Electrical Engineering

No change

Fourth Year in Mechanical Engineering

Replace Humanities (first semester) with Engineering Materials
Machine Shop may be added to second semester

Fourth Year in Metallurgy

Replace Computer Math with Machine Shop

Note: The above estimates in the fourth year do not reflect the many minor changes in content and hours in the individual subjects.

Although it was recognized that much of the proposed curriculum was in a bare bones state and would undoubtedly change considerably in detail as more faculty with the necessary competences joined, a number of key ideas were incorporated. A firm commitment was made to a three year common core and the calendar was switched to a semester system. A limit was placed on the number of subjects to be taken at once by a student and promotion was to be subject by subject rather than by year. Estimated homework hours were added to contact hours to weigh subjects more equitably and the average number of contact hours per week was substantially reduced. The way was left open for a broader interpretation of the Humanities offerings and the idea of quite different offerings in Technical Arts began to take shape. Although not mentioned in the memorandum, plans were well under way to provide strong textbook support to the teaching program.

Many innovations in process as well as in content were contemplated and were to be tried primarily in the first year for the next batch of students.

The idea of a full three years of common core had many implications. It provided a firm framework for a coordinated development of basic science and engineering science and provided a protective envelope for the very difficult evolution of the Technical Arts concept. It permitted a reasonable emphasis on Humanities and English and forestalled at least for some years the pressures of individual departments for specially tailored programs. In the Indian environment it was thought all too easy for the engineering departments, as they gained strength, to become separate fiefdoms and every opportunity was taken to promote interdisciplinary efforts and influences. Even then it should be noted that students were admitted to IIT/K directly into the various engineering specialties. It was hoped that a firm core would permit the very limited but growing faculty talents to be concentrated on relatively few subject developments, recognizing that the two professional years would also have to be offered as the first class moved inexorably upward. It was expected by many that a future review of the core might well put considerable flexibility into the third year when better perspective had been attained and broader faculty talents had been assembled. Nevertheless it appeared that one result of a considerable effort to introduce flexibility into reputedly rigid Indian educational practices had been to devise a rigid and extensive core program.

Although the students entering IIT/K were perhaps a year younger than their American counterparts, their earlier training had a strong traditional science and mathematics flavor. Despite considerable language study they were largely unexposed to much

history or social studies. They were bright learners of facts and standard procedures and had had little chance to develop skills of interpretation or intellectual give-and-take. They adapted well to the science and engineering science component of the core which was more extensive and potentially better than similar offerings in the United States. Many of the students were seriously handicapped by an inadequate command of English and were at a particular disadvantage in the verbally oriented humanities subjects, even after remedial work in the first year. Thus the impact of the Humanities was not in proportion to the time devoted to it, which was considerably less than wanted by many American faculty and considerably more than usual for India. The Technical Arts suffered start up pains similar to the other more standard laboratory programs because of initial lack of equipment and qualified staff. In addition they were different enough in intent and style to be very difficult even for many of the best teachers to implement. For the relatively inexperienced Indian student it was thought vital that he become familiar with mechanical devices and various measurement instruments, with digital computation, with graphics and with industrial and shop practices. Except for digital computation the expertise of the young Indian faculty did not lie in these areas and often they themselves felt the lack of such perspective. Over the early years much concentrated effort of both Indians and Americans was only partially effective in establishing stimulating and challenging subjects, partly due to lack of sustained and continuous attention in various areas.

The initial development of the various professional programs of the fourth and fifth years in engineering occurred from 1963 through about 1965 and was very dependent on the quality and specific competencies of the faculty on hand. Everybody was

nearly overwhelmed with the sheer scale of the task of running the core years for increasing numbers of students and simultaneously creating dozens of new upper class subjects with scarce material resources and long time delays between planning a laboratory and receiving the equipment. The degree of American influence and involvement varied widely. The strongest leadership was perhaps by Professor Charles Dryden in Chemical Engineering which was woefully understaffed. He stepped into the near vacuum and performed admirably. In other areas a major American role was to keep the focus of the new subjects from being too narrow and too much oriented toward preparation for sophisticated postgraduate training. Many of the Indian faculty (and a few of the younger Americans) had little professional experience except in the doctoral thesis type of research and development work. They were in the stage of publishing papers to establish their reputations with their colleagues and themselves and found it difficult to come to grips with the more prosaic needs of India.

During these early years the first postgraduate work at IIT/K began. Some of the younger faculty in both science and engineering began work toward their doctorates, often very slowly because of the pressure of teaching duties, and with no apparent policy guidance from IIT/K which had not been able to face the problem as yet. Thus the influence of the individual senior faculty concerned was dominant if not always consistent and reasonable and a number of difficult situations developed. The science and mathematics departments rapidly increased the scale of their postgraduate efforts in conjunction with their early development of some areas of research. It was not until the Senate became operational and the other departments moved strongly into postgraduate work that general postgraduate policy became established, especially at the doctoral level.

Early Educational Policy and its Implementation

The development and implementation of educational policy took place in a time of much emphasis and energy necessarily devoted to other problems. Faculty recruitment and the successive moves to and around the new campus as space became available consumed much energy and often took top priority. The representation among the existing faculty of many important academic areas was quite incomplete as was the level of experience in actually operating an academic program in a predominantly American pattern. Fortunately many basic features had been agreed upon in the early negotiations and reenforced strongly in the early stages of collaboration. Thus there was no doubt that the curriculum would be of five years, science-based, with a strong humanities component. The set of aims which were generally favored by the American staff and a few senior Indians were summarized by the Program Leader in the Second Semi-annual Progress Report of KIAP.

> A primary aim should be that the graduate be capable of and interested in improving his professional capabilities throughout his career. Another aim is to have the student accept a growing share of the responsibility for his learning and treat home study responsibly. Also that textbooks, lectures, demonstration, tutorials and laboratories are all part of a coordinated approach to a team effort at education aimed at maximizing the efficiency of the real education both with regards to the efforts of the students and the faculty. Further, that grading on examinations is a necessary but inadequate measure of a student's professional development and that other means of measuring the success of the educational process must be sought, experimented with and exploited. Finally that research activity by the faculty and graduate students has a strong and fundamental influence on the undergraduate educational activity and must be balanced against the demands of routine teaching.

The development of appropriate policy and procedures necessarily involved much discussion and, especially for the Americans, learning about Indian needs and special problems, before the required confidence in specific proposals could be achieved.

The acceptance of such proposals was originally very much of a stop-and-go process depending entirely on individual initiatives. In response to the need for some formality of process, a succession of committees was established. First in the fall of 1962 there was the Ad Hoc Committee to prepare curriculum proposals. It was followed by a high-level Steering Committee (evenly staffed by senior Indian and American faculty) which, when permitted by the Director, actually made decisions. In late spring of 1963 a First Year Committee was formed of carefully selected faculty to implement the broad policy representated by the 13 May 1963 document reproduced earlier in this paper. This Committee had surprisingly broad operational latitude to carry out the major innovations, especially in educational process, in the first year program in the fall of 1963. The hope was that if this group was vigorously successful (and it was), the innovations might then spread into the upper years at least as fast as that class of students progressed. In 1964 the First Year Committee evolved into the Core Curriculum Committee which helped spread the innovations quickly, brought faculty pressure to bear on the decisions of who taught various controversial subjects such as the technical arts, and focussed faculty discussions on the final layout of the full sequence of engineering science subjects.

Throughout this process the Director carefully guarded his control of academic policy to ensure that major elements remained intact and developed in proper directions. Yet faculty acceptance at each stage was important. Since the understanding by many of the Indian faculty of many of the key innovative elements in educational process was not very deep, the ennabling role of the American faculty was vital. In particular the full functioning of the Senate on matters of academic policy was held off until most key elements were already in operation, and until

enough experienced Indian faculty had joined to prevent over-representation of one area or point of view.

This entire process was complicated enormously by the poor usage of the few channels of communication which existed. Most important information seemed to arrive third hand by word of mouth. When an important decision was made in the Director's office, it seemed generally assumed that everyone immediately knew not only the essence of the decision but understood the context in which it was made. Most documents of the period were largely of American authorship although the content was jointly arrived at. This reflected general reluctance by Indians to put important matters in writing lest they become unchangeable or be officially challenged. It also reflected for many of the Indian faculty individual fears of demonstrating less than first-rate competence in written English. It was also true that only the Program Leader and the Director had secreterial service which was anything but atrocious.

Among the many operational matters tackled directly by the First Year Committee were those relating to the quality of student faculty contacts. The lecture tutorial system was designed to increase feedback from students during the tutorials and to the students through the scanning and returning of regular home assignments. It was intended that lecturing at students and testing for rote learning would be minimized, that grading would be on the student's overall performance during the semester in each subject, and that good textbooks would be a major tool of learning for the students. Control of each subject and responsibility for it and its examinations was in the hands of the teachers themselves rather than an external group. Lest this appear too straightforward, and even obvious to some American eyes, the differences from the system under which all the Indian

faculty had studied were major and deeply felt.

The issue of grading, for example, caused untold hours of heated discussion until it slowly became apparent how different the basic assumptions were in the practice of the two countries. The vital importance of the exact formal ranking of each student to his future opportunities and career was strange to the Americans in their context of plenty of jobs for all good graduates. The arguments for grading on a curve and using imprecise letter grades were beyond the experience of many Indians. The American penchant for using actively the range from 60 to 100 in numerical grading conflicted with the Indian practice of using the range 25 to 75 and thus clouded the real issues in many a difficult d scussion.

The introduction of good textbooks in all basic courses was far more difficult than it would appear. Few adequate texts were then available in India and were subject to the vagaries of a poor distribution system even if ordered. Ordering from the United States was adopted in most cases but required months of lead time and a quality of performance in processing and shipping which took several cycles to bring up to a level of minimum acceptability (much to the chagrin of the usually critical Americans). The cost of the American books had to be at least partially subsidized for the Indian student to bring the cost within his reach and to permit him to build up a library if he so desired. The complexity of this entire process beginning with the timely decision of the instructor to the timely sale of the book to the student took tremendous amounts of very scarce professional effort.

The handling of final examinations and control of official record keeping were not easy to deal with in a context of a very

cumbersome administrative bureaucracy and of extreme pressure on students for high grades with overtones of possible dishonesty and manipulation in the background. They made the timely issuance of academic performance reports and proper student counseling very difficult. To provide an extremely different process for purposes of demonstration and comparison, the First Year Committee insisted that each instructor-in-charge be responsible for the security and administration of his examination, and for the very prompt entry of semester grades into the IBM 1620 computer. These were then machine-compiled into full student records for action by the Committee as needed and prompt mailing to the students. Although it was not entirely successful, this end-of-term experiment was very influential in the later formulation of standard procedures.

The development of undergraduate laboratories was acknowledged to be of vital importance especially to the Indian student. The attempt was to make them challenging and flexible by not ordering large set pieces of apparatus but rather building around smaller general purpose equipment. However the expertise needed to order the equipment (almost entirely from the United States) appeared on campus only as faculty joined IIT/K and the delay until it arrived was often more than an academic year. Thus progress was very spotty for these reasons as well as the inherent need for large expenditure of precious faculty time to set up good instructional labs.

Special Topics

In a number of areas Americans found themselves taking clear initiatives without the close collaboration with Indian colleagues which characterized most of the interactions. The digital computer was brought on campus and the Computer Center was developed into

a going concern almost entirely through the professional efforts of a group of American faculty. Yet three years after the IBM 1620 arrived, the Computer Center was under the firm and imaginative guidance of a skilled Indian team. This was a gamble which paid off handsomely for the educational and research programs within IIT/K and had a very substantial and early impact on the Indian national scene. This early success was aided by the inherent glamor and visibility of computers in the India of 1963 and 1964 and was undoubtedly based on good technical planning, but the key element seems to have been the attraction to IIT/K of well qualified Indian faculty with real leadership potential.

Aeronautical Engineering was brought into being at IIT/K starting in 1964 by a similarly strong, well planned effort by a sizeable group of Americans. Yet three years later the department, now under Indian control, was limping along in very poor health. Despite extreme difficulties in locating and recruiting qualified faculty, a reasonable nucleus had joined but, lacking anything like strong imaginative leadership, the department was wracked with internal dissension. Despite an adequate curriculum the students were well aware that their educational program was not very satisfactory even for a new department. Perhaps somewhat of an analogy can be made with the growth of Chemical Engineering where, through lack of qualified candidates for the Indian faculty, a senior American played an early leadership role for a number of years in a very effective manner. Recruiting difficulties hampered the development of the department, especially at the leadership level, and it was still making only erratic progress by the middle of the decade, barely managing to maintain an adequate educational program.

Another American initiative involved the language problems

of the incoming Indian students and resulted in the ordering of a substantial language laboratory. Here the scale of the American effort never reached a critical size and the unusually severe and unique recruitment difficulties in an area of relatively low professional reputation prevented even minimal Indian support. Complicating the situation was the comparative lack of clarity of the goals of the venture as viewed in the Indian cultural setting and its relatively low priority and visibility. After three or four years it could only be viewed as an unsuccessful effort.

The trials and tribulations of the remedial English program as exemplified by the language laboratory affair, have many of the same root difficulties as the more respectable and professional humanities program. In an Institute of Technology, the humanities and even the social sciences play a secondary role. It is hard to recruit good faculty without offering them real opportunity for professional development. Yet overall priorities necessarily limit the number of positions to a degree that groups of critical size are unlikely to be attainable in all but a few fields. It is unrealistic to expect such a widely diverse group to be able to develop a high quality educational program without very strong internal leadership and the real support and understanding of the technical faculty. IIT/K had neither of these during the developing years and it is no surprise that the program remains fragmentary and of mixed quality. These comments should be viewed in the context that even the best American technical schools, with decades of effort, are not close to understanding how to solve these same problems. Further the traditions in India probably make the fundamental problems even more difficult to solve there.

From the earliest days at IIT/K there has been an expectation

that unusually good undergraduate science and mathematics degree programs might well evolve quite naturally. A combination of factors frustrated this hope again and again in the early years. First and foremost was the lack of clear official sanction, inasmuch as the IITs were set up to concentrate on technology. Mathematics and science education at the undergraduate level were considered the responsibility of the universities and had evolved in a narrowly specialized three year pattern followed by a two year master's program. This conflicted with the five year Bachelor of Technology pattern in the IITs. It conflicted even more directly with the strong three year core of science and engineering science which had become a feature of the IIT/K curriculum. Compromise plans which laid out a five-year two-degree path for IIT/K students interested in the sciences and mathematics seemed to hinge on a loosening up of the third year of the common core. Such a plan appeared compatible with more traditional two year master's programs for incoming post-graduate students. Yet the engineering faculty was reluctant to acquiesce if it meant diverting significant numbers of incoming students away from technology. Alternatively, increased class size was translatable into increased cost and facilities for the undergraduate program at a time when the postgraduate programs were expending rapidly and the financial picture was becoming less favorable. By 1968 the goal was still unrealized.

Another dream of the early years which at time seemed almost realizable was the establishment of an educational program in management. Improved management education in India was receiving considerable attention in New Delhi and management institutes in Ahmedabad and Calcutta were being supported by Harvard and MIT through the Ford Foundation. IIT/K seemed a natural environment for management education following the models of Carnegie-Mellon University and MIT. Strong interactions could be visualized

with engineering and with the relatively weak social sciences which might become mutually supportive. Despite numerous visits of experts and much discussion at IIT/K, in Delhi, within the Consortium and elsewhere, the plan never reached the takeoff point. Probably no one factor dominated but it was not readily possible to bring together in sufficient degree preliminary recruiting (both Indian and American), Consortium and IIT/K initiatives, and USAID and GOI agreement and actions. Management education at IIT/K remains an unfulfilled opportunity.

Assessment of the Early Educational Program

After about five years of collaboration it was apparent that a tremendous amount of creditable work had been accomplished. It seemed impossible that all the slips backward, the frustrating delays, and the seemingly few faltering forward steps could have added up to so much. The undergraduateprogram was generally successful. Most of the first graduates were doing postgraduate work and finding it quite straightforward both in India and in some of the best schools in the United States. The others were quite pleased to discover that they could perform creditably on their first jobs. Even discounting that they were an extremely intelligent group, it appeared that their technical education at IIT/K was at least quite adequate.

The academic program was still growing and filling out, albeit somewhat unevenly and erratically. The teaching laboratories were not fully developed and many parts of the Technical Arts were surprisingly tough to handle well, even for experts. English and Humanities offerings were much improved but still had a very long way to go to achieve full partnership with the rest of the program. Overall the program could properly be criticized as being too theoretical which was quite understandable

and even almost inevitable considering the strengths of the young faculty.

Postgraduate programs were developing rapidly, first in science and then in all departments as faculty time and effort could be redirected from the demands of undergraduate teaching. The faculty in many instances were in a continuous state of being overextended so that hopes for substantial research efforts were often regularly postponed. Much time and effort had been absorbed in the process of learning how to control and operate an academic program once the curriculum was set. This process included counseling and placement, the handling of exams, homework, and grading, the operation of faculty committees of the Senate and of the departments, and for many young Indian staff it was all new and different.

During this early period of development the roles of both the American and Indian faculty shifted somewhat. At first much of the background effort leading to policy development and suggested changes was carried out by American staff. With the growth in numbers, experience and confidence, these initiatives were being taken more and more by Indian faculty. It was clear that substantive interaction was aided by the "visiting" rather than "line" status of the Americans despite the frustrations felt by the "powerless but concerned" Americans and the "responsible but overworked" Indians. In fact the influence of the American staff was very deep, not just through ability and willingness to speak out and offer advice but by the difficult and continuing demonstration of joining in the detailed working out of key difficulties. New Americans knew little of Indian problems and ways, new Indians knew little of controlling and operating a western style undergraduate academic program; both were technically qualified but often with different depths of

professional experience. They learned much from each other and IIT/K gained very significantly in the process.

A Look at the Future

Without attempting in this paper to assess the current state of the academic program at IIT/K in any detail, it may be instructive to look at some trends for the future. Thirty years ago engineering looked toward science for the power to move forward rapidly and indeed much effort has gone into successfully building firm bridges between the two. The tremendous growth of postgraduate engineering education and the successful concentration on engineering science for undergraduates are measures of this effort. But now the nearly blind faith in the power of science-based technology is waning. The weakness of engineering in really understanding the social dimensions of societal problems is becoming all too apparent. It has in fact led to the current lessening of general support for technological endeavor and of career opportunities in science and engineering.

Perhaps the key idea is that technology is no longer science limited. Instead it is limited by social science. Like science thirty or forty years ago, social science is now in an early stage of development and it is difficult to see how to use its principles and concepts to solve social problems. It is very probable that the primary gains through technology of the next decades will be based on a tremendous growth in the basic understanding of the social sciences. Firm bridges between social science and technology will be needed and just as much effort will be required as was spent in developing the bridges of engineering science. Again it will not be clear just how and where to begin, which leads to follow first and with what perspectives. Yet it is probable that our institutes of technology

and our universities will play a major role in this process.

Ten years ago the primary reason for including humanities and social sciences at IIT/K was simply to help give breadth to the undergraduate academic program as an element of general education. Now, however, it would appear vital to strengthen the social sciences especially and to help the engineering disciplines overcome their preoccupation with science, face toward social science and work hard at the uncertain tasks ahead. The bridges to science must be maintained and even strengthened but the major gains in the long run are in the development of and exploitation of social science. It is at least as important in India as in the United States to develop a deep and yet operational understanding of the social contexts and needs of society. India must do better than just try to break away from its stable root cultures and strive for material gain by blind grasping for the outward signs of a higher standard of living. The United States in turning away from blind faith in the upward spiral of gross national product must seek large scale equilibria with a more than superficial understanding of human needs and desires.

Along with the current change in emphasis toward the social context of technological problems is an indication that the basic nature of the problems may be changing. The scientific method so cherished by technology has been to reduce a problem to its essentials by modeling it in the simplest meaningful form and then basing the attack on it on fundamental principles. The corollary has been that assembling the answers to many small problems will give a viable answer to a large problem. This is acceptable when the small problems are effectively unconnected. The rapid recent growth of areas such as systems engineering indicates

that in more and more cases the interrelationships are important to the overall solution. Perhaps we are coming to the point where we must begin with the idea that many important problems are not usefully attacked by looking first at the solutions for isolated small parts and building toward a grand solution by superposition of subsolutions. Rather we should accept the essential complexity of many problems and learn to deal with them directly. This will require a substantial change in our way of thinking and in the kit of mental models we bring to the analysis of problems and on which we base our intuitive judgments.

The curricular changes and the research efforts that should evolve to meet the challenges to technology of a social science context and an essential complexity are farily clear, at least in broad outline. However, it seems probably that a complementary development will be necessary as well. The increasing complexity of technological problems in a rapidly changing environment cannot be handled by engineers narrowly trained in skills and techniques based on science. They must be educated more deeply and in other important dimensions of intellectual and ethical development. Here again we may have a problem of essential complexity where solutions to the subproblems of learning science, engineering science, professional engineering, technical arts, English and humanities may not sum to an optimum education. The student may have been forced through programmed lockstep learning into an intellectual framework or frame of reference quite different from what is desired for leadership in technology.

Most undergraduate learning in institutes of technology can be called regulated learning and likened to riding an express train. Projects, project laboratories and thesis work can be

characterized as exploratory learning and help to develop other dimensions of intellectual growth. Largely missing is any clear recognition by the faculty of the maturation process of each student and how it is affected by a schooling process perceived by the faculty almost entirely from a curricular point of view. While accumulating skills, facts and techniques, the student's personal maturation is proceeding apace. He listens to what the faculty says but is more impressed with what it does. He learns from the hidden curriculum as well as the overt one. He faces a rather impersonal educational system barely paying even lip service to just those human values and problems which he sees as central to his life. The educational process says many things to the student which a faculty member would never say to him on a face-to-face basis and would often vehemently contradict. There is an essential lack of intellectual honesty and integrity in the current curricular approach to technical education which calls for deliberate action by the entire faculty. It is not a matter which can be left to the humanists and neatly pigeonholed in one subject per semester.

CHAPTER III

ACADEMIC LEADERSHIP AND THE SUPPORT SERVICES AT THE INDIAN INSTITUTE OF TECHNOLOGY/KANPUR

by

Robert S. Green

&

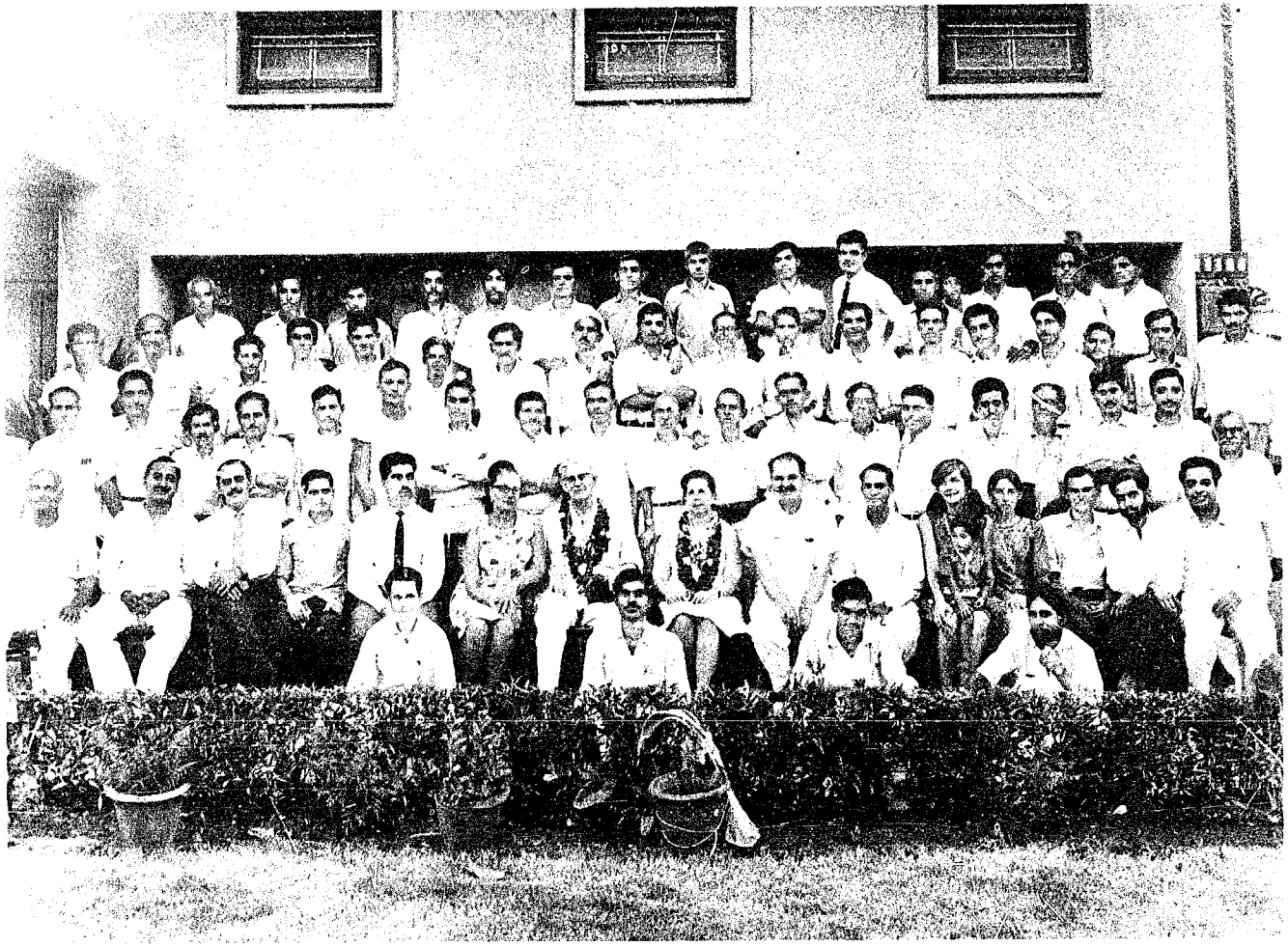
J. Mahanty

GIVEN BY

THE TRANSPORT SECTION

KANPUR INDO - AMERICAN PROGRAM

113/20A, Swaroop Nagar, KANPUR
On 11th. July, 1966



Floor Sitting :-	Sarva Shree	A. K. Phillips (Transport Supervisor) K. S. Kanojia (Dispatcher) Kanhiya Lal, R. S. Bakshi.
Chair „ :-	„ „	L. P. Sinha, S. M. Shepherd, P.Yadav, G. P. Bajpai, Mrs G. N.Petievich, Dean R. S. Green (Program Leader) Mrs R. S. Green, G. N. Petievich (Administrative Officer) R. C. Sahai, Miss Kathy Kehoe, (Baby Ahmad in Lap) Miss Nancy Burks, B. Singh, R. K. Pathak, M. Munje.
Standing Ist Row	„ „	E. Williams, B. N. Dikshit, Nand Ji, K. S. Awasthi, R. L. Verma, Gerald D Johnson, Babu Lal, S. M. Hashim, Munna Lal, A. S. Reubin, H. L. Verma,
	„ „	Balbir Singh, B. L. Jha, S. L. Sharma, Brij Kishore, J. E. Lawrence, S B. L. Dubey, D. K. Sen, K. N. Dixit.
Standing 2nd Row	„ „	J. Menezes, P. R. Pandey, G. D. Sharma (Mechanic) G. B. Singh, B. J. Singh, P. J. Daniel, N. R. Bhatia, B. M. Pal, S. K. Bajpai, A. Khaliq, C. P. Sharma, P. N. Pandey, R. N. Tiwari, Md. Akhtar, S. L. Bhatia (Mechanic) Bhagwan Din, Kashi Singh, Ram Dulare.
Standing 3rd Row	„ „	M. D. Misra, Kishori Lal, S. L. Srivastava, U. K. Pandey (Temp) Sohan Singh, B. L. Gupta, M. L. Misra, Daya Ram, Manni Singh Chawhan, K. Ahmad (Dispatcher) Mohan Lal, Kailash, Shri Kant, D. N. Awasthi, D. P. Tiwari.

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Introduction

Academic leadership and the administrative and technical support services in an organization like the Indian Institute of Technology, Kanpur must reflect in some measure the clarity of institutional objectives as understood by the faculty, the students and the staff. The task of educational leadership is that of assisting the academic community to establish institutional goals, and secondly of marshalling the resources of the institution to achieve the agreed objectives. The support staff, both administrative services and technical services, play an important role in meeting institutional objectives.

The period of formation and growth that the Institute has gone through was one in which the academic and research objectives were defined well and with a reasonable degree of precision by the faculty, and to a lesser extent, by the students. The term "academic excellence" means to a faculty member, or to a student, comprehensive grasp of a field of activity, generation of new ideas, continued improvement of curricular content and pedagogical techniques, productive research, etc. Therefore, when attainment of academic excellence is set as one of the main objectives of the Institute, the faculty as a whole has no difficulty in living with it. However, the supporting staff will have less appreciation of such objectives. Their involvement is at a different level, their work being mainly administrative detail, procurement of material, design and fabrication of equipment, and so on. This involvement is often so specific that the generalities of institutional objectives hold little attraction or moving power for the supporting staff. Thus, the opportunity for classic sub-goal optimization is presented.

Semantic differences intrude themselves. The existence in India of what is termed "academic administration" which more realistically should be termed "administrative services" clouds

the issue. For purposes of this paper the title and the ensuing discussion will use the euphemism of "academic leadership" to characterize the broader role of educational administration. Namely, identification of goals and the marshalling of total resources to achieve those goals.

The problem that this Institute (along with most similar institutions in the world) faces is to build a bridge between the faculty and students with their interest in broad institutional objectives and the other, of the supporting staff with their involvement in matters of detail. Has the Institute set for itself clear institutional objectives which represent a shared goal of faculty, students and staff? Can each important element of the academic community derive fulfillment in achieving mutual goals? The objective of this paper is to analyze and study these questions. We shall start with a picture of the academic leadership, the faculty, the students, and the administrative and technical services as they exist now and examine in detail the various factors responsible for their present structure and form. We shall also discuss the possible directions in which changes should be brought in to make all elements of the academic community more effective in attaining institutional objectives.

Academic Leadership

The academic leadership group at the Institute consists of the Director, his Deputy, Dean of Faculties, Dean of Research, and the heads of the several departments. Chairmen of important committees of the Senate form an important part of this leadership group, as well as strong individual faculty leaders.

A major objective of this leadership group, or perhaps the

major objective, is to assure faculty participation and control of the academic affairs of the Institute. It is fairly recorded that the leadership group at Kanpur has been and remains convinced that the imposition of standards from outside an institution, or an institution solely directed from the top, cannot be expected to result in an institution of more than mediocre quality. Academic goals must be set by the people who are going to achieve them. Their goal is to develop that degree of responsibility on the part of the faculty which will cause them to develop and maintain standards, and to create and improve curricula. The faculty must be helped to become both free and responsible.

As the faculty is given a strong hand in the academic affairs of the institution, great demands are placed upon the academic leadership. The recent trend toward increasing the participation of students in the educational decision process adds strenth and complexity. Academic leadership in such circumstances becomes an exceptionally difficult but rewarding task. The task of the academic leadership becomes that of getting the maximum productivity from a group of talented individuals. The job of providing maximum support for such a faculty involves the development of mechanisms to get recommendations and decisions from persons in closest contact with the problem under attack. In other words, a decentralization of authority and responsibility is called for. At the same time academic leadership must be such as to ensoure that goals are made explicit and support provided to achieve those goals.

The following items are the principal tasks to be performed by academic leadership as a whole. Accompanying notes indicate the role played by the several members of the academic leadership group at the Institute:

- Identification of Academic Goals - In the early years the Director played a key role in enunciating academic goals. As the faculty assembled, the Director was an important figure in gaining faculty participation in establishing levels of quality, curricular areas, and curricular structure. Key decisions were those pointing to academic excellence as a prime goal, the core curriculum, and the organizational framework, i.e., conventional engineering departments with interdisciplinary orientation, science departments with their own graduate programs, and significant work in humanities and social sciences. The Senate has been a natural source of policy review and realignment.

- Evaluation of Student Needs - These contacts have at times been the particular interest of the Deputy Director and the hostel wardens. The recently created office of the Assistant Dean of Students has been an important step towards responding to the needs in this area. More formal ways of obtaining student judgments may be needed at Kanpur as well as at other institutions around the world.

- Perception of Industrial and Governmental Needs - It has appeared essential that definite efforts be made to evaluate industrial and governmental needs for engineers and scientists and the need for new knowledge resulting from research. The Institute accepts its role as an important resource in national development. Academic leaders must make realistic evaluations of need in planning Institute programs. This effort is encouraged by academic leadership but it must have the participation of the entire faculty. These ideas must then be translated into sound programs in the national interest.

- Faculty Selection - The responsibility for faculty recruitment has been borne primarily by department heads, Dean of Faculties, and the Institute Director. The splendid faculty assembled at the Institute bears witness to the excellent work and care which have gone into the assembly of applications to be considered by regularly empaneled selection committees.

- Faculty Evaluation and Development - The department heads, together with senior members of their faculties, bear primary responsibility in this area, including making recommendations for promotions and merit increases in salary. The initiation of research endeavors is of particular concern to the Dean of Research, but departmental initiatives are essential. The department head and the deans of faculties and research are important in arranging for travel to scholarly meetings to present papers and to interchange information.

- Environment for Learning - Academic leaders set the tone for the freedom of inquiry, publication, and teaching that is essential in a first-rate institution. Facilities are provided for research, and support is sought for meritorious research proposals. Students are led to critically examine ideas put before them. A fine library is available and the high circulation rate indicates its usefulness to the academic enterprise. Computational facilities have been utilized effectively from almost the beginning of the Institute. These facilities, and more importantly, the attitudes of the academic community, define the learning environment of the institution.

- Curricular Development - Leadership in this area is provided by department heads working with their faculties to improve the several departmental programs. While the review process is essentially continuous, at least one major revision of Institute curricula has been accomplished. The difficult area of student influence on curricula needs to be approached in a matter of fact way. Ideas must be tested for their merit regardless of their source.

- Management of Scarce Resources - Central to the task of academic leadership will always be the requirement to allocate scarce resources in such a way as to optimize the achievement of institutional goals. These decisions of resource allocation are critical and require the best from the academic leadership from department head to Director. Faculty, students, and building facilities attest to the care with which these decisions have been made. Budgetary choices are the means of implementing policy decisions; thus such choices merit the attention of the most senior and most able of the academic leadership. Closely allied to the management of resources is the representation of the Institute program.

It is perhaps appropriate at this point to examine some of the problem areas in the work of the academic leadership group.

- The Offices of the Deans - The formation of the offices of the Dean of Faculties and the Dean of Research was accompanied with a rationale citing the need to provide administrative support to the Director in his role as academic head of the Institute. The function of each dean remains implicit rather than explicit. Since the functions of the deans were not defined initially, in course of time each dean has assumed roles which may or may not be consistent with the functions and beliefs of the academic leadership group. It is important that the role of the deans be defined carefully, and that they are not allowed to fritter away their energies in all sorts of routine administrative involvements.

- Faculty Attitudes - There is at present considerable dissatisfaction among the faculty on their role in decision-making in the Institute. Additionally, there is great concern with the manner in which promotion policies of the Institute are implemented. This is an indication that a certain gap has come into being between the academic leadership and the rest of the faculty - a gap that must be bridged. Now that the initial phases of the Institute's growth are over, it is necessary to adopt a promotion policy for the faculty in which importance is given to professional and academic performance rather than to specific organizational contributions to the Institute. The group or individuals who evaluate and carry out policies on promotion must have the confidence of the faculty. An attempt must be made to ensure the participation of the newer faculty members in various decision-making bodies, so that the latter gradually become less like coteries of chosen individuals who may appear to have grabbed all power and authority for themselves.

In summary, academic leadership has the task of making institutional goals explicit for faculty, students, and staff. Additionally that leadership has the responsibility of bringing to bear the administrative services, the technical services, the research program, buildings and facilities, and the financial resources

to meet and achieve institutional goals. Goals must be made real to faculty members, for that which takes place in the classroom is most critical. Paper goals, if they are not shared or understood by the faculty members, will be transmitted to students in a thoroughly unsatisfactory way. If communication to the student is uncertain, it is small wonder that the reaction frequently involves doubt and disbelief of motives and intents of faculty and of institutional objectives. Understanding can assist the desired transformation in attitudes from an extension of the secondary school, to an institution of students desiring to learn rather than wanting to be taught. The challenge to academic leadership and faculty is great.

Administrative Services

In this critical area the Registrar and his staff are the key figures. Their understanding of institutional objectives or lack of understanding can make or break the institutional program. Their job is enabling. There must be a continued awareness of the laws and regulations under which the institution operates. Their counsel must always be available to advise the academic leadership how institutional objectives may be achieved within the system. This critically needed counsel must not, however, be allowed to become a substitute for institutional policy. Given a set of institutional policies the Registrar and his staff become the experts on the means of accomplishing the desired ends.

The major categories of assistance provided are outlined below, together with the identification of the persons playing a leading role.

- Academic Services - The Assistant Registrar (Academic) is in charge of student records, grade reporting, and a variety of other student services. The faculty establishes degree requirements, and the Assistant

Registrar (Academic) and his staff record the student's progress toward his academic goal. It is important that students look upon this activity as a real and necessary service in their behalf. The accurate handling of the mass of information at a reasonable cost in terms of manpower is a real achievement.

Another important area of operation is that of the Registrar in recording the debates and decisions of the Senate in an orderly fashion with the assistance of the Senate Coordinator. Likewise, the committees of the Senate require professional services to complete their missions.

- Personnel Services - The Assistant Registrar (Administration) and the Registrar play important roles in faculty selection. To them falls the advertising, recording of applications, notices to members of the selection committees and applicants, and eventual preparation of appointment documents. Good knowledge of personnel practices can and does provide invaluable assistance to the Director and the department heads as they plan the staffing of the Institute. The Assistant Registrar (Administration) becomes the resident expert on procedures for appointment, promotion, leave, suspension and dismissal for faculty and staff. Decisions upon the employment of staff are shared with the Deputy Director, and department heads where staff members may be assigned.

- Stores and Purchases - This element of the Institute's staff is of particular importance to the laboratory operations. The reasonable stocking of parts can speed up the process of construction and repair. This has a direct effect on the length of time a graduate student needs for his research work and the efficiency of laboratory instruction for the undergraduates. Overstocking of little-used parts ties up resources unnecessarily, so study of part issue for prior years points the way toward economical operation.

  Purchasing has the responsibility of getting required goods to the departments in the shortest possible time that is consistent with sound purchasing practices. Certainly a protection afforded by purchasing is that of assuring the Institute that its requirements will be obtained at the specified quality at the lowest cost. This requires knowledge of industrial production and the marketing mechanisms for a wide range of products.

This specialized knowledge needs to be at the service of faculty and students whose primary attention is focused on a different set of problems. Academicians will eternally bless the purchasing officer who can obtain the difficult item quickly and the impossible item in only a little longer time.

- Accounts and Finance - It is impossible to manage intelligently without accurate accounts reflecting past expenditure. Accounting information, with costs broken out in ways comprehensible to the academic administration, is a critical need. This need may require specially derived records to reflect costs of portions of the Institute program. Management data of this sort may be needed whether or not it is a statutory requirement.

  A second major function is that of assembling budget decisions in acceptable form for submission and consideration. This assistance is essential to assist the academic leadership in faithfully representing budgetary needs and in effectively presenting the Institute case for funds.

Technical Services

The services of many kinds of skilled people are required to make possible a program in modern science and engineering. Current technology is too complex to have each student and each faculty member become skilled in all of the contributing arts.

- Computer Center - This is an outstanding example of the kind of technical service which has immeasurably strengthened and enhanced the academic programs of the Institute. While it shares the teaching assignments of the degree departments, and is oriented toward research, its major contribution has been in services to hundreds of students and faculty members. The abilities of Institute graduates are much more highly valued because of their consistent exposure and use of the Computer Center.

- Library - A service which is much like the Computer Center is that of the Library. Essential to any strong academic program is a good library. The orientation of the Institute Library is toward encouraging full use of their materials. Circulation rates become a

matter of pride. This effective organization sees its mission as directly supporting Institute goals of academic excellence. The contribution is a real one.

- Central Machine Shops - In the central shops, faculty members and graduate students bring their sketches to be transformed into hardware needed for their experiments. Often the technician will see easier ways to fabricate the part than the sketch concept demonstrates. If so, improvements are discussed before completing the job. It is usual in such circumstances for more work to be brought to a central facility than it will accomodate. This situation calls for efforts to match the capability with demand. This is, the situation becomes one that possibly requires a budgetary modification or a major overhaul of scheduling and production methods. In any event, excessive completion times require decisive action before it seems simpler to develop independent departmental shops at a consequent increase in cost.

- Glass Blowing - Here again a specialized service is made available which is essential to successful research projects. Scheduling of jobs was one of the keys to meeting the demand for this service.

- Departmental Technicians - The laboratories of each department are dependent for their efficiency upon the supporting personnel on duty. Equipment is maintained ready for instructional use. Research equipment is prepared and overall supervision of laboratories is maintained.

- Central Laboratories - Research equipment having Institute-wide use is maintained ready for use by any department.

The recent events concerning the supporting staff have brought into focus a number of important issues which have been overlooked, almost inevitably, in the organization of the Institute. Whereas it is important for the supporting staff to share the eagerness of the faculty and the students toward attainment of institutional objectives, it is equally important that they have a clearer picture of their own future careers. The Staff Rationalization Committee appointed in 1969 did a commendable job in establishing uniform criteria for promotion and suitable job ladders in various categories.

However, the implementation of the recommendations is being done in a centralized way by a Central Recruitment Committee. This approach deserves close examination. There is a substantial view that a certain degree of decentralization of the promotion and recruitment policies would represent a fairer way than the central approach. It is argued that if each department or section processes the promotions of its staff, the latter will be judged by people with whom they have worked. An avenue of appeal to the Director should exist to deal with instances of miscarriage of stated policy.

Another important lesson to be learned in the Institute context is that the greatest care must be exercised in avoiding redundance at the supporting staff level. Unlike the faculty, who hopefully would spend their free time in useful professional work, the supporting staff members tend to get frustrated when too much free time is available. Discontent may indeed be encouraged by light work loads. It would be in the best interests of the Institute, if a careful and detailed analysis were to be made of the extent of utilization of the various categories of the support staff. Subsequent profitable re-deployment of the staff would be possible to achieve a rational distribution of work load.

Critique and Conclusion

It is concluded that the institutional goals - academic and research objectives - are fairly well understood by the faculty members who shared in their formation. It appears that understanding is achieved largely from implied rather than explicit statements of purpose. Thus it would not be surprising if administrative and technical service staff members would draw their own implications [illegible] goals from the context in which their work is done. Some evidence seems to suggest that some record keeping

is looked upon as the end in itself or at least in fulfillment of the requirements of the Government of India, rather than as an integral part of management decisions. It is possible that the morale of the supporting staff is less than it should be for lack of their understanding of explicit Institute goals and appropriate sub-goals for their particular units. Everyone would like to believe himself to be a significant member of the Institute. It appears well worth the effort to assure that each person knows the importance of his contribution to the overall enterprise.

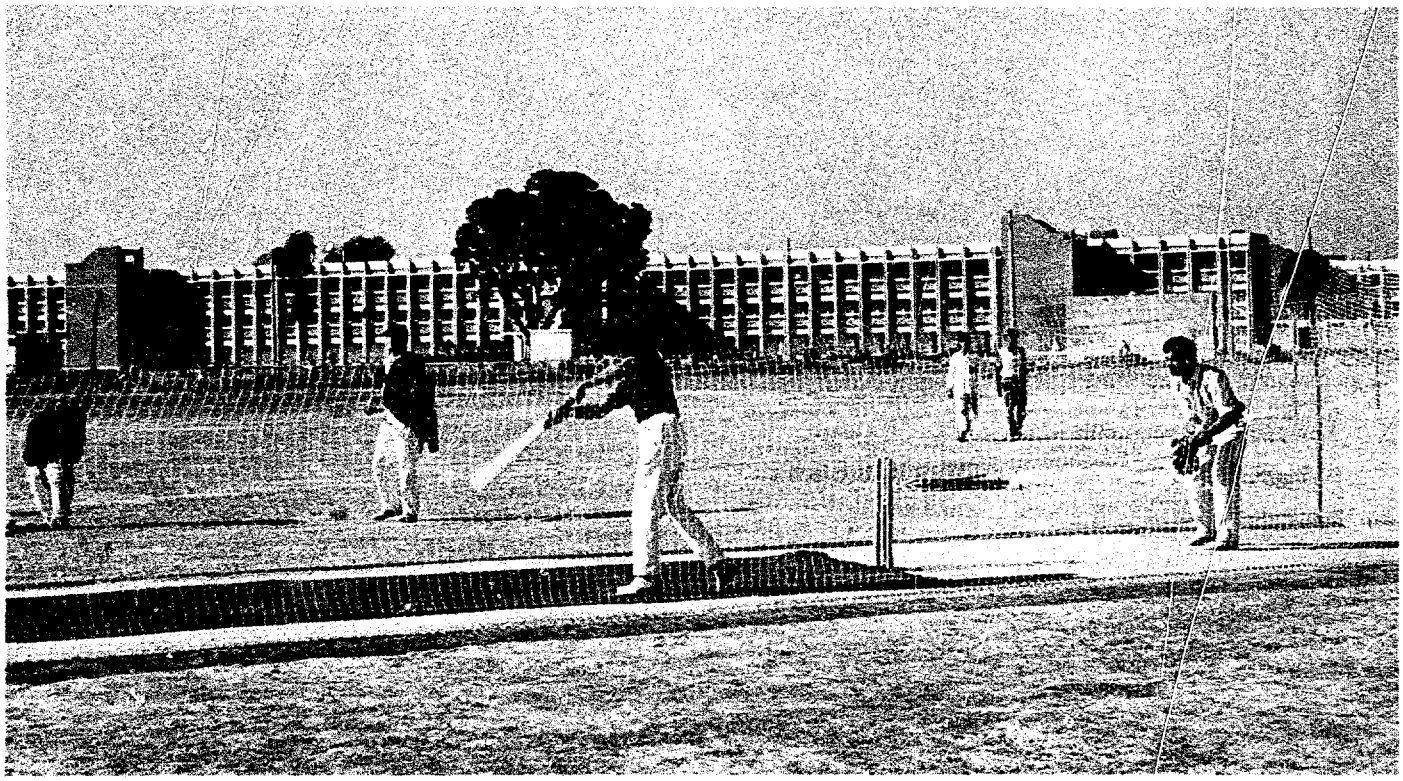
It is suggested that the very terminology tends to confuse academic administration with necessary administrative services. The Institute as a teaching and research organization must be effectively managed by participants in the academic process. There can be no doubt that administration must be accomplished by the academic leadership as defined here. It does not seem at all possible to relegate this function to a professional staff. Familiarity with the form of budgets should not be sufficient reason for functional budget decisions to be made by other than the academic leadership.

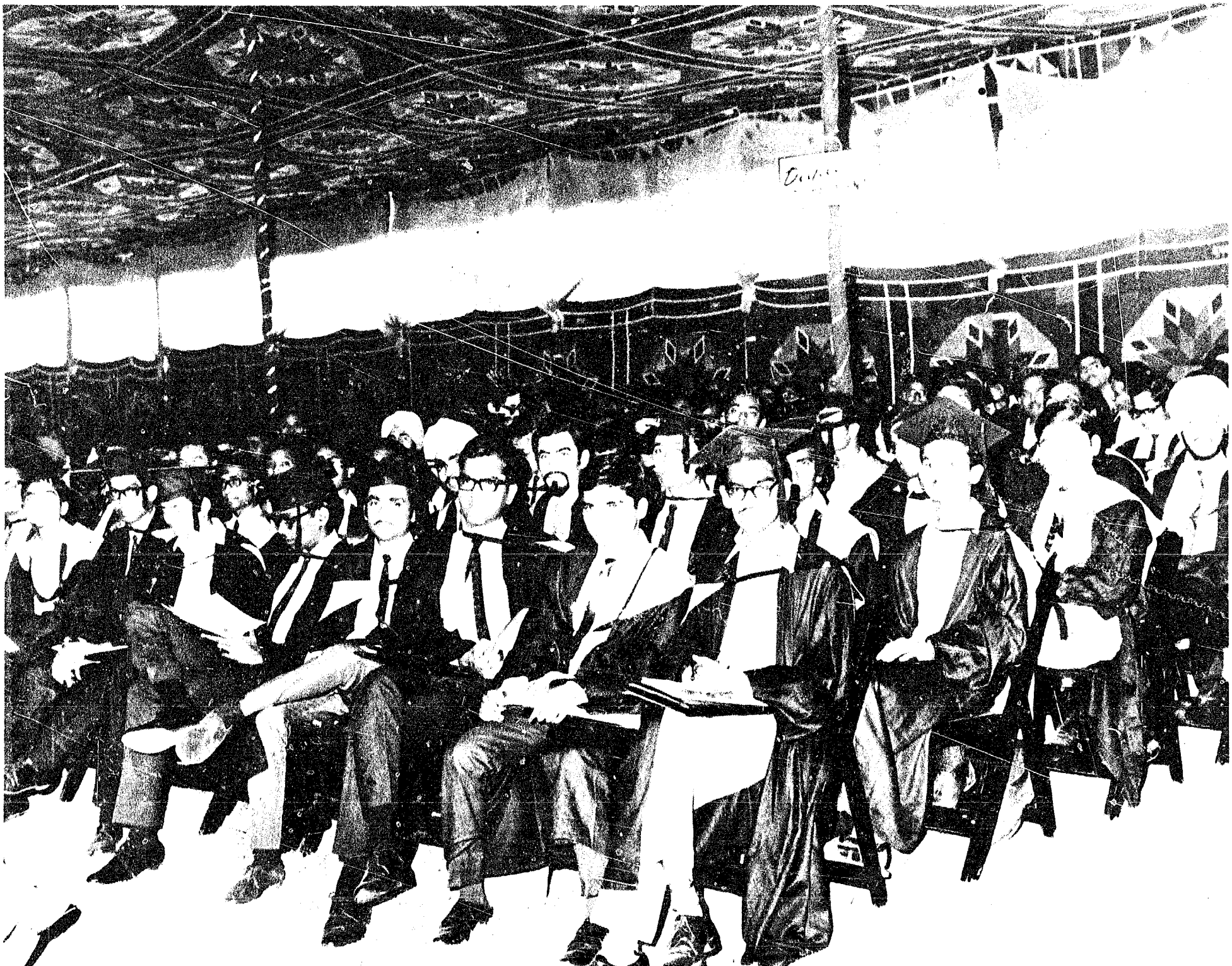
It is proposed that the academic leadership attempt a more explicit statement of institutional objectives and review it widely with all segments of the Institute. Modifications in the statement should be solicited from students, faculty, and staff. Once agreed, acceptable sub-goals should be developed by the contributing elements of the academic and service organizations.

In-service training along the lines which would increase the effectiveness of an Institute group to achieve its sub-goal and maximize its contribution to Institute objectives would continue to be worthwhile. It is recommended that financial incentives be used to reward those who participate and increase

their competence. Performance on the job should have some tangible reward.

To an extent the lack of explicit goals has hindered faculty communication with students, and put a barrier to student understanding. Effective student contributions to administrative and academic decision-making can be expected to follow increased understanding on their part. Students as partners working toward the achievement of institutional objectives can be a real strength.





CHAPTER IV

OPERATIONAL INTERACTIONS

by

Gilbert Oakley, Jr.

In 1966,
Madame Indira Gandhi
was welcomed to the Campus by
Sir Padampat Singhania,
then, Chairman of the
Board of Governors, IIT/Kanpur

To describe all the operational interactions that have taken place during the course of the Kanpur Indo-American Program would be difficult if not impossible for an individual writer and even a most eager reader would have difficulty in separating signals from noise. For the purposes of this report the writer will therefore touch on those points which seem of significance to him as a result of having lived in close association with the Program over its lifetime of 10 years. This association includes participation in the formation of the Consortium and membership on the pre-contract subcommittee; later membership on the Consortium Steering Committee throughout the life of the Contract save for the three years - 1968-1971 - of service as Program Leader at Kanpur. Readers who have seen the Program from other points of view will hopefully be stimulated to comment and to note omissions that they feel are significant.

Throughout there have been four major agencies whose constructive interaction has been necessary for the development of IIT/K as an institution. These are, the Ministry of Education of the Government of India, the U.S. Agency for International Development, KIAP, and IIT/K itself - already a very young institution in its own right when the basic Contract was signed. Within each of these agencies were sub sets of relationships: USAID/New Delhi vis-a-vis AID/Washington, within KIAP, EDC the Prime Contractor and the supporting university members of the Consortium, IIT/K vis-a-vis the Ministry of Education, etc.

Pre-Contract Phase

The initial contacts between the four major agencies during the summer and fall of 1961 were fruitful in that the operating representatives of each agency very quickly developed an understanding of each other's problems and showed in concrete ways a

willingness to compromise and to innovate. This circumstance was critical and cannot be minimized when one tries to weigh the various factors which contributed to the development of the Program.

For example, the AID agency was easily persuaded to depart from its standard practice which involved first the signing of a Contract and then the development of a Work Plan. In this case they granted a six-month contract with sufficient funds to permit the development of a Work Plan prior to signing the basic Contract. During this period the Director of IIT/K and a senior representative of the MOE visited each of the Consortium Institutions and met with the Consortium Representatives and as a result their views of the kinds of support which might be provided were broadened. Seven representatives selected from the Consortium Institutions went to India and consulted with USAID/ New Delhi, the Ministry of Education, and the existing staff of IIT/K and, together with them, reached agreement of objectives, scope of work and developed a detailed Work Plan to be supported by the basic Contract.

The fact that all who were to be involved knew what the Contract was about before it was signed was of major signigicance. The amount invested was more than justified in terms of being able to get to work quickly, of eliminating early misunderstandings, and of better fitting of resources to the task in hand. Psychologically it was also easier to develop a better plan for operations prior to making the long-range commitment that signing of the Contract required. In short, this departure from normal AID procedure insured that the Contract came as no surprise to anyone and that the Program would be off and running upon signature of the Contract.

On another score, it was significant that the Consortium (KIAP) insisted that all academic appointees to the KIAP staff

be bona fide faculty members of the Consortium Institutions. There were two principal reasons for insistence on this point. First, it was felt that the usual AID practice of permitting up to 50 per cent non-faculty representation could lead to a first- and second-class citizen syndrome in the field and that institutional responsibility for quality might not be easily maintained. Secondly, the development of long-term and self-sustaining institutional relationships was seen as a worthwhile goal, the attainment of which could be weakened by watering the stock. At the time, adherence to this requirement caused some pain in that KIAP had, on occasion, to decline very attractive offers to serve on the part of some outstanding people.

The Ministry of Education modified its normal procedures for approval for visiting staff and acquisition of equipment to facilitate and speed up the fielding of personnel and the development of laboratories. Of greater significance was the MOE's expressed intent to permit IIT/K, together with KIAP, to experiment and innovate throughout the development process. In spite of increasing budgetary pressures, the Ministry has consistently encouraged departure from the traditional Indian model. Without this it is doubtful that much could have been accomplished.

Of equal importance is the fact that the USAID Mission in New Delhi at the outset defined its role in the Program in such a way that it was clear that KIAP was to have full professional responsibility for the Program at IIT/K and that USAID's role was to support that Program to the extent that its resources would permit.

To sum up the initial phase of the operation, there was a feeling among the four agencies of jointly venturing on a common program. This spirit has pervaded the Program throughout its existence and has even persisted in spite of changing personnel

and occasional disagreement and frustration. Main channels of communication have always been kept open and remarkably informal, and only seldom has there been need for formal, position-paper type correspondence.

Operational Phase

In looking at the operational phase of the Program it is necessary to look much closer at details and to examine the relationships that existed within each of the four agencies involved. Where did these relationships operate constructively and where did they inhibit development? If the job were to be done again what would one plan to do differently? While I do believe that the initial spirit and feel of the Program was most auspicious, and that that same spirit of jointly venturing has persisted, I'm also acutely aware that there were enough sticky wickets throughout the game to bring down any operation no matter how well conceived if that spirit had not prevailed.

Intra-KIAP Relationships

It is certainly not clear just what motivated each of the institutions to join the Consortium in the first place. Some combination of a number of motivating factors was in any case effective. Some of these were, a feeling that American institutions must become involved in the world around them, a sense of duty, a notion that the experience would benefit and broaden faculty perceptions, an interest in India and Eastern culture, just plain missionary spirit and others. In any case it would take a brave, if not rash, man to answer for any of the institutions concerned whether it would do it again. This in no way is intended to suggest that the job was not worth doing. It only suggests that whatever motivations were effective ten years ago may not be of consequence now.

In any case and for whatever reason, nine universities and EDC did see fit to commit themselves, together, for the purpose of collaborating in the development of IIT/K. One of the expressed long-range goals was the development of self-sustainable institutional relations between the various institutions and IIT/K for their mutual benefit. (Such relationships exist between many Western universities, at least to the point where constructive informal and formal activities are pursued). There are some encouraging signs in this respect. There have already been about five IIT/K faculty who served as visiting professors at Consortium Institutions without Contract support, and another five IIT/K faculty who served as visiting professors in non-Consortium institutions in Canada or the United States. Whether further visiting appointments may be accepted in the present political context is a moot question.

While it is doubtful whether at this time that any of the Consortium Universities can show concrete evidence of positive results from participation in KIAP, it is clearly evident that many individual staff members who have served at Kanpur have maintained a high level of continued interest. Of the KIAP staff involved over 50 responded to Professor Hazen's request for comment on this review of the Program. Many are in active correspondence with IIT/K faculty and many have become actively engaged in Indian and foreign student affairs on their campuses after returning from Kanpur. In summary, it is doubtful that a "cost effectiveness" study would show a tangible result at this time, if ever. However, intangibles may contribute more in the long run to the development of our institutions.

Effective management of the Consortium required the establishment of a structure and the assignment of responsibilities and functions. Did the structure as established at the outset function effectively?

It was agreed that the Consortium Steering Committee consisting of one appointed member from each of the universities and EDC would have overall responsibility for the direction of the Program and that the Program Leader would have responsibility for the day-to-day direction of the operations in the field. EDC, through its Program Administrator, was to provide logistic support both for the field and for the Steering Committee, in addition to its basic and legal responsibility to see that the conditions of the Contract with AID were fulfilled, new amendments negotiated, etc. It should be noted that this arrangement was somewhat unconventional in that while, from a legal point of view, EDC was in fact the prime contractor and the universities sub contractors, the responsibility for the direction of the Program effectively rested with the Steering Committee where EDC had but one vote among ten. It is significant that in ten years of operation this potentially conflicting sharing of responsibility has posed no problems that were not resolved by discussion.

In practice did this management concept prove effective? One test is to see whether it was able to adapt itself to changing situations as development took place. There is evidence that it did in a number of cases. For instance early emphasis was placed on academic development, and staff recruited by the Steering Committee was preponderantly academic. Midway in the Program it became evident that support for the administrative structure at IIT/K was a critical need; and shortly thereafter, more than half of the American Staff at Kanpur were working in non-academic areas.

Again, as academic departments at Kanpur matured, it became apparent that short-term visitors preeminent in their fields could be used effectively and the record shows a shifting away from long-term to short-term academic appointments.

On the other hand there were some instances where the system did not respond as quickly or as positively as would have been desirable. For example, while support for the development of the book collection for the library was substantial, it was not until late, hopefully not too late, that adequate support was given in the area of library management.

In the case of equipment procurement (over seven million dollars' worth), the Steering Committee wisely refused to go along with a suggestion from AID to immediately purchase some two million dollars' worth of equipment suggested by the ASEE. The Committee held that no equipment should be ordered until men were in the field and could make selections of equipment on the basis of need. However, this decision should have been followed up by a firmer insistence that departmental budgets should be established and adhered to before additional purchases were made.

As the Institute at Kanpur developed, the role of the Steering Committee has changed. In the early stages it did set policy, and did actively concern itself with major details of the Program: should it support and approve the development of a TV facility?; to what extent should the Program support nuclear research?; etc. Decisions of the Steering Committee did affect the course of the Program. In addition, it did fulfill its recruiting responsibility and did function as a reasonable, if not perfect, screening device, in which nominations were given careful scrutiny, some being rejected for a variety of reasons. The Committee has also served as a placement agency to provide relevant Participant training programs and the members have been instrumental in securing the support of their institutions for various aspects of the Program; i.e. Purdue's support of the IIT/K Library; Princeton's and University of California's support for the Computer Center, etc.

In recognition of the fact that the Institute had developed to the point where it was doing its own steering, the Committee formally changed its name to Consortium Committee at its meeting on 4-5 June 1969.

In practice, the elected Chairman of the Steering Committee has played a role larger than that of chairing the meetings. Strong linkage has developed among the Chairman, the Program Administrator, and the Program Leader. Questions of policy and matters of major importance often could not wait for scheduled meetings, and consultation among the three above has resulted in decisions which have been generally acceptable to the Committee as a whole.

On balance, the original concept for the management of KIAP seems to have worked very well. In pre-Contract days AID regarded the Consortium notion with some apprehension. That their apprehension has been dispelled; and that the Consortium has survived, is perhaps testimony enough that it is a workable device.

As a former Program Leader, my comments on the role of Program Leaders may be suspect. In any case, some lack of objectivity may have to be taken into account. There have been five Program Leaders during the life of KIAP. All had one thing in common, namely; previous involvement - two as Staff Members and three as Steering Committee Members - so that they all were familiar with objectives and goals. However, each brought to the job a different interpretation of his role. Whether matched temperamentally with the Director, or not, I'm convinced that it has been wise to have had five Program Leaders rather than one or two over the span of the Program. Too much mutual reinforcement and mutual dependence between Program Leader and Director could be just as destructive as a prolonged matching of dissimilar types and perhaps a balanced diet was best for both the Institute and the Program.

I'll state flatly that I think Program Leaders were necessary, even though at times we might have been described by some as necessary evils. The reasons for, are, I think, too obvious to dwell on; and I will leave the arguments against, for others who may care to raise them.

As a Steering Committee member, I found the meetings much more lively and imperative when the Program Leader was present. The risks of poor second guessing were eliminated and his presence provided a sense of compelling reality. As a Program Leader, I found the work of preparation and the hurly burly of a long trip and a short stay physically taxing but well worth it, not just from the point of view of the reassurance and support which written communications can seldom provide. I think the Contract was right in providing for attendance at all Steering Committee meetings (usually three per year). There may be on occasion justification for skipping one meeting in three but I don't think adequate communications can be maintained by attending less than two meetings per year. On the same point, I do think that the Contract (as this one did) should provide so that each Steering Committee Member can visit the field at least once, and more often, if his term is longer than two or three years.

As a general observation, good communications are difficult to maintain and require constant attention above the normal call of duty. Even though the Program Administrator, and the several Program Leaders, have stuck to a rigorous schedule of weekly Friday Letters in both directions (the numbers are now from the field, K-515, and from EDC, W-535) communications in the effective sense have very occasionally broken down, misunderstandings have developed, and effort was expended to re-establish rapport. Copies of all Friday Letters went routinely to the Chairman of the Steering Committee; but - I think - it might have also been worthwhile to have circulated appropriate excerpts from them to the Steering Committee Members at least on a monthly basis.

EDC's role in KIAP has been an unusual one, ranging from full legal responsibility as the Contractor, to the handling of humble details necessary to provide logistic support. From time to time it has served as a lightning rod drawing fire and ire from the field and home fronts, and this in itself may have contributed to the general harmony among the participating universities. The Project Administrator has been the focal point for the channeling of information, has handled Contract matters, interpretation, negotiation of amendments, budget control, etc., and has been responsible for overseeing the procurement program, the Participant Program and logistic support for departing and returning staff.

The concept for KIAP seems to have stood up remarkably well, perhaps because no attempt was made to establish a rigid written format for its conduct. This was a conscious decision which left KIAP free to develop as the Program developed. Hindsight certainly reveals things that could have been done better, or differently, but the conditions for learning and correcting were good, perhaps mostly due to a will on the part of all concerned to keep lines of communication open.

Relations with the Ministry of Education

Earlier reference has been made to the initial strong support of the MOE which has been accompanied by good communications throughout the Program. Mr. Chandiramani, our first principal contact at the Ministry, and his successor Dr. Chandrakant, have always maintained their availability and interest. The Program did pose them a number of problems which generally lay outside the MOE and which did inhibit progress. Perhaps the most serious, certainly the most frustrating was the unforseen requirement that the Customs Service would exact duty on equipment furnished to IIT/K under the U.S.-funded Contract.

The delays entailed further extended the already long delivery schedules to say nothing of the psychological traumas engendered.

Unilateral rupees budget cuts imposed by the MOE as a result of general GOI belt tightening due to pressures such as the Indian-Chinese conflict and the first Indo-Pakistani war were disconcerting, though understandable. In one year of my tenure there were three such cuts, and I must say, that it unwittingly gave support to those department heads whose budget philosophy was best described as "spend or perish". In consequence, the efforts to insist on sound departmental budgeting practice were not favorably affected.

On the other hand, the MOE, through its representative on the Institute finance committee, did encourage sound budgeting practices. The MOE was to some extent successful in that budgets for presentation were prepared. This, however, does not say that these budgets were effectively implemented internally or were widely circulated or understood.

There is evidence that the MOE did provide substantial support to IIT/K and did encourage the development of institutional individuality. It is also true that in the later years of the Program, national fiscal stringencies did result in imposed unilateral budget cuts at all the IITs, these have had an inhibiting effect on development and have given rise to concern as to whether the MOE intends to continue its policy of encouraging innovation.

USAID - KIAP Relations

As mentioned before, USAID-KIAP relations developed from a sound base of understanding and have continued to be a constructive force throughout the Program. The files contain remarkably few stiff notes and statements of position or protest. However, in some cases such formality was necessary, for

instance to strengthen USAID's hand in dealing with the GOI on a sticky matter, and there were some cases where disagreement required resolution in a formal way. However, the relationship has been constructive because communication has been open and a spirit of partnership has persisted throughout. While informality of the relationship poses problems for the future historian or researcher in that documentation is thin, it may well be that relationships of this kind are productive in inverse relationship to the amount of documentation available.

Documentation required by AID/Washington: the PIPs, PROPs, PIOs, and the substance of the PROAGs were openly discussed and developed. Whenever appropriate, IIT/K was included so that when these documents were sent forward they contained no surprises for any of the parties concerned.

On the other hand, it has taken a long time to develop a commonly understood format for fiscal reporting between KIAP/Newton, KIAP/Kanpur, USAID/New Delhi and AID/Washington. Accounting offices at each of the four locations have somewhat different points of view and objectives: time lags lead to apple-and-orange problems, and the myth that "figures don't lie" leads to misunderstandings. Hopefully, when all is finished and the pipe lines are empty, a reasonable reconcilement can be reached. This is one area where better understanding between those directly to be concerned should have been reached at the outset.

Of no small significance to the IIT/K enterprise was the close relationship between the U.S. Embassy in Delhi and USAID/ND. This has been an integrated mission during the life of the KIAP Program. I know, from experience in other countries, that such a working relationship between State and AID all too seldom obtains, and when it does not, programs suffer. KIAP is fortunate in knowing that it has been supported throughout by the Mission as a whole.

IIT/K - KIAP Interactions

Dr. Dahl and Professor Halfman have described many of the KIAP-IIT/K interrelations in their papers and I am sure that Dean Green and Dr. Mahanty will cover much of the rest of the ground in theirs.

One of the major objectives during my tour of duty (1968-71) was to prepare for disengagement of KIAP in a formal and contractual sense in June of 1972. Happily, development over the previous six years had been sufficient in a number of areas to make this a reasonable objective. In a number of academic departments it proved practical to shift from long-term American staff appointments to short-term appointments, the role shifting from advisor to visiting professor in the conventional sense. While all academic departments had not achieved a high level of development, enough had, so that KIAP's role could change - in this respect - with confidence.

Initiatives, originally joint, were shifted to IIT/K; and as has been mentioned before, the KIAP Steering Committee changed its name in June, 1969, to Consortium Committee in recognition of this.

However, it will remain to be seen whether the administrative infrastructure will be able to pick up to the point where it can support the Institute as it should. It is doubtful that efforts which have been made by the Program will have any lasting success until the attitude of the faculty and the senior staff changes from that of disrespect and disregard for supporting staff. It is only fair to point out that a similar attitude prevailed at most American educational institutions until 30 or 40 years ago. It is also fair to say that some of the faculty and senior staff are recognizing this problem and that some steps are being taken to improve the situation.

On balance the relationships between KIAP and IIT/K have been productive and I believe that most of the American staff have looked on their tours at Kanpur as constructive and rewarding.

Conclusions

The general concepts underlying the relationships of those involved in the enterprise seem to have been sound as evidenced by the general lack of substantive disagreement between the parties concerned as far as goals and objectives were concerned.

However, at times details loomed large and in some cases inhibited progress. For example the matter of customs clearance of GOI title equipment and the payment of duty was never resolved to the satisfaction of all concerned. Substantial delays were involved and programs at IIT/K were disrupted. Whether this situation could have been ameliorated by negotiation before the Contract was signed is perhaps a moot question.

Perhaps the weakest link in the system in spite of regular weekly Friday Letters between KIAP and EDC and the Consortium Committee Chairman was communications between India and the United States, both KIAP and EDC and USAID/ND and AID/Washington. Perhaps reliable satelite telephone service will eliminate much of this problem. In any case the need for good communications is imperative and cannot be overstressed.

CHAPTER V

INDIAN INSTITUTE OF TECHNOLOGY/KANPUR
AT THE END OF THE
KANPUR INDO-AMERICAN PROGRAM

by

John G. Fox

In 1970, Dr. M. S. Muthana was appointed Director, IIT/Kanpur.

KIAP AND AID

The planned activities of the Program were restricted as a result of the Indo-Pakistan War in December 1971. This was due not so much to the War itself as to the chill in Indo-American relations that occurred later. The effects became apparent as early as January 1972 and grew in intensity right up to the end of the Program.

Five short-term visitng staff who were scheduled to come to Kanpur during the spring months, were not able to obtain visas. Six Participants who were scheduled to go to the USA and remain until the end of the Program, were not given permission to go by the Government of India.

Compared to 170 past exchanges of staff between India and the USA, these cancellations, though frustrating, represent only a small part. However other more serious consequences of the chilly relations at the highest level of Government have also occurred. These will be discussed in connection with specific topics below.

Post-Program Proposal

Prior to the autumn of 1971, a number of discussions were held amongst consortium and Program representatives with AID officials in Washington and New Delhi on the possibility of some further support for IIT/K after the close of the Program. Agreement had been reached that such support on a reduced scale for a few years was desirable in order to help the institution achieve its full momentum of development.

The form tentatively agreed upon was that of a lump-sum grant to IIT/K to use in promoting exchange of staff between IIT/K and, not only the Consortium, but other institutions as well. With India's foreign exchange problem and its distance from advanced

centers of science and engineering, the isolation of its experts from the rest of the world is a serious problem. This grant was intended to alleviate that problem. In the early discussions in Delhi, KIAP and IIT/K proposed about one and a quarter million dollars for support in a five-year period besides a sizable rupee component. The dollar sum proposed by the Mission was much less - a quarter of a million dollars. This was subsequently increased to half a million dollars as a result of discussion with AID in Washington. Up to this point the funds were specifically not to be used for the purchase of spare parts or small pieces of auxiliary equipment. However, when the Mission realized that IIT/K had already expended considerable sums for the maintenance of the equipment and had plans to increase these allocations in future years, agreement was reached to proposed additional dollar funds for the upkeep of equipment.

The last discussion in New Delhi took place in September 1971, among representatives of IIT/K, KIAP, MOE, and USAID. Further planning was stopped, first by the vote in the US Senate against all foreign aid appropriations, and then by the developing chill in Indo-American relations. The plan at present is pigeon-holed in both USAID and the Ministry of Education awaiting a favorable time for pursuing it at official levels.

IIT/K Endowment Fund

In October 1971 the IIT's were informed by the Ministry of Education (MOE) that agreement had been reached in principle by the Governments of India and the United States of America to set up an endowment out of Special Foreign Currency (PL 480) for the development of the IIT's in new directions. The normal development of the Institutes would be met out of funds allocated for that purpose as in the past. The income from the endowment would be applied for the following special new purposes:

To support interactions amongst the five IIT's through exchanges of faculty, students, and instructional materials and through joint research projects.

To improve engineering education in India through curriculum development, preparation of instructional materials and teacher training.

To support management training at the IIT's.

To support exchange of academic faculty and industrial experts, consulting services to industry and collaborative research in industry by post-graduate students.

To support innovative teaching by grants to departments or individuals.

To build at each IIT a regional center for sophisticated and expensive instruments to serve the faculty of other institutions.

Thirty million rupees would be the approximate annual sum for these purposes. The principal was to be created out of Special Foreign Currency in an amount to be calculated when the interest rate was agreed upon by the two governments. The question of the amount of interest, which would in turn determine the amount of principal to be set aside, was still under discussion by the Governments of India and the USA. For example, at 1% the principal would be three thousand million rupees, at 2% half that, and so on. The administration and management of the affairs would be carried out by a Governing Body consisting of the following:

Minister in charge of Education of the Central Government

Chairmen of the Boards of Governors of the five IIT's

One representative each from the Ministries of Finance and of Education and Welfare

Three eminent persons connected with science, engineering, or industry (the names were announced)

However, after October further discussion ceased as a result of the cold war-induced relations at Government levels. It is

greatly to be hoped that this excellent plan, generous on the part of the US Government and far-sighted on the part of the Indian Government, will be revived and put into effect as soon as relations have returned to normal.

Curved concrete shells shade a corner of the Southern Laboratory

Electronics Park

As early as 1966, discussions were initiated between IIT/K authorities and the Directorate of Industries of the Government of Uttar Pradesh to establish an industrial park for entrepreneurs adjacent to the campus. The plan was to take advantage of the considerable expertise amongst the faculty, primarily in Electrical Engineering, to create a growth-point for a sophisticated electronics industry in U.P. A large meeting was held on campus in July 1971 which was attended by the Chairman of the Electronics Commission, representatives of the Directorate of Industries of Uttar Pradesh, local industrialists including some young entrepreneurs, and IIT/K faculty. The thinking at this meeting was that the enterprises undertaken in the Park should involve to a large extent the production of technologically intensive equipment, this being the type of enterprise which would make best use of the close association with IIT/K; there should be a prototype design and development center administered by IIT/K; there should also be testing facilities, a standards laboratory, and a tool and die shop at IIT/K. It was expected that the Institute would also play an important role in providing management training for the entrepreneurs.

Further discussions were held between representatives of the U.P. Directorate of Industries and IIT/K. The scale of the project was to be an investment of Rs. 50 million within about 3 years.

However, two developments occurred which brought the project to a temporary halt from which it is still slowly recovering. One of these was the unavailability of 100 acres of land adjacent to the campus, which had been planned for use as the site of the park. To the complete surprise of everyone at IIT/K, it turned out

that there had been a real snafu in connection with the land: It was suddenly discovered that the owner had leased it to a brick-making concern for five years! The U.P. Government has taken its case to court, but a decision will require years. Meanwhile, another similar but less convenient site has been obtained some distance from the campus.

The other development which has slowed the project is the transfer away from Kanpur of one of the key figures, an enthusiastic supporter of the project, in the U.P. Government.

At the moment the future of this U.P.-sponsored enterprise is uncertain.

Regional Computer Center

India's intention is to establish large modern computers at selected places around the country. The cost will be about 30 million rupees each, of which about one quarter will have to be in hard currency. An evaluation committee has visited a number of institutions in the past year to assess their suitability as Regional Computer Centers. This committee recommended that IIT/K be enabled to provide computational service and educational programs in computer applications for industry and other organizations in the northern region, to set up consultation cells in computer-aided design of engineering systems, and to develop into a national center for computer science education.

To date no decisions have been announced but the indications are that Kanpur is not being considered among the first round of sanctioned Centers. This makes its future as a Regional Center uncertain since the foreign exchange available for the Centers from the United Nations Development Program is limited. This is disappointing. IIT/K is one of the two best existing computer centers in the nation, certainly the best at an educational institution. It should logically expect to be one of the very first choices as

an enlarged facility. However, the matter is not closed and one may hope that a proper decision may yet be reached.

At least the IIT/K computer group may benefit from a PDP1 computer, with a great deal of auxiliary equipment, donated to the Institute by Stanford University. It will be used to do work on computer animated film for educational purposes, time sharing, image processing and pattern recognition. It will be in effect a research tool for the Computer Center. The Program arranged and paid for its transportation to India. It has been delayed in a warehouse in Bombay for several months: The delay is largely due to the strained Indo-American relations.

Advanced Center for Electronics Systems

The Ministry of Defense is establishing at each of the five IIT's a center for research and training in radar and communications. The budget for the center at IIT/K for the next five years in the amount of 12 million rupees has been announced. A little over half of the total will go for capital expenditure on laboratories, equipment, and additional housing for the increased staff which will be required. The remainder will be for the salaries, travel, and expendables. The purpose of the project is training and education, research and development including futuristic investigations, information retrieval and dissemination, consultation with the Defense Ministry, and additional specific projects as desired and funded by the Ministry of Defense. Construction of the main laboratory building on campus has begun.

This is a project of the Department of Electrical Engineering. It will require many new staff appointments. Some will be joint appointments of faculty in the Department and in the Center. Some will be appointments of full-time engineers at the Center. The number of students (officers) sent for M.Tech. training by the Ministry of Defense is planned to be about 20 each year. When

the project is in full operation the professional staff in the Department of Electrical Engineering will be about double the present size.

Each of the centers will be evaluated after 2 or 3 years by a committee of the Ministry of Defense. Those which have been judged successful will then be put on a rolling five-year budget. This feature will make it possible for a center as a whole and for each individual staff member to plan his activities 4 or 5 years ahead. This would appear to be a considerable improvement over the practice common in India, the US and elsewhere of one or two year budgets with their consequent difficulties for long-term planning.

The installation of a project such as this, sponsored by the military, on a university campus is something that would probably not be done at an American university in these times: the trend of American universities is to dissociate themselves from such activities. However, in India in its present stage of development a project of this type at an academic institution is not inappropriate. In the first place, the research carried out will be unclassified. In the second place, there are very few, if any, centers outside the IIT's where such advanced research, vital for the country's needs, could be prosecuted. Finally, just as American institutions developed more rapidly in their younger days with this kind of activity, so will IIT/K, at the beginning of its second decade. At some future time, the Center will have become successfully established and IIT/K will have reached a higher level of maturity and achievement. Then, if public opinion in India desires a separation of military research from academic institutions, divorce proceedings could be initiated. The advantages of the union now will outweigh the trauma of the separation then.

Administrative Developments

There were two related strikes at IIT/K during the past year

which resulted in significant changes in the administrative structure. There was one in October for four days and another in March for twelve days. The first was settled locally by the creation of a Grievances Committee made up of representatives of faculty and workers. It was partly responsible for the cancellation of the Director's visit to the US and of the meeting of the Consortium Committee which he had been scheduled to attend. The second strike was over delay in implementation of the recommendations of the Grievances Committee. It resulted in the institute being closed for twelve days and the students being sent home for two weeks. The second strike was settled by the new Chairman of the Board of Governors in consultation with the Ministry of Education. The chief results were the granting of permanent jobs to more than 500 temporary employees, for which the Ministry sanctioned the additional posts and funds, and the appointment of a Standing Committee which is to handle "all recruitment, promotion, disciplinary action, house allotment, and other grievances of the Institute employees". This Committee, appointed by the Board of Governors, reports to the Director. It includes representatives of the faculty, the union and the students. It has authority over about 2,000 employees of the Institute - all but the faculty and a few senior supervisory persons.

There is concern among the faculty over the loss of autonomy of the Institute by the intervention of the Board Chairman and the Ministry rather directly into administrative affairs of the Institute. There is also concern that the Standing Committee may not be able to combine successfully the varied functions of recruitment, promotion, disciplinary action and complaints against disciplinary action. There are signs that the allegiance of the non-academic staff has to some extent been diverted from the faculty and administrative officers on campus to the Board of Governors and the Ministry of Education.

At least some of these fears may prove to be unfounded. The

strike had reached an impasse which required mediation by someone not directly connected with the local scene. The Chairman of the Board of Governors has since made it clear that the Standing Committee is a temporary instrument to be used only until the situation returns to normal. He has been reliably reported also to have suggested to the staff that now with the greater part of their grievances and demands satisfied, they should begin to think of the Institute's welfare as well as their own. It may turn out that the loss of autonomy was a once-only occurrence to settle the strike which will not recur as long as similar impasses are avoided in the future.

The strikes have driven home the point that the Institute and in particular each individual of the academic and administrative staff must take up the challenge of helping the members of the supporting staff to have a feeling of involvement in the IIT/K enterprise. Without their willing cooperation little can be done. To give them a feeling of partnership, instead of servitude, may be difficult, and require time, but is not impossible. It is also essential.

An Administrative Review Committee, appointed by the Director, worked hard during the year and at the end had formulated a number of recommendations for improvements in the administrative processes of the Institute. Some of these have already been implemented by the Director; other implementations will follow. Briefly, a few are the following: In major Institute matters the decisions should be arrived at by groups instead of individuals. There should be representation of students on various specified departmental and Senate committees. Student feedback from courses should be obtained in a regular fashion which was specified. Department heads should be selected by polling the departmental faculty in a way which was spelled out. A six-man Faculty Affairs Committee, appointed by the Director, should review the recommendations of

somewhat similar departmental committees on faculty promotions, merit salary raises, appointments, selection committees, long leaves, and confirmations. The Senate membership should be broadened by including more faculty, some alumni, and some students. Student representatives were already present at the last Senate meeting.

The recommended changes should help, in the words of the Administrative Review Committee, "increase participation, insure objectivity, and decrease arbitrariness". They would carry the Institute a long step toward the Director's goal of shared authority. The Institute would become stronger and more self-sustaining. The Director plans to implement most of these recommendations.

Board of Governors

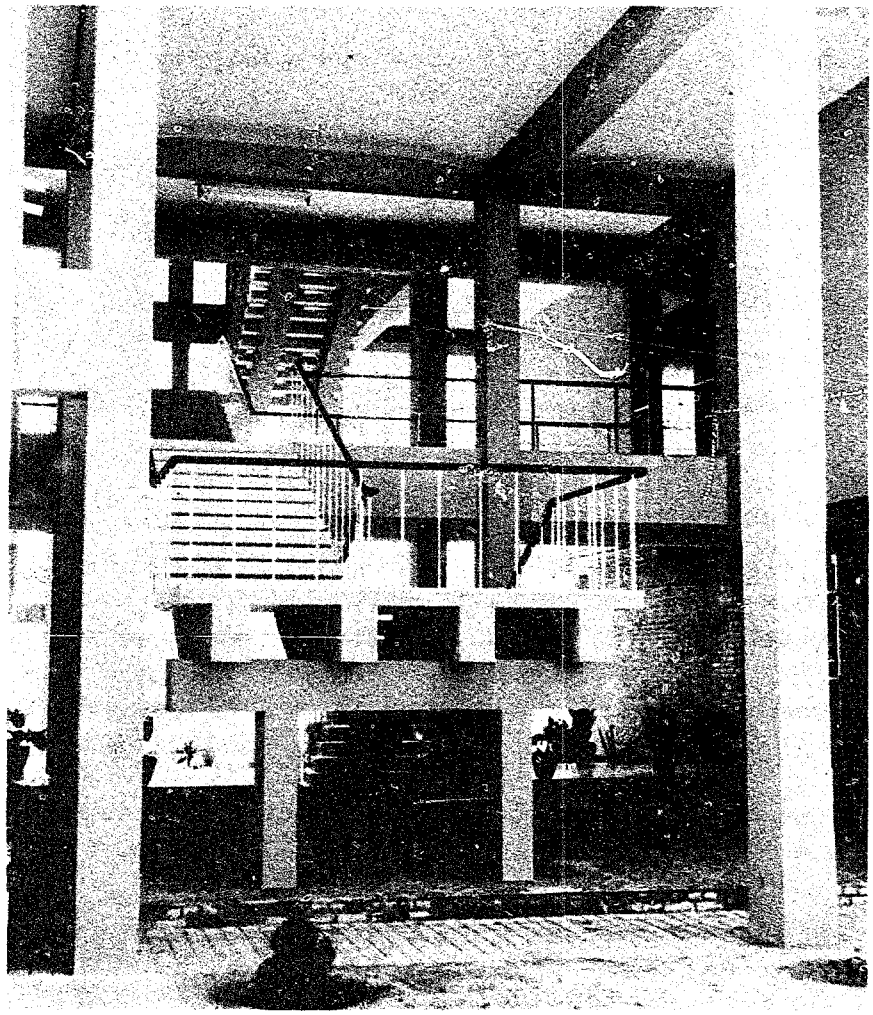
The thirteen-man Board of Governors has eight new members and a new Chairman as of early 1972. It has already made a strong impact on the Institute through the settlement of the strike. It has held one meeting so far. It has already shown that it wants to take an active interest in the development of IIT/K. One of the new members asked for and obtained an open meeting with the faculty, attended by other Board members, to discuss under what constraints IIT/K had been operating in the past and how they could be removed. Two of the new members are also members of the National Committee on Science and Technology (NCST) which was created by the Prime Minister during the past year as a national body to work in close association with the Planning Commission. The function of the NCST is to further the industrial and scientific development of India. Another member of the NCST is a faculty member at IIT/K, so three of this important council of ten have strong associations with IIT/K. This should facilitate the aim of the Institute of play a leading role in the technological and scientific development of India.

With the encouragement of the Chairman of the Board of Governors, the Director is resubmitting the Institute's building program to the Ministry of Education. Completion of the program has been delayed for about three years for lack of funds. The request is for 14.5 million rupees for an assembly hall, gymnasium, and sports center, swimming pool, laboratories, class-rooms, administration building and additional housing. This represents a 20% expension, measured in expenditures. This budget will be reviewed during the summer of 1972 by the Finance Committee of the Board of Governors. The fate of this proposal will be some indication of what the future holds for IIT/K.

The Board, in day-long meetings with itself, the faculty, and with department heads urged faculty members to generate ideas and propose projects, which they consider important, to whatever agency of the Government seems appropriate. If these are turned down the Board further urged the faculty to submit its proposals to the Board and pledged itself to actively seek support for worthwhile ideas. One member of the Board had some specific suggestions of ways in which IIT/K could aid in the national development: It could initiate a training program for master craftsmen expert enough to be well-paid. These are very scarce in India. IIT/K could sponsor a consulting group of young engineering graduates, who would gain experience for a couple of years in solving industrial problems under the guidance of faculty members and who in some cases would go on to become entrepreneurs. It could rethink promotions criteria, in particular the relative weight to be given to contributions to Indian industry versus publications. These are mentioned to show the kind of thinking and interest in the new Board.

As might be expected, there was some grumbling amongst the faculty about outsiders (non-academic ones at that) coming in and making suggestions about the development of IIT/K. However, there

are times in the history of every society when war (teaching and research) is too important to be left to the generals (professors). I believe that the faculty of IIT/K is open-minded and objective enough to consider the suggestions on their merit and to judge them in the same way. Not all will turn out to be possible or practical, but some will. I believe that if the new Board involves itself in the affairs of the Institute and does it with reasonable tact, it could be a real asset to IIT/K. Its interest in broad and important aspects of the activities and development of IIT/K in the context of the national drive for self-sufficiency could be a positive help to the Institute in achieving its present goals and in formulating and achieving new goals in the coming years.



BRIEF DECENTENARY RETROSPECT

An attempt will be made in this section to describe briefly certain facets of IIT/K which were not covered in earlier chapters of this report.

Students

Through the common Entrance Examination for the five IIT's the students are highly screened. The successful fraction is 1/10th or 1/20th of all those who apply. The process is a selection on merit with no favoritism. Thus the undergraduate student body is of very high quality. Experience with those IIT/K graduates who continue in post-graduate work in the USA has been that they compare favorably with the products of the best American institutions. The impression among the faculty at IIT/K is that the post-graduate students are not of the intellectual standards of the undergraduates. Presumably, this is because the cream of the graduates of Indian institutions still prefer, when possible, to go abroad for further studies.

In connection with the often-discussed brain-drain of highly trained people from India, the following summary of the placement of IIT/K graduates is of interest:

	Higher Education		Employment		
	India	Abroad	India	Abroad	Not Known
B.Tech. (840 students)	15%	26%	48%	5%	6%
M.Tech.,M.Sc. and Ph.D. (576 students)	15%	17%	60%	2%	6%

The percentages were calculated from the most recent available figures given in the 11th Annual Report, 1970-71. They summarize the information on all graduates since the inception of IIT/K.

The figures do not support the notion that there is a serious brain-drain since only 5% of the B.Techs. and 2% of the higher degree graduates are employed abroad. The notion is still not supported even if one conservatively adds all of the 6% in each case whose status is not known. However it is premature to draw the conclusion that there is not a significant brain-drain because one does not yet know the eventual employment status of the 42% of B.Tech. students and 32% of higher degree students who are still pursuing further education, especially the 20% or so abroad. Furthermore, even though the fraction employed abroad be small, it probably contains the best students.

Not contained in the above table, but given in the figures of the 11th Annual Report, is the interesting fact that of 111 Ph.Ds. produced so far, none are employed abroad. This argues on the side of small brain-drain.

Faculty

The chief characteristics of the IIT/K faculty are youth and ability. It has been policy since the beginning to recruit young people. Another helpful policy has been not to require the customary interviews for recruits from abroad. This was a break with long-standing Indian tradition, pioneered by IIT/K, and now beginning to come into practice at other Indian institutions as well. Still another policy of several years standing has been subsidization of the travel expenses for a new faculty member, his family and a certain amount of household goods from his location abroad to India. This effort on behalf of reverse brain-drain has certainly helped IIT/K to acquire top-quality faculty. After some initial seed money from The Ford Foundation, these expenses have been provided by KIAP. For the future the Institute is proposing in its next budget, funds to continue the practice.

The youth of the faculty while contributing undoubted vigor and creativity has also brought problems. One of these is that

the members of the faculty are still primarily interested in their professional careers and have not in general made themselves available for administrative positions. Another problem is difficulty with promotions. Since there is not a steady-state distribution of age amongst the faculty, there is not the normal rate of retirement which would make promotions available to younger members. In fact, there have not yet been any retirements and few are in sight for several years.

Besides vigor and creativity, there is another, even less tangible, characteristic which is probably due at least in part to the faculty's youth. This is a sort of egalitarianism, a democratic attitude, of faculty members toward one another. This has been communicated inevitably and unconsciously also to the students. The result is that youngest faculty members freely discuss and even argue with older faculty members as do the students with all faculty members. There are doubtless other reasons for the existence of this attitude at IIT/K to a far greater extent than at the other IIT's and certainly at other Indian universities. One may be the established policy at IIT/K of rotating department heads. The normal term of the department heads is three years after which another individual takes over. This is by no means the practice in Indian institutions. Another reason may be that, contrary to Indian custom, IIT/K, as a matter of policy, has not taken its own Ph.D. students onto the faculty. This not only provides the maximum variety of point of view and approach in an institution, which is its main purpose, it also has the useful consequence of not continuing the inequality of the professor-student relationship into a faculty relationship. Perhaps a further reason for the free and easy attitude is that 40% of the faculty received post-graduate and/or post-Ph.D. training in the West, most of them in the USA. Possibly the presence for extended periods, during the last 10 years, of 120 visiting American families with their attitudes of informality has also played a role.

Whatever the reasons, the atmosphere certainly exists and makes IIT/K unique. It is one of the reasons most frequently cited by faculty for preferring this institution to any other in India.

Support Staff

The Institute and the Program became increasingly aware during the past ten years that one phase of the Institute operations which needed much more attention than it had received was the area of technical and administrative support staff. Although the Program made strenuous efforts beginning about five years ago by bringing over expert consultants in this area, much remains to be achieved.

The number of skilled technicians is too few. The Institute has difficulty in correcting this imbalance because of budget limitations, especially in the most recent years. The quality of the present technicians is not all that could be desired, partly because there is a general scarcity of this kind of person in India, and partly because the Institute's pay scale does not provide effective competition with industry for these people. From hindsight it would have made sense at the beginning to establish training programs, for example in electronics and instrumentation. Most of the graduates would have left and gone out into local or more distant industry which in itself would have been a national gain. But probably a few could have been induced to remain at IIT/K for at least a few years. This would have provided a continuous input of skilled technicians. This idea was considered seriously by the Institute during the past year but too late for the Program to help. It may yet be put into effect by the Institute.

The unskilled support staff was allowed by the previous administration to grow much larger than necessary. Many employees were in a temporary classification even though they had been employed at the Institute for several years. Their discontent exploded into the strikes faced by the present Director during the past year.

They were made permanent employees, so these grievances have been removed. There is however a continuing lack of efficiency, due mainly to poor supervision. This statement can be made with assurance because there are enough instances in which the supervision is good and the support staff works well.

In some of the IIT/K offices the efficiency of the office staff is abysmal. This can also be blamed on inadequate to non-existent supervision because here again there are definite examples of individuals performing with very low efficiency in one office, being transferred to another with good supervision, and then performing quite satisfactorily.

Equipment

The total of over 7 million dollars worth of teaching and research equipment provided by the Program is on the whole being well used and fairly well maintained. Sufficient facilities for its upkeep and repair were not provided as early as could have been done. In the first five lush years of the Program equipment purchases ran at the rate of well over 1 million dollars per year. There were many growing pains and problems to cope with, and equipment maintainence no doubt seemed of lower priority. In the last five years, when the average acquisition rate was 1/10th of the former, the need became apparent and maintenance facilities were enlarged. Much still remains to be done and the lack of skilled technicians is part of the problem.

In retrospect, it would have been better to even out to some extent the rate of spending for equipment. Ninety percent of the equipment purchases were made during the first five years of the Program. However only 50% of the present faculty had joined in the first five years (128 out of 260). So the first 50% of the faculty had at their disposal 90% of the equipment money while the second 50% had only 10% of the equipment money. It is certainly a fact that many able ambitious young faculty recruited during the

last five years have not been able to assemble equipment for the experiments they would like to do. The ratio of nine to one in equipment purchased in the first and second halves of the Program probably contributed to neglect of maintenance as mentioned above. It also appreciably decreased the influence of the visiting American staff since they had little more to approve in the way of expenditures. It is not suggested that equal amounts of money should have been made available each year. That would obviously have been impractical given the delivery times of many months that often prevail. However it is suggested that the ratio of nine to one was too large.

It was early made a policy not to buy equipment unless it was desired by an existing member of the IIT/K faculty. This wise decision was largely adhered to. It is doubtless one reason why the equipment, by and large has been well used. Certain large pieces of equipment were incorporated into "Central Facilities". This concept was good in principle but has not always worked out as intended. In most cases, the person in charge of a Central Facility was an early arrival and is now in a senior position and the primary user of the equipment. Younger recent faculty arrivals often find it difficult to gain access to the equipment. It also is generally believed but is not easy to substantiate that there is a certain amount of hoarding of equipment. This grew out of a natural and even far-sighted attitude on the part of the people who ordered equipment during the early years in sufficient quantity to last them for a considerable time in the future. However, in the interest of the Institute, it would be better if this equipment had a less personal and more general availability. The Institute is aware of this difficult problem and is considering how to cope with it.

Part of the trouble of equipment maintenance is due to the fact that a good fraction of the engineering faculty is theoretical as opposed to experimental; four years ago, it was 50%. Theoretically-

minded faculty is neither willing nor able to teach experimental attitudes and techniques. It is not interested in using or maintaining equipment. There are indications that the experimentally-inclined fraction of the faculty has been increased. There are additional very recent signs that pressure from the Government and the public for India's Institutes of Technology to make greater contributions to the country's industrial development are having the effect of already turning some faculty from theoretical to experimental pursuits. As more and more faculty use equipment, there will be more and more insistence that it be properly maintained.

One of the wise early decisions of the Program was that the visiting American staff not be in positions of Institute authority. They were faculty and staff members and in that sense full participants but all 120 of them including Program Leaders had only an advisory status. Of course, they were not without influence. It accrued to them in varying degrees through their personal and professional stature as well as their control over equipment purchases. One important consequence of the advisory status of all Program members is that the phase-out of the Program has caused no administrative difficulties for the Institute. IIT/K has been wrestling with its administrative problems all along. It has a working system which it is continually trying to improve. A recent important step in this direction was described earlier - the recommendations of the Administrative Review Committee. Because of the early decision that the Americans be only advisors the transition of the Institute through the end of the Program is smooth.

Reaching Out

There has been a surprising amount of energy devoted by IIT/K to services for education and industry considering how young the institution is. Twelve years ago it started from scratch and ten years ago, at the beginning of the Program, it was still very small.

Since then, almost 150 short courses and conferences have been organized and held for persons at other educational institutions, in public and private industry, in technical branches of the Government and for a few National Talent Scholars. These courses have ranged in length from a few days in the cases of some conferences and symposia to a month or more for some of the short courses. The average length was perhaps two weeks. The following table shows year by year the number of courses devoted to the improvement of teaching, instruction in computer programming, training in specialized branches of engineering and science, and conferences and symposia.

NUMBER OF SHORT COURSES OFFERED TO NON-IIT/K PARTICIPANTS

	Courses for the Improvement of Education	Courses on Computer Programming	Specialized Intensive Courses	Conferences and Symposia	Totals	Number of Faculty Engaged in Summer Consulting
1960-61						
1961-62						
1962-63						
1963-64		4	1		5	
1964-65		2	1		3	
1965-66		2	2	2	6	
1966-67		2	2	6	10	7
1967-68	1	1	1	2	5	11
1968-69	11	3	5	2	21	14
1969-70	10	4	8	5	27	17
1970-71	9	2	15	10	36	11
1971-72	13	3	15	4	35	15
					148	

Courses in computer programming were initiated in 1963 soon after installation of the first computer, and have continued ever since at the rate of two or three per year. Short courses on special engineering topics were begun at about the same time and have been offered in greatly increased numbers in the last four years. Also in the last four years appreciable numbers of courses for teachers at other educational institutions have been provided. During the last two years the total of all such outside service courses has been about 35 per year. The Program has contributed 60 visiting experts whose participation in these short courses got the effort off to a good start and gave it momentum.

The last column in the above table gives the number of faculty engaged each year in industrial employment for two summer months. This desirable link between IIT/K faculty and industry has involved altogether during its six years of existence a total of 45 faculty members and 20 or 25 corporations. There have been many repeats for both faculty and corporations. The Program has various beneficial side effects: Many of the industrial problems on which the faculty has worked have been included in the academic curriculum as course problems or projects. In some cases, the contact has resulted in a research grant by the corporation. In a few cases it has resulted in the faculty member being hired by the corporation! Even this is desirable from the national point of view and tolerable for IIT/K as long as the numbers remain as small as they have been so far. The custom of academic faculty consulting in industry and of industry seeking help from faculty is fairly new in India. In the past, most engineering faculty members have been too far removed from engineering practice to be of use to industry. It has been IIT/K's policy to develop this program slowly and carefully. Without the exercise of a good deal of care and caution in matching the faculty member and the job, there is real danger of a misfit. This could have serious consequences for the future of the consulting program if it occurs during the early years when the program's

reputation is being established. This table does not include the considerable amount of consulting carried out during the academic year by many members of the faculty.

Another measure of the contribution of an educational institution to the society around it, is its activity in authoring books. Altogether, since the beginning, IIT/K faculty members have written 40 textbooks. This is a considerable accomplishment for a faculty which was very small 10 years ago and has gradually grown since then to 260. During much of this period, there were extra demands on the energy and time of the faculty in creating courses, curricula, and research programs where none had existed before.

Many other aspects of IIT/K could be discussed. The computer and its use has been a great success story. All IIT/K students learn how to program. The computer facility which includes an IBM 7044, 1620, 1401, and 1800 is in use 24 hours a day. It has become an essential component in the work of the faculty and students. The Library is well stocked with 180,000 bound volumes and well housed in its own building. While its operations of cataloging, shelving, etc. often leave something to be desired, the general picture is satisfactory. Research is supported partly by Institute funds and to an increasing extent by outside agencies both public and private. As the Program ends there are 120 research grants in effect (not including the large Defense Contract) totalling Rs. 2.5 million. This figure is several times larger than for any other IIT. These grants have terms ranging from one to three years; the annual budget from these sources is Rs. 1.1 million. This may be compared with the normal operating budget of the Institute of Rs. 21 million.

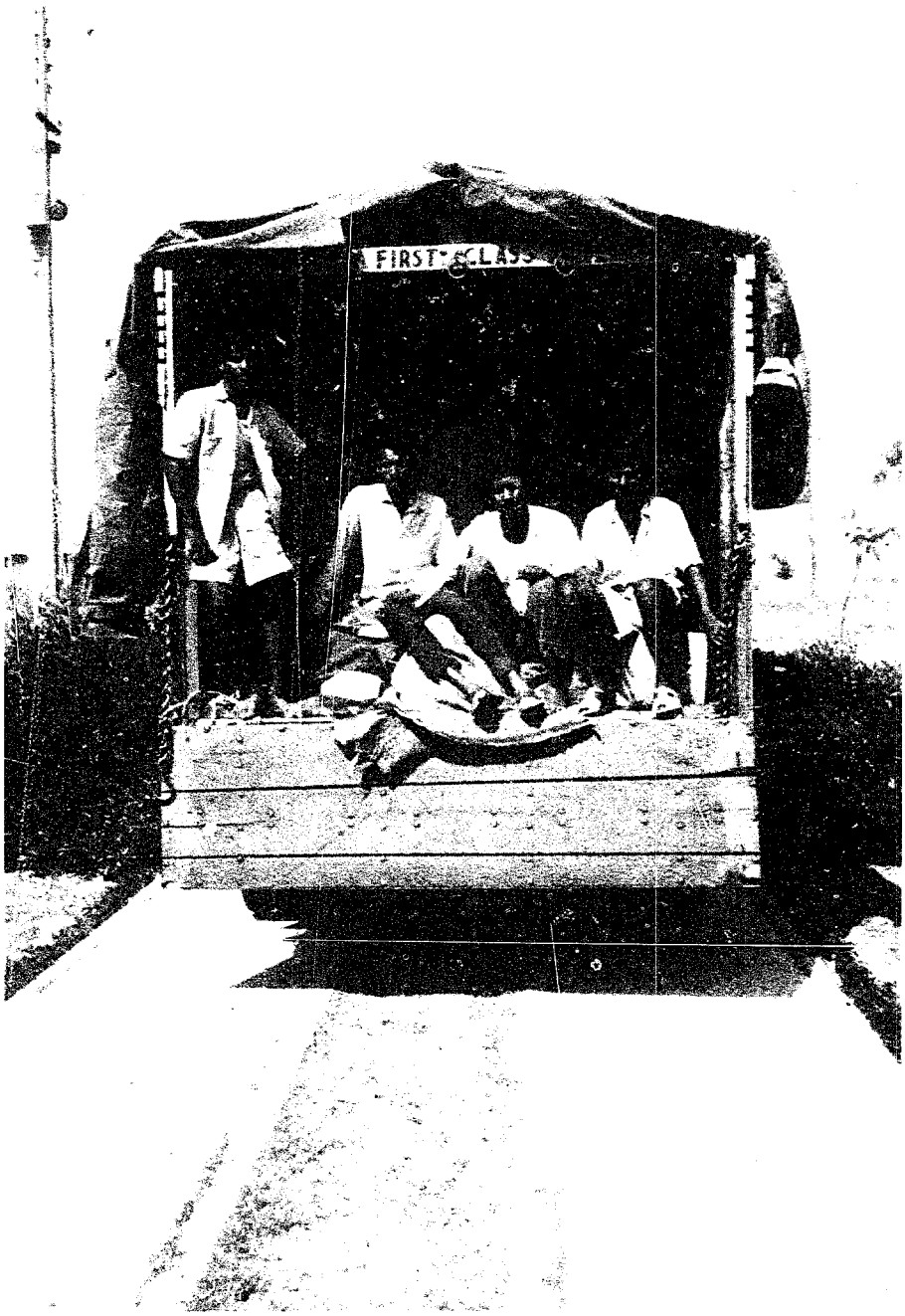
IIT/K has come a long way in 10 or 12 years. It is by general off-campus agreement the best of the five IIT's.

There is little doubt that India has embarked on a new phase of development. There is a widespread desire, articulated vigorously by the Prime Minister and other Government leaders that the country attain self-sufficiency. Men, institutions and resources are being marshalled for a strong effort to create a rising standard of living. This attitude was triggered by the December War, with the subsequent breakdown of good relations between the U.S. and India and the cutoff of American aid. The reduction of aid is a serious matter, but India realizes that if it had not been so dependent on foreign aid the reduction would not have been so serious. The efficient job done by the armed forces during the December War was a demonstration that something important can be accomplished by the nation on its own. The realization that this was possible has given confidence that other problems can also be solved without outside help. The Government loses no opportunity to urge the nation to turn now to the economic front and solve the problem of poverty.

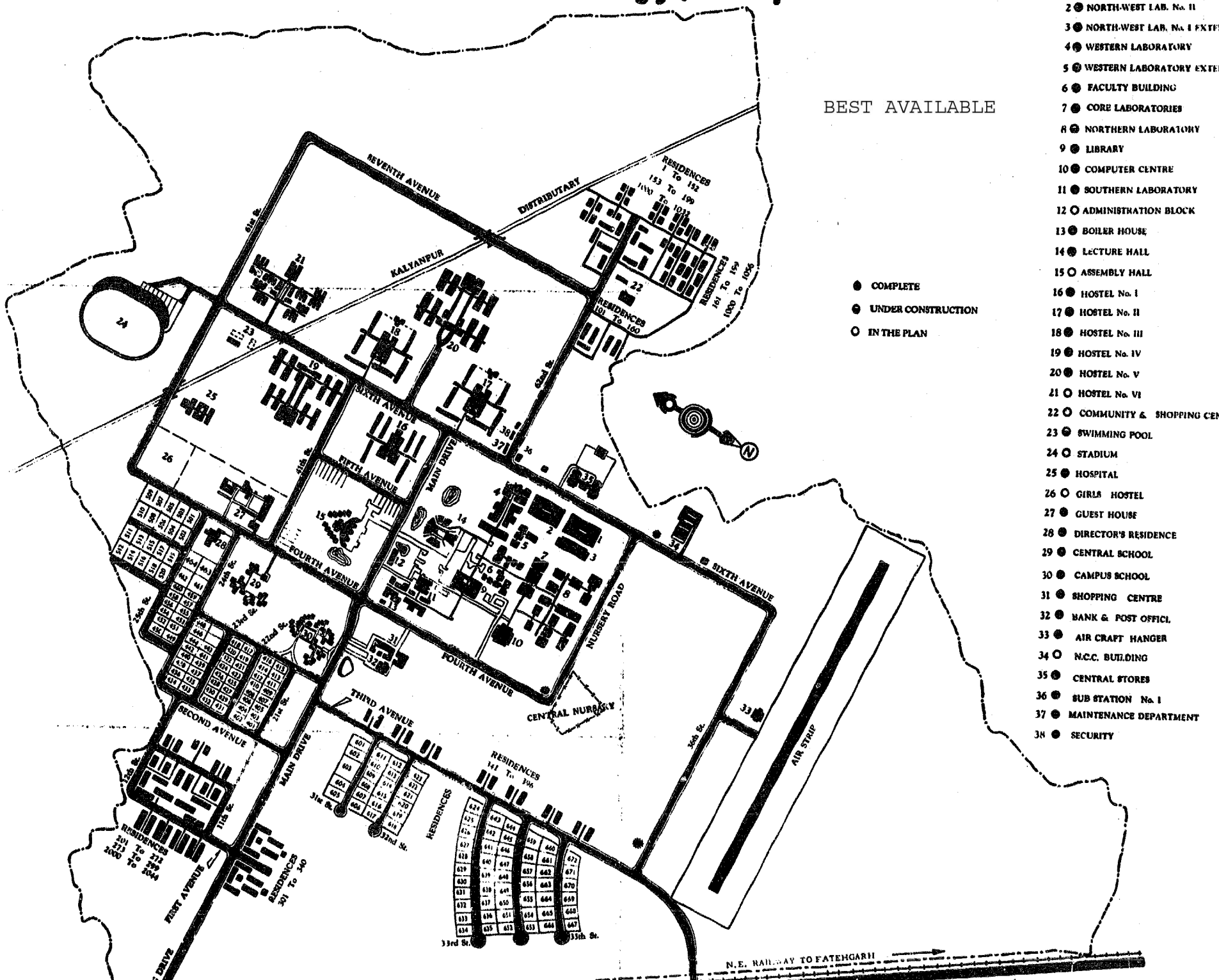
IIT/K has attained adequate maturity at just the right time to share significantly in this effort. It has built well over the past 10 or 12 years. The faculty is of high quality. The students are of high quality. The performance of the supporting staff is not of high quality, but a beginning has been made to remove its dissatisfactions and enlist its fuller cooperation. The teaching is good - often very good - receiving continued attention: The core program (the first three undergraduate years) was thoroughly reviewed and revised in 1971. Research programs in most areas are well under way. Industrial consulting is established and increasing.

Additional U.S. aid to maintain contact with centers of progress in engineering and science in the Western world, until India's foreign exchange problem is solved, would be helpful.

However, with further aid or without it, the Institute is indeed poised to contribute importantly to India's industrial increase and, in the process, to its own growth.



campus plan of
indian institute of technology, kanpur.



BEST AVAILABLE

APPENDIX A

THE CONTRACTS

Preliminary Contract - (ICAc-2188) August 1961 - February 1962

The purposes of this Contract were:

a) To support the organization of a Steering Committee composed of one representative of each Consortium Institution.

b) To hold such meetings of this Committee in the United States and in India as might be necessary for entering into a definitive contract and supporting agreements for providing technical advice and assistance to the Government of India in the development of IIT/Kanpur.

Contract-supported activities in the U.S. included continuing negotiations with AID, organizational meetings of Steering Committee, and Joint Conferences with Indian and U.S. officials, before and after they visited Consortium Institutions (September-October). In November, there were conferences in India involving a seven-man team from Steering Committee and EDC staff, GOI and USAID authorities, university officials and others. (Indian technological education studied, Work Plan developed in cooperation with USAID Mission, working relationships with IIT/Kanpur clarified, material collected for Kanpur Post Report, etc.). Back in the U.S., continuing negotiations with AID resulted in the definitive contract (February 1962) and agreement with AID on the operational plan that had been worked out previously in India.

Excerpts from the Contract, signed 21 February 1962, and the twenty-one Amendments thereto:

"This Contract is made and entered into between the United States of America, as represented by the Agency for International Development (AID), and Education Development Center, Inc., a non-profit corporation, with its principal office located at 55 Chapel Street, Newton, Massachusetts (USA).

Whereas, the Contractor, as the prime contractor for a Consortium, is willing and able to render technical advice and assistance requested by the Government of India....

....Now, THEREFORE, the Contractor agrees to use its best efforts to render technical advice and assistance... in the development of the Indian Institute of Technology, Kanpur, India....

....It is understood that the services provided in India are an integral part of the United States foreign assistance program...that the Contractor will be responsible for all professional and technical details of the project...and that within budgetary limitations the Contractor will be reimbursed for costs incurred in accordance with the applicable provisions of the Contract...."

THE CONSORTIUM consists of the following institutions:

California Institute of Technology

Carnegie-Mellon University

Case Western Reserve University

Education Development Center, Inc.

Massachusetts Institute of Technology

The Ohio State University

Princeton University

Purdue University

University of California

The University of Michigan

"....The purpose of this project is to collaborate with the Government of India in the development of IIT/Kanpur. The IIT is one of four such institutions in four geographical regions of India, and the latest of them to be established. It is intended to serve India as a center for the education of engineers and scientists, for the production of teaching

staffs for Indian engineering and technological institutions, and for research and extension....

SCOPE...The Contractor in cooperation with other Consortium members will collaborate with IIT....

to advise on curricula, on the development of research programs, on supporting services such as the library, on building requirements and selection of equipment;....

to procure equipment to be obtained outside of India;....

to assist in the selection of IIT faculty (Participants) for study in Consortium Institutions and...

to arrange for their training programs....and.... (the bucket)

to engage in such other activities as may be conducive towards a realization of the fundamental purpose of the project, and...."

From Amendment #2:

"....Such activities include, but are not limited to arranging for the transportation of scholars to India to join the IIT/K faculty.

....The U.S. field staff will be under the direction of the Program Leader, who will serve as a Staff Consultant to the Director of IIT/K. The Program Leader will coordinate the activities of the field staff with those of the faculty of IIT/K in a manner consistent with the policies established by the Consortium Steering Committee and IIT/K.

....It is understood that the Government of India has agreed to provide without charge to the Contractor, office space, furnishings and supplies, stenographic services; communication services such as postage, telegraph, cable and telephone....Basic operating facilities necessary to carry out the job; within India, and....It is understood that USAID without charge to the Contract will provide U.S. field staff with household furnishings, transportation, and commissary and other privileges to the same extent and subject to the same rules as are applicable to USAID direct hire personnel."

Reimbursement for Costs:

"....It is understood that the Government of India shall make a contribution to a USAID-maintained (trust) fund to cover certain local costs of U.S. field staff, such as local travel costs and that U.S.-owned Indian rupees will be used for allowances, international transportation and allowable local costs in India, including the salaries of personnel locally employed."

In the ten-year history of the Program, the most significant Contract provisions that were made subsequently had to do with IIT/K faculty. One such provision was for training IIT/K faculty for higher degrees. The principal beneficiaries of this provision were promising young faculty who had not yet earned doctorates. Another provision - achieved only after inter-governmental negotiations - was for travel of prospective IIT/K faculty (and their families) from their places of residence abroad to India.

As of June 1972, thirteen and one-half millions of USAID dollars, had been disbursed by EDC under the Contract. Of this sum, seven and one-half million dollars were for laboratory equipment with the balance for Technical Services (Salaries and related costs) and Participant training in Consortium Institutions.

APPENDIX B

U.S. STAFF

Between March 1962, and June 1972, 122 different members of the U.S. KIAP (field) Staff served for a total of 2266 man months in India.

The original (Academic Year 1962-63) KIAP Staff began operating in March 1962, with the arrival in Kanpur of N.C. Dahl (MIT) as Program Leader, and, during the next few months, of J.E. Vielehr (EDC) as Administrative Officer and Professors Richard Zimmerman (ME-Ohio State); D.A. Davenport (Chemistry-Purdue); Chavarria-Aguilar (English/Linguistics-Michigan); G.R. Meluch (Library-Purdue); M.J. Kaldjian (CE-Michigan); A. Gill (EE UC-Berkeley); T.B. Kohman (Chemistry-Carnegie).

In December 1965, during the two-year tour of R.S. Green (Ohio State) as Program Leader, the field staff reached its numerical peak - 28 plus their families. By December 1967, the level had been reduced to 24. In December 1969, the level was 19 U.S. Staff. In December 1971, the level was 8 U.S. long-term Staff, supplemented by Short-term visitors. All U.S. Staff were scheduled to leave IIT/Kanpur before Contract termination on June 30, 1972.

Between June 1961 and June 1972, the Consortium Committee (originally the Steering Committee) held 38 scheduled meetings (34 were held at Consortium Institutions and 4 in Washington, D.C.).

Steering Committee Members represented the Presidents of their respective Consortium Institutions, with responsibility for all Program activities on their campuses. As a Committee, they were responsible for policy, recruitment of U.S. Staff, and placement of Indian Participants.

During most of the period of the Contract, the U.S. Staff at EDC consisted of a Program Administrator, an Administrative Assistant, a Participant Coordinator, and a Purchasing Agent (40% to 60% of their time) as well as support personnel - 2 secretaries, 2 typists, a shipping clerk, as needed.

ACTON, Forman S., Associate Professor
Department of Electrical Engineering
Princeton University
Princeton, New Jersey 08540

Service at IIT/Kanpur: 7/63 - 7/64 IBM 1620 Computer
8/67 - 12/67 and EE

ALO, Richard Anthony, Associate Professor
Department of Mathematics
Carnegie-Mellon University
Schenley Park
Pittsburgh, Pennsylvania 15213

Service at IIT/Kanpur: 9/69 - 9/70 Math

ALVARADO, Alfonso Miguel
Research Administrator
Patent Advisor, Room 234
Hullihan Hall
University of Delaware
Newark, Delaware 19711

Dr. Alvarado represented Case Western Reserve University on The Steering Committee from 1965-68

ANDRES, Ronald Paul, Associate Professor
Department of Chemical Engineering
Princeton University
Princeton, New Jersey 08540

Service at IIT/Kanpur: 12/69 - 12/70 ChemE

ARCHER, Robert R., Professor
Civil Engineering Department
School of Engineering
University of Massachusetts
Amherst, Massachusetts 01003

Service at IIT/Kanpur: (Case Western Reserve) Between 12/64 and 6/66 Professor Archer worked at IIT/K with both the Civil Engineering Department and the Computer Center.

ASHLEY, Holt, Professor
Department of Aeronautics & Astronautics
Stanford University
Stanford, California 94305

Service at IIT/Kanpur: (MIT) 8/64 - 9/65 AeroE

ATTWOOD, Stephen S.
(Deceased)

Dean Attwood represented The University of Michigan on The Steering Committee from 1961 until his death in 1965.

BACON, John, Professor
The Ohio State University
Department of Electrical Engineering
2024 Neil Avenue
Columbus, Ohio 43210

Service at IIT/Kanpur: 7/67 - 12/68 EE

BAKER, Lawrence M., Professor
Department of Psychology
Purdue University
Lafayette, Indiana 47907

Service at IIT/Kanpur: 12/66 - 6/68 HSS

BAKER, Sharitt E., Senior Lab Mechanician
Department of Mechanical Engineering
University of California, Berkeley
Berkeley, California 94720

Service at IIT/Kanpur: 6/67 - 7/68 ME

BATTAGLIA, Glenn J.
10 Windmill Drive
Sudbury, Massachusetts 01776

Service at IIT/Kanpur: ESI (EDC) 2/64 - 5/66 Admin. Officer

BENADE, Arthur H., Professor
Physics Department
Case Western Reserve University
University Circle
Cleveland, Ohio 44106

Service at IIT/Kanpur: 7/64 - 8/65 Physics
Professor Benade represented the Case Institute of Technology on The Steering Committee from 1961 - 1964.

BERDAHL, Martin C.
Manager Instrument Section
California Institute of Technology
Jet Propulsion Laboratory
Pasadena, California 91109

Service at IIT/Kanpur: 12/69 - 12/71 EE

BERG, Glen V., Professor and Chairman
Department of Civil Engineering
College of Engineering
The University of Michigan
Ann Arbor, Michigan 48104

Service at IIT/Kanpur: 8/67 - 8/69 CE

BERG, Margaret E., Catalogue Librarian
General Libraries
The University of Michigan
Ann Arbor, Michigan 48104

Service at IIT/Kanpur: 8/67 - 8/69 Library

BERGDOLT, Vollmar E., Professor
School of Mechanical Engineering
Purdue University
Lafayette, Indiana 47907

Service at IIT/Kanpur: 7/63 - 7/64 ME

BERGEN, Arthur R., Assoc. Professor
Department of Electrical Engineering
University of California, Berkeley
Berkeley, California 94720

Service at IIT/Kanpur: 7/63 - 11/64 EE

BILLINGTON, David P., Professor
Department of Civil and Geological Engineering
Princeton University
Princeton, New Jersey 08540

Professor Billington represented Princeton on The Steering Committee, 1964-65.

BOLZ, Harold A.
College of Engineering
The Ohio State University
2070 Neil Avenue
Columbus, Ohio 43210

Dean Bolz represented The Ohio State University on The Steering Committee for two years, 1964 - 1966.

BRANDT, Benjamin T., Section Manager
Fabrication Division
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California 91109

Service at IIT/Kanpur: 5/67 - 7/69 ME

BREEN, Leonard Z., Professor and Head
Department of Sociology
Purdue University
Lafayette, Indiana 47907

Service at IIT/Kanpur: 8/64 - 12/65 HSS

BROKAW, Josephine, (Ms.)
Ann Arbor Board of Education
1220 Wells Street
Ann Arbor, Michigan 48104

Service at IIT/Kanpur: Educational Consultant EDC
7/67 - 9/69 Campus Schools

BROOKS, Shepherd
EDC
55 Chapel Street
Newton, Massachusetts 02160

Program Administrator 1961 - 1972 Secy SteerComm
EDC 1968 - 1971 SteerComm Rep

BROWN, Wayne G., Professor
Mechanical Engineering Department
University of California, Berkeley
Berkeley, California 94720

Service at IIT/Kanpur: 7/64 - 12/65 ME (Design)

BROWN, Douglas J., Dean of Faculty (Ret)
6 Edgehill Road
Princeton, New Jersey 08540

Service at IIT/Kanpur: (Princeton) 2/68 - 3/68 Admin.

BUCHANAN, Harvey D., Professor of History and Head
Division of Special Interdisciplinary Studies
Case Western Reserve University
10900 Euclid Avenue
Cleveland, Ohio 44106

Professor Buchanan represented Case Western on The Consortium Committee, 1970 - 1972.

BURKS, Arthur W., Professor and Chairman
Department of Philosophy
2208 Angell Hall
The University of Michigan
Ann Arbor, Michigan 48104

Service at IIT/Kanpur: 6/65 - 1/67 HSS

CAIN, Robert L.
(Present address unknown)

Service at IIT/Kanpur: (Purdue) 2/66 - 8/67 Library

CARROUCHE, Richard L., Instrument Specialist
235 E. Holly Street
Pasadena, California 91109

Service at IIT/Kanpur: (California Institute of Technology)
7/64 - 7/65 EE

CARRUTH, William K.
EDC
55 Chapel Street
Newton, Massachusetts 02160

Service at EDC: 1966 - 1972 Participant Coordinator

CHAVARRIA-AGUILAR, O.L.
Dean of Liberal Arts & Sciences
City College
Convent Avenue at 138th Street
New York, New York 10031

Service at IIT/Kanpur: The University of Michigan
8/62 - 7/64 HSS
Following his two years at IIT, where he advised on the teaching of English as a second language, Professor Chavarria-Aguilar represented The University of Michigan on The Steering Committee, 1965 - 1967.

CHENEA, Paul F., Vice-President
Research Laboratories
General Motors Corporation
Warren, Michigan 48090

From 1961 - 1966, Dr. Chenea represented Purdue on The Steering Committee. He served as Chairman of the Committee from 1962 - 1966. He left Purdue (where he was Vice-President for Academic Affairs) to join General Motors.

CHISHOLM, Jane E., (Ms.)
EDC
55 Chapel Street
Newton, Massachusetts 02160

Service at EDC: 1964 - 1972 Administrative Assistant

CLARK, Samuel D., (M.D.), Associate Director
Medical Department
Massachusetts Institute of Technology
77 Massachusetts Avenue
Cambridge, Massachusetts 02139

Service at IIT/Kanpur: (MIT) 1/67 - 12/68 IIT/K Health Service

DAHL, Norman C.
The Ford Foundation
320 East 43rd Street
New York City, New York 10017

Service at IIT/Kanpur: (MIT) 1961 - 1962 Chrmn SteerComm
3/62 - 6/64 ProgLdr
1965 - 1968 SteerComm Rep

Professor Dahl served as Chairman of The Steering Committee from day one until his departure for India in March 1962 on a two year appointment as the first Program Leader. Subsequently, he served as MIT's representative on The Steering Committee. From 1968 to 1971 he was in India with The Ford Foundation.

DAVENPORT, Derek A., Professor
Department of Chemistry
Purdue University
Lafayette, Indiana 47907

Service at IIT/Kanpur: 8/62 - 8/63 Chem
1/70 - 6/71
Service with Steering Committee 1963 - 1966

DERGE, Gerhard J., Professor
Department of Metallurgy and Materials Science
Carnegie-Mellon University
Schenley Park
Pittsburgh, Pennsylvania 15213

Service at IIT/Kanpur: 10/62 - 6/63 MetE
9/70 - 10/70

DRAKE, Robert S., Jr., Dean
College of Engineering
University of Kentucky
Lexington, Kentucky 40506

Professor Drake was Princeton's first Representative on The Steering Committee and was a member of the Sub-Committee that visited the IIT's in November 1961.

DRYDEN, Charles E.
(Deceased)

Service at IIT/Kanpur: (The Ohio State University)
7/63 - 7/65 ChemE
Professor Dryden's "Outlines of Chemical Technology" (1st edition 1964) was first prepared to meet the need of students in his course at IIT/Kanpur for a text that relates the industrial chemical processes to the emerging industries in India. Revised from time to time, it is now the all India standard text for interested faculty and students.

DUMPEL, Frits
25 Dorann Avenue
Princeton, New Jersey 08540

Service at IIT/Kanpur: 7/70 - 6/72 Data-Processing (Administrative) Princeton

DUNN, Oliver C.
Associate Director
Purdue University Libraries
Lafayette, Indiana 47907

Dr. Dunn, in addition to setting up and administering the IIT/K-Purdue Library Collaboration Project, served at IIT/Kanpur for four "Short Term" tours as Library Advisor as follows: 7/62 - 8/62
4/64 - 5/64
2/66 - 3/66
9/68 - 12/68

ELLIOT, Charles E., III
Assistant Professor
South Asia Program
Cornell University
Ithaca, New York 14850

Service at IIT/Kanpur: 10/64 - 8/66 HSS (English)
C.E. Elliott, visiting Instructor in Linquistics, (The University of Michigan) helped produce new linquistic materials for teaching English at IIT/K and worked on the use of the Language Laboratory for teaching of first year English.

ERICKSON, Alve J.
100 Memorial Drive
Apt. 52-C
Cambridge, Massachusetts 02139

Service at IIT/Kanpur: (Asst. Professor, MIT)
3/63 - 1/66 ME

FAY, Peter W.
Professor of History
California Institute of Technology
Pasadena, California 91109

Service at IIT/Kanpur: 8/64 - 6/66 HSS

FONTAINE, William E., Distinguished Professor
School of Mechanical Engineering
Purdue University
Lafayette, Indiana 47907

Service at IIT/Kanpur: Short Term tour at IIT/K as Air-Conditioning Consultant 11/64 - 12/64

FONTANA, Mars G., Professor and Chairman
Department of Metallurgical Engineering
The Ohio State University
116 West 19th Avenue
Columbus, Ohio 43210

Tour at IIT/Kanpur: 2/72 MetE

FOX, John G., Professor of Physics
Carnegie-Mellon University
Schenley Park
Pittsburgh, Pennsylvania 15213

Service at IIT/Kanpur: Two tours:
From 6/67 to 1/69 and 1/71 - 6/71 with Physics Department continuing through 6/72 as Program Leader.

FRANKLIN, Stanley P., Associate Professor of Mathematics
Carnegie-Mellon University
Schenley Park
Pittsburgh, Pennsylvania 15213

Service at IIT/Kanpur: 7/67 - 6/69 Math

FUNKHOUSER, Richard L.
Engineering Librarian
Civil Engineering Building
Purdue University Libraries
Lafayette, Indiana 47907

Service at IIT/Kanpur: 4/64 - 4/66 Library

GILL, Arthur, Professor
Department of Electrical Engineering
University of California, Berkeley
Berkeley, California 94720

Service at IIT/Kanpur: 9/62 - 9/63 EE

GOODENOUGH, John B.
Leader Electronic Materials Group
MIT Lincoln Laboratory C 126
244 Wood Street
Lexington, Massachusetts 02173

Tour at IIT/Kanpur: Dr. Goodenough spent five weeks lecturing and leading discussions in the Winter School in Solid State Chemistry (Nov. - Dec. 71)

GRAHAM, Donald H.
(Deceased)

Service at IIT/Kanpur: Graduate Research Assistant (MIT)
9/64 - 1/66 EE

On May 18, 1971 Professor H.K. Kesavan, former Chairman of the E.E. Department, IIT/Kanpur wrote, "The news of Don Graham's death has caused immense grief to all of us who knew him at IIT/Kanpur... I want to convey the high esteem that IIT/Kanpur had about Don's services to the educational programme there, particularly when it was in its infant stage. In fact, Don had become a model graduate student, because of both his professional and personal qualities he left an indelible immpression on the IIT campus..."

GREEN, Robert S., Associate Dean
College of Engineering
The Ohio State University
2070 Neil Avenue
Columbus, Ohio 43210

Service at IIT/Kanpur: Dean Green represented Ohio State on The Steering Committee from its formation in 1961, until the Program terminated in June 1972 - with the notable exception of his two year tour in India, as Program Leader (7/64 - 8/66)

HALFMAN, Robert L., Professor and Deputy Head
Department of Aeronautics and Astronautics
Massachusetts Institute of Technology
77 Massachusetts Avenue
Cambridge, Massachusetts 02139

Service at IIT/Kanpur: From September 1962 until December 1963 served as a Regular Staff Member, and from July 1966 to August 1968 he served as Program Leader. From then until the end of the Program he was MIT's representative on The Steering Committee.

HANSON, Raymond J.
Senior Electronics Development Technician
Los Alamos Scientific Laboratory
University of California, Los Alamos
Los Alamos, New Mexico 87544

Associated with E.E. Department, (Electronics) at IIT/Kanpur, 7/67 - 1/69. (also see: Dwight L. Stephenson)

HARRISON, Royal G.
Senior Engineer, Instrumentation
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California 91103

Service at IIT/Kanpur: 11/70 - 6/72
Advised on operations, maintenance and instrument development in nuclear electronics and other areas.

HAYNER, Gene E.
Engineering Experiment Station
The Ohio State University
Columbus, Ohio 43210

Between February and June 1965, Mr. Hayner assisted in the development of a duplicating facility at IIT/Kanpur.

HAZEN, David C., Professor
Sayre Hall, Forrestal Campus
Princeton University
Princeton, New Jersey 05840

Service at IIT/Kanpur: 1963 - 1965 SteerComm Rep
9/64 - 9/65 AeroEngr
12/66 - 2/67 " "

Professor Hazen assisted in the development of the Department of Aeronautical Engineering, and from then on maintained a lively interest in that Department and IIT/K as a whole. With the exception of his tours in India, he represented Princeton on The Steering Committee continuously, from 1963 until the end of the Program in 1972.

HEALD, Morrell
Professor of History and Chairman
American Studies Program
Case Western Reserve University
University Circle
Cleveland, Ohio 44106

Service at IIT/Kanpur: 7/66 - 7/67 HSS (History)
Assisted in curriculum development and departmental organization.

HILL, Thomas M.
Professor of Management
Massachusetts Institute of Technology
77 Massachusetts Avenue
Cambridge, Massachusetts 02139

In August 1967 Professor Hill spent about two weeks at IIT/Kanpur to survey the desirability of instituting a Management Education Program at IIT/Kanpur.

HUDSON, Donald E.
Professor of Mechanical Engineering and
Applied Mechanics
California Institute of Technology
Pasadena, California 91109

Professor Hudson was CalTech's Representative on The Steering Committee from the preliminary phases of the Program in 1961 until 1965.

HUGG, Ernest B., Assistant Director
Physical Plant
California Institute of Technology
Pasadena, California 91109

Service at IIT/Kanpur: From 6/66 to 1/68 Mr. Hugg helped with facilities planning and the organization of maintenance operations.

HUNTZICKER, James J.
Research Fellow
Environmental Engineering Science
Keck Laboratories
California Institute of Technology
Pasadena, California 91109

Acting Assistant Professor of Physics, University of California, Berkeley with service at IIT/Kanpur for one year 1/71 - 1/72.

HUSKEY, Harry D.
Division of Natural Sciences
University of California, Santa Cruz
Santa Cruz, California 95060

Service at IIT/Kanpur: Professor UC-Berkeley 7/63 - 7/64
Professor UC-Santa Cruz 1/71 - 3/71

Professor Huskey played a leading role in helping to make the Computer Center at IIT/Kanpur outstanding in India - beginning with the introduction of the IBM 1620 Computer System in 1963.

HUTCHINSON, Francis W.
Department of Mechanical Engineering
University of California, Berkeley
Berkeley, California 94720

Service at IIT/Kanpur: In his two years (July 1966 - August 1968) with the Program, Professor Hutchinson was a strong emissary for IIT/Kanpur throughout technical India. Trend setting results included - top level symposia on environmental control, summer programs for employment of faculty in industry. Publication (with an IIT/K collaborator), "Refrigeration, Air Conditioning and Environmental Control in India."

HUTTENBACK, Robert A.
Professor of History, Dean of Students
California Institute of Technology
Pasadena, California 91109

Service at IIT/Kanpur: Assistant Professor California Institute of Technology 12/62 - 1/63 HSS (History)

JOHNSON, Gerald D.
165 Village Lane
Auburn, California 95603

Service at IIT/Kanpur: Systems Programmer, UC-San Francisco Computer Center 9/65 - 2/68

JOHNSON, Irma Y. (Ms.)
Science Librarian, Library
Massachusetts Institute of Technology
100 Memorial Drive
Cambridge, Massachusetts 02139

Service at IIT/Kanpur: MIT 8/68 - 8/70 Library
After her first year in India, Ms. Johnson reported that she had learned some of the clues which suggest change readiness or unreadiness and the importance of investing time accordingly. Before the end of her second year, the position of Librarian in relation to IIT/K faculty and administration had been strengthened, and the long open position of Librarian at IIT/K had been filled.

JOHNSON, Robert E.
EDC
55 Chapel Street
Newton, Massachusetts 02160

Service at EDC: Purchasing Agent 1962 - 1972
Accompanied IBM 1620 on Charter Flight to Kanpur - 1963.

JORDON, Angel G., Professor and Head
Department of Electrical Engineering
Carnegie-Mellon University
Schenley Park
Pittsburgh, Pennsylvania 15213

Professor Jordon gave a series of lectures and formal presentations in his month at IIT/K. 12/70 - 1/71 EE

KALDJIAN, Movses J.
Department of Engineering Mechanics
The University of Michigan
Ann Arbor, Michigan 48104

Service at IIT/Kanpur: Assistant Professor 9/62 - 9/64 CE

KEHOE, Ray
Associate Director
Bureau of School Services
The University of Michigan
Ann Arbor, Michigan 48104

Service at IIT/Kanpur: 1/66 - 7/67
Mr. Kehoe served as the first American advisor to the IIT/K Campus and Central Schools in 1966-67, and was appointed Superintendent of the Opportunity School, when it first opened its doors.

KELLEY, John L.
Professor of Mathematics
University of California, Berkeley
Berkeley, California 94720

Service at IIT/Kanpur: 8/64 - 12/65 Math

KERREBROCK, Jack L.
Professor of Aeronautics & Astronautics
Massachusetts Institute of Technology
77 Massachusetts Avenue
Cambridge, Massachusetts 02139

Service at IIT/Kanpur: 1/72 - 3/72 AeroEng

KHATCHATURIAN, Narbey
Department of Civil Engineering
University of Illinois at Urbana-Champaign
Urbana, Illinois 61801

Service at IIT/Kanpur: (Purdue) 9/69 - 7/70
Professor Khatchaturian's academic activities at IIT/K included work with graduate students, and committee work with both the Civil and Aeronautical Engineering Departments.

KICENIUK, Taras
Department of Mechanical Engineering
California Institute of Technology
Pasadena, California 91109

In his service at IIT/Kanpur 3/66 1/68 (ME - Graphics) Mr. Kiceniuk engaged in a wide range of activities including helping with design courses, soaring, and advising about instructional and research labs and shops.

KOHMAN, Truman P., Professor of Chemistry
Carnegie-Mellon University
Schenley Park
Pittsburgh, Pennsylvania 15213

Service at IIT/Kanpur: 12/62 - 12/63 Chem

LEACH, Ernest B., Associate Professor of Mathematics
Case Western Reserve University
Cleveland, Ohio 44106

Service at IIT/Kanpur: 7/63 - 7/64 Math

LEE, Robert M.
Chief Engineer
Department of Computer Science
University of Utah
Salt Lake City, Utah 84112

Service at IIT/Kanpur: (UC-Berkeley) 6/65 - 8/66
During his year with KIAP, Mr. Lee contributed his technical expertise in electronics to the Computer Center and a number of IIT/K laboratories.

LEHNERT, Rudolph P.
101 Adams Drive
Princeton, New Jersey 08540

Service at IIT/Kanpur: (Sr. Tech., Forrestal Research Center Princeton University) 6/65 - 8/65
Mr. Lehnert assisted in the installation of wind tunnels and other special equipment in the Aeronautical Engineering Department.

LEONARDS, Gerald A.
School of Civil Engineering
Purdue University
Lafayette, Indiana 47907

From 1966 - 1972 Professor Leonards was Purdue's representative on The Steering Committee.

MASON, Peter V.
Group Supervisor, Cryogenics Research
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California 91109

Service at IIT/Kanpur: (Asst. Professor, CalTech)
7/64 - 12/65 EE
Professor Mason worked with the Electrical Engineering Department and played a major role in the development of the IIT/K Low Temperature Laboratory.

MATHEWS, Jon
Downs Laboratory of Physics
California Institute of Technology
Pasadena, California 91109

Service at IIT/Kanpur: Professor Mathews was a member of the KIAP staff from 7/64 - 8/65, and between 2/69 and 6/72 he was CalTech's representative on The Steering Committee.

MAYER, Joseph E.
Department of Chemistry
University of California, San Diego
San Diego, California 92101

Service at IIT/Kanpur: 12/66 - 3/67 Chem
While at IIT/Kanpur, Professor Joseph Mayer gave a series of lectures on Statistical Mechanics.

MAYER, Maria Goeppert
(Deceased)

Service at IIT/Kanpur: (UC-San Diego)
In 1963 Dr. Maria Goeppert Mayer, a theoretical physicist, was awarded the Nobel Prize for her work on Nuclear Shell Structure. While at IIT/K (12/66 - 3/67) she lectured on nuclear physics - and with her husband, helped provide impressive assurance that IIT/Kanpur was developing international standards of scholarship.

McGAUHEY, Percy H., Professor (Emeritus)
Department of Hydraulic and Sanitary Engineering
University of California, Berkeley
Berkeley, California 94720

While in India, Professor McGauhey developed recommendations for an effective program of Sanitary Engineering education and research for IIT/Kanpur. 7/63 - 9/63

MELUCH, George R.
Purdue University Libraries
Purdue University
Lafayette, Indiana 47909

Service at IIT/Kanpur: Assoc. Professor Purdue
7/62 - 8/64 Library

MERRIAM, Marshall F., Assistant Director
Technology and Development Institute
East West Center
University of Hawaii
Honolulu, Hawaii 96822

Service at IIT/Kanpur: (UC-Berkeley) 9/67 - 10/69
In addition to teaching and research, Professor Merriam with four Indian co-authors wrote a lab text (Experiments in Materials Science) and engaged in an Equipment Survey, helped in Faculty Liaison with Industry; and conducted a Brain Drain Survey on Opinions and Background of Faculty and Senior Staff at IIT/Kanpur.

MONTENEGRO, David
1427 Quintero
Los Angeles, California 10026

Service at IIT/Kanpur: (EDC) 9/63 - 4/66
Worked with IIT/K faculty and technicians on the installation, development, and maintenance of electronics teaching laboratory and research equipment.

MOYER, Burton
Dean, College of Liberal Arts
University of Oregon
Eugene, Oregon 97403

Service at IIT/Kanpur: (UC-Berkeley) 7/65 - 8/66
After 28 years service in Berkeley, with the Physics Department and the Lawrence Radiation Laboratory, Dr. Moyer moved in 1971 to the University of Oregon to take up a different kind of academic responsibility. While in India he was associated with the post graduate committee of the IIT/K Physics Department and participated in negotiations with India's Atomic Energy Establishment for the installation of a Van De Graaff Accelerator at IIT/K to help the IIT become a major center for research in Nuclear Physics.

NICOLET, Marc-Aurele
Assoc. Professor of Electrical Engineering
California Institute of Technology
Pasadena, California 91109

CalTech 1965-68 Steering Committee Representative

NICHOLS, Gaylord E., Jr.
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California 91109

Between July 67 and June 1970, Mr. Nichols worked with IIT/Kanpur staff on the improvement of middle administration and support services.

OAKLEY, Gilbert, Jr.
EDC
55 Chapel Street
Newton, Massachusetts 02160

Service at IIT/Kanpur: Mr. Oakley represented EDC on The Steering Committee throughout the life of the Program, except for the period July 68 - June 71, when he served as Program Leader at IIT/Kanpur.

OLCOTT, John W.
Aeronautical Research Associates of Princeton
50 Washington Road
Princeton, New Jersey 18040

A flight research specialist, Mr. Olcott (Princeton) was associated with the Department of Aeronautical Engineering IIT/Kanpur, from November 64 - May 65, and again from October 66 - January 68.

PADGHAM, Walter H.
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California 91109

Service at IIT/Kanpur: 2/68 - 3/68
Mr. Padgham prepared a report on the "administrative side of the house" for consideration by the Director, IIT/K.

PAUMEN, Richard T.
Registrar
University of Pennsylvania
University Park, Pennsylvania 16802

Service at IIT/Kanpur from 12/65 - 1/67, when Mr. Paumen (then Registrar at Case) assisted in the systematization of the handling of student records.

PEARSON, Erman A.
Professor of Sanitary Engineering
University of California, Berkeley
Berkeley, California 94720

Professor Pearson represented the University of California (State System) on The Steering Committee (1961 - 1962) and was a member of Sub-Committee that visited IIT's in Bombay, Madras, Kharagpur and Kanpur in November 1961.

PETIEVICH, George N.
Admin. Officer, Physical Plant
Massachusetts Institute of Technology
E18-210
77 Massachusetts Avenue
Cambridge, Massachusetts 02139

Service with EDC at IIT/Kanpur: Mr. Petievich came to EDC from Berkeley. In India he was Administrative Officer of the Program from October 1965 to March 1969.

PIGOTT, Joseph, D., President
University Circle Development Foundation
10831 Magnolia Drive
Cleveland, Ohio 44106

Service at IIT/Kanpur: (Case Western) 3/65 - 5/66
EngrPhysPlan

From March 1965 to May 1966, Mr. Pigott, then of Case Institute of Technology, assisted in putting space planning at IIT/K on a sound basis. Following his return to the U.S. he represented Case Western on The Steering Committee until he resigned in June 1970 to assume his present position.

PULLEN, M. William, Jr., Associate Professor of
Engineering Geology
Purdue University
Lafayette, Indiana 47907

From 7/66 - 1/68 Professor Pullen assisted in plans and operations of the Civil Engineering Department, IIT/Kanpur, and in setting standards for working with students.

RABINOWITZ, Irving N.
Director of Research
C.C.I.S.
Rutgers University
New Brunswick, New Jersey 08903

Service at IIT/Kanpur: 5/63 - 12/64 Computer
In November 1962, when he was Associate Director of the Computer Center at Princeton, Dr. Rabinowitz prepared "Recommendations for the Organization and Operation of the Kanpur Computing Faculty," assisted in determining the configuration of the original IBM 1620 System for IIT/K, and then served at IIT/Kanpur from May 1963 - December 1964 in the establishment of the IIT/K Computer Center.

RAND, Earl J., Assistant Professor
Department of English
University of California, Los Angeles
Los Angeles, California 90024

In the course of his service at IIT/Kanpur (7/68 - 9/70) Professor Rand assisted with the English language training program of the Department of Humanities and Social Science. He recommended that high quality instruction be encouraged by the provision of rewards for good teaching.

REEDY, Herman E.
Supervising Technician
Department of Electrical Engineering
Carnegie-Mellon University
Pittsburgh, Pennsylvania 15213

Service at IIT/Kanpur: 1/72 - 4/72
In June 1971, the Head of the Electrical Engineering Department, IIT/K, requested the services of Mr. Reedy to assist the E.E. Department in the setting up and commissioning of the IIT/K Integrated Circuits and Devices Laboratory and in training technicians in this area. Mr. Reedy was at IIT/K from mid-January until mid-April 1972.

REYNOLDS, Alton L.
Principal, Fiske School
Wellesley Public Schools
Wellesley, Massachusetts 02181

As Educational Advisor (EDC) with the Program at IIT/Kanpur, between September 1969 and May 1971 Mr. Reynolds assisted in developing curriculum and teaching techniques for elementary and secondary schools on campus, and elsewhere.

RICHARDSON, Archie M., Jr.
441 Summit Drive
Pittsburgh, Pennsylvania 15228

Service at IIT/Kanpur: Assoc. Professor MIT 9/69 - 7/71

In July 1971 Professor Richardson wrote "After discussions with the Consortium Representative and the Head of the Civil Engineering Department" "of this very pleasing suburban campus judged by me to be approaching early maturity"..."I judged my role to be best served by acting as a regular member of the Civil Engineering Department with emphasis on stimulating laboratory and professional activity in Soil Mechanics and Foundation Engineering. One Ph.D. student's research began by assisting me with research into the engineering behavior of saturated indigenous clay using partially indigenous traxial compression apparatus" developed at IIT/K.

ROTH, Dana L.
Chemistry Librarian
California Institute of Technology
Pasadena, California 91109

From December 1970 until April 1972, Mr. Roth assisted in the operation of the Library, IIT/Kanpur, and under the direction of the Librarian carried out selected library automation projects.

RYAN, Lawrence
20A-009
Massachusetts Institute of Technology
77 Massachusetts Avenue
Cambridge, Massachusetts 02139

Service at IIT/Kanpur: 8/65 - 8/66 Glass Blowing Shop
In August 1966 Mr. Ryan wrote "I wish to express my sincere appreciation to the Central Glass Shop Committee, the members of the Faculty and the glassblowers, for their kind cooperation in helping me reorganize the glass shop into the efficient, productive body that it is now" - and has been ever since (Ed.) with procedures for handling requests as they come in from faculty and other staff, for stocking material, and for scheduling cooperatively the work load.

SCANLAN, Robert A., Professor
Civil Engineering Department
School of Engineering and Applied Science
Princeton University
Princeton, New Jersey 08450

In 1964, Professor Scanlan represented Case Institute of Technology on The Steering Committee.

SCHATZ, Edward, R.
Vice-President for Academic Affairs
Carnegie-Mellon University
Pittsburgh, Pennsylvania 15213

Dr. Schatz represented Carnegie Institute of Technology on The Steering Committee from the beginning in 1961 until February 1964.

SCHERMERHORN, Richard A., Professor
Department of Sociology
Case Western Reserve University
Cleveland, Ohio 44106

While at IIT/Kanpur (9/68 - 9/70), Professor Schermerhorn worked with the H.S.S. Department, and developed interests in many aspects of IIT/K. In noting some of the cross currents of its development, he observed: "If eternal vigilance is the price of liberty, it is no less the price of institutional advance. Only by this kind of vigilance will the future of IIT/Kanpur fulfill the dreams of its founders."

SCHNEERER, William F.
Director, Department of Instructional Support
and Associate Professor of Engineering
Case Western Reserve University
University Circle
Cleveland, Ohio 44106

Service at IIT/Kanpur: 6/63 - 8/63
From a 1963 report: "By the enthusiasm he communicated and by his obvious grasp of Engineering Graphics, together with his imaginative approach, Professor Schneerer was able to get a group of IIT/Kanpur instructors from different departments pulling together as an interested team for the teaching of the new first year graphics course."

SCHREIBER, William F.
Professor of Electrical Engineering
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

Service with the Department of Electrical Engineering, IIT/Kanpur from July 1964 until May 1966, and again for two months in the winter of 1972.

SCORDELIS, Alexander C.
Professor of Structural Engineering
University of California, Berkeley
Berkeley, California 94720

Represented (September 1962 - July 1965) the University of California on The Steering Committee.

SECKEL, Edward, Professor
Aeronautical Engineering
Princeton University
Princeton, New Jersey 08540

Service at IIT/Kanpur: Between August 1965 and May 1966, Professor Seckel worked with the Department of Aeronautical Engineering, where he was particularly interested in the development of the flight facility.

SEEBER, Norton C.
Dean of School of Economics and Management
Oakland University
Rochester, Michigan 48063

Service at IIT/Kanpur: (Assistant Professor - Carnegie-Mellon University) 9/63 - 5/65 HSS

SHEPARD, Lawrence A.
80 Cushing Avenue
Belmont, Massachusetts 02178

Service at IIT/Kanpur: (Lecturer MIT) 1/66 - 8/67 MetE

SHOOK, William B.
Department of Ceramic Engineering
The Ohio State University
124 West 17th Avenue
Columbus, Ohio 43210

Service at IIT/Kanpur: Visiting Professor, Department of Metallurgy, August 1963 - July 1965.

SITTIG, Marshall
Development Office
Princeton University
Princeton, New Jersey 08540

Service at IIT/Kanpur: (7/68 - 5/70) as visiting Consultant in Research Administration.

SMULLIN, Louis D.
Head, Department of Electrical Engineering
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

Service at IIT/Kanpur: August 1965 - August 1966 as visiting Professor, Department of Electrical Engineering, IIT/Kanpur. Represented MIT on The Steering Committee - April 1962 - June 1965.

SNELL, Jack E.
Civil & Geological Engineering
Princeton University
Princeton, New Jersey 08540

Professor Snell was at IIT/Kanpur from February 1966 - July 1967. He left behind a substantial contribution in Civil Engineering, where the Chairman of the department wanted to develop a program in Snell's specialty - of study and research for transportation systems analysis.

SOROKA, Walter W.
Professor of Applied Mechanics
University of California, Berkeley
Berkeley, California 94720

Represented the University of California on The Steering Committee, from September 1965 until summer, 1969.

SPEAKER, Thomas B.
20 Albert Street
Lewiston, Maine 04240

Service at IIT/Kanpur: (Purdue) 11/64 - 12/65
Assisted with the design of air-conditioning systems for Library, Lecture Halls and Computer Building.

STARBUCK, Raymond B.
c/o O.B. Elsworth
Bush Avenue
Belle Haven
Greenwich, Connecticut 06830

Service at IIT/Kanpur: (Princeton) 8/68 - 6/72
Administrative Officer (KIAP)

STEEVES, John G.
Curriculum Center
Wentworth Institute
550 Huntington Avenue
Boston, Massachusetts 02115

Instructor 8/66 - 9/67
Wentworth/EDC 8/69 - 8/71
During his two tours at IIT/Kanpur, Mr. Steeves assisted in the development of Technical Support Services - Central Workship, Graphic Arts, Central Instrumentation etc.

STEPHENSON, Dwight L.
Assistant Group Leader
J-8 Scientific Laboratory
University of California, Los Alamos
Los Alamos, New Mexico 87544

Service at IIT/Kanpur: 7/67 - 7/68 EE
From a report "In Dwight Stephenson, the Program was fortunate to have an excellent representative of that modern innovation - dynamic professional engineers working in an academic environment...needed for larger development efforts..."In 1970, Mr. Stephenson with Mr. Hanson, submitted a proposal for an "Electronics Product Development Laboratory at IIT/Kanpur that (was) the culmination of considerable thought and discussion with IIT/K faculty, Indian government and lab personnel, engineers and managers from Indian Industry, and KIAP members." In June 1972, when the Program ended, that proposal was still pending.

STIRTON, William, E.
Vice-President Emeritus
The University of Michigan
Ann Arbor, Michigan 48104

Representative on The Steering Committee 1961.

STRAUSS, Herbert L.
Associate Professor
Department of Chemistry
University of California, Berkeley
Berkeley, California 94720

Service at IIT/Kanpur: 7/68 - 8/69 Chem

SUPPE, Frederick R.
Department of Philosophy
University of Illinois
Urbana, Illinois 61801

Service at IIT/Kanpur: 10/65 - 8/67 A University of Michigan graduate research assistant to Professor Burks to complete Ph.D. dissertation, with additional service with the Humanities and Social Sciences Department and with the T.V. Center.

TEARE, Richard B.
University Professor of Engineering
Carnegie-Mellon University
Schenley Park
Pittsburgh, Pennsylvania 15213

From 1964 through the end of the Program in June 1972, Professor Teare represented Carnegie-Mellon University on The Steering Committee. He served as Chairman of that Committee from May 1966 until his resignation as Chairman in June 1969.

In March 1966, he was the Head of an 8 man Evaluation Team from Consortium Institutions that visited IIT/K.

TRENHOLME, John
Research Physicist
Naval Research Laboratory
Washington, D.C. 20390

Service at IIT/Kanpur: (California Institute of Technology) 7/64 - 8/65 EE

UHLIG, Herbert H.
Professor of Metallurgy
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

In two months, in the fall of 1965, Professor Uhlig presented four lectures each week in a Metallurgy course, plus seminars in seven other departments and labs, and made an inaugural address on a national Symposium on Corrosion organized at IIT/Kanpur.

VAN VALKENBURG, Mac E.
Professor & Chairman
Department of Electrical Engineering
Princeton University
Princeton, New Jersey 08540

Involved with E.E. Department, IIT/K for one month visit in fall of 1970.

VAN WYLEN, Gordon J.
Dean of Engineering
College of Engineering
The University of Michigan
Ann Arbor, Michigan 48104

Appointed University of Michigan representative on The Steering Committee, beginning May 1967; elected Chairman, June 1969 (name then changed to Consortium Committee). Service with Committee through June 1972.

VIELEHR, Jerome E.
Vice-President, Finance
Aqua - Chem, Inc.
P.O. Box 421
Milwaukee, Wisconsin 53201

Service at IIT/Kanpur: (EDC - then ESI) 5/62 - 11/69
As the first KIAP Administrative Officer in Kanpur, Mr. Vielehr initiated arrangements for a continuing "First Class Operation" to enable new KIAP staff to get to work promptly.

VOGLER, Roger C.
Epping, New Hampshire 03042

Service at IIT/Kanpur: (EDC) Architectural Consultant, KIAP staff 8/68 - 9/71

VREBALOVICH, Thomas
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California 91103

Service at IIT/Kanpur: 8/68 - 7/70 AeroEng

WELCH, David F.
Associate Professor of Engineering Design
California Institute of Technology
Pasadena, California 91109

In his year at IIT/Kanpur - July 1964 - January 1965, Professor Welch helped develop several interdisciplinary Technical Arts Courses, including Engineering Graphics and Engineering Design.

WEST, Charles T., Professor and Chairman
Engineering Mechanics
The Ohio State University
155 Woodruff Avenue
Columbus, Ohio 43210

Service at IIT/Kanpur: 9/68 - 7/70 Visiting Professor
ME
Gave Seminar on Nonholonomic Systems

WIEDERHOLD, Giovanni C.M.
Associate Director for the ACME Faculty
Computation Center
Stanford University
Stanford, California 94305

(Head of Programming UC-Berkeley) from 10/64 - 10/65 he worked with the IBM 1620 Computer Center at IIT/Kanpur.

WIEGEL, Robert L.
Professor of Hydraulic and Sanitary Engineering
College of Engineering
University of California, Berkeley
Berkeley, California 94720

From July 1969 - June 1972 represented the University of California (State System) on The Consortium Committee.

WILHELM, Donald J.
Department of Chemical Engineering
University of Maine at Orono
Aubert Hall
Orono, Maine 04473

Service at IIT/Kanpur: (Research Engineer - The Ohio State University)
Author: "Guide to the Conduct of Undergraduate Laboratory Courses in Chemical Engineering" and "A Linear Systems Simulation Program for the IBM 7044", both written during Dr. Wilhelm's tour at IIT/Kanpur (October 1967 - December 1970.)

WILKE, Harvey R.
Professor of Environmental Engineering
Department of Civil Engineering
Purdue University
Lafayette, Indiana 47907

Service at IIT/Kanpur:
Visiting Professor of Sanitary Engineering. Helped with development of Curriculum and Facilities. Author: "Report on Sanitary Engineering Activities, IIT/Kanpur 1965 - 1966."

WOOD, Russell J.
404 Riverside Drive
New York, New York 10025

Service at IIT/Kanpur: (EDC - then ESI)
Architectural Consultant, KIAP staff 6/63 - 5/65

WOODS, Richard D., Assistant Professor
Department of Civil Engineering
The University of Michigan
Ann Arbor, Michigan 48104

Service at IIT/Kanpur: 7/71 - 8/71
Co-Author, proposal to NSF for a joint IIT/Kanpur, The University of Michigan field study on Screening of Earth Waves. Worked with soil dynamics group on shallow seismic investigations for foundation design.

ZIMMERMAN, Richard H.
Assistant Vice-President for
Administrative Operations
Professor of Mechanical Engineering
University College
The Ohio State University
Columbus, Ohio 43210

Arriving at IIT/Kanpur in July 1962, Professor Zimmerman was the first KIAP staff member to go to India as a visiting professor. He participated extensively in the early development of the M.E. Department, before completing his tour in 1964.

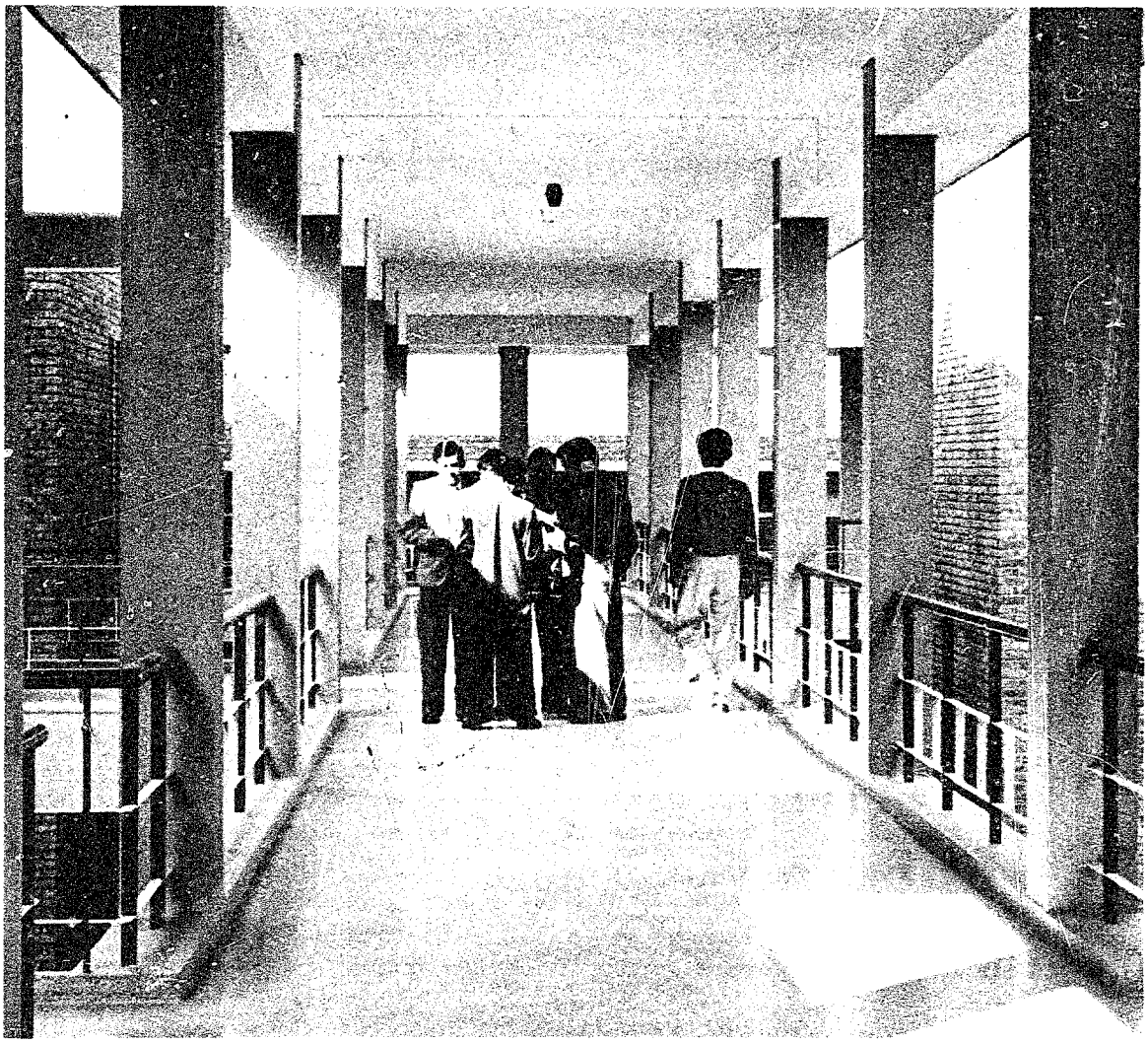
APPENDIX C

PARTICIPANT TRAINING

Under the Program forty-seven faculty and technicians were provided with special training at the various Consortium Institutions in the U.S.

The procedure established for each Participant began with a nomination from IIT/K (via Program Leader) to the Consortium Committee in the U.S., with recommendations for the nature and the extent of the desired training program.

The following list of IIT/K Participants is in the order of their departure from the U.S.



KANPUR INDO-AMERICAN PROGRAM PARTICIPANTS

IIT/Kanpur Faculty and Staff Trained at Consortium Institutions

(listed by date Training Programs were completed)

- 1963 -

SAHAI, Chaturbhuj (B.E.)
(left IIT/K for industry - 1966)

Training at Purdue University - developing a measurement laboratory; 11/62 - 10/63

- 1965 -

KELKAR, Madhav Krishna (B.Sc. Dipl. Librarianship)
(left IIT/K for Bombay - 1969)

Training at Purdue University - library science; 3/65 - 10/65

JASEJA, Thadho Sirdinomal (Ph.D. Physics)
(left IIT/K for Birla Institute of Technology - 1966)

Post Doctoral Program at Massachusetts Institute of Technology - micro-wave spectroscopy; 7/65 - 10/65

- 1966 -

BAKSHI, Ranvir Kumar (M.A. English)
Lecturer

Training at The University of Michigan - utilization of language laboratory; 7/65 - 1/66

SINGH, Kadash Kumar (Ph.D.)
Professor of Psychology, and Head, Department of Humanities and Social Sciences

Updating in social psychology via visits to Carnegie-Mellon University, The University of Michigan, Purdue University and University of California, Berkeley; 1/66 - 2/66

AGARWAL, Guru Dass (Ph.D.)
Associate Professor of Civil Engineering

Doctoral Program at University of California, Berkeley - inexpensive sewage and waste treatment systems - Thesis on "Electrochemical Phenomenon in Water Filtration"; 1/64 - 6/66

RAJARAMAN, Vaidyeswaran (Ph.D.)
Professor of Electrical Engineering,
Head of Computer Center

Post Doctoral Program at University of California, Berkeley - digital computer hardware and hybrid systems; 9/65 - 7/66

NANDA, Vir Vikram
Pilot Instructor, Flight Science

Training at Princeton University, et al - techniques in glider instrumentation and instruction; 6/66 - 9/66

- 1967 -

SINGH, Prithwi Raj (Ph.D.)
Assistant Professor of Chemistry

Post Doctoral Program at Purdue University - teaching and research in organic reaction mechanisms; 9/66 - 8/67

KRISHNA MURTHY, Rangaiyer
Foreman, Aeronautical Engineering Department

Training at Princeton University - flight simulation techniques, aeroelastic model construction; 5/67 - 9/67

DHAR, Durga Nath (Ph.D.)
Lecturer in Chemistry

Post Doctoral Program at California Institute of Technology - teaching and research in advanced organic chemistry (natural products); 10/66 - 10/67

- 1968 -

HASAN, Mohammad M. (M.S.)
Lecturer in Electrical Engineering

Training at Carnegie-Mellon University - solid state device development; 9/66 - 7/68

RAO, Dasari Ramachandra (Ph.D.)
Associate Professor of Physics

Post Doctoral Program at Massachusetts Institute of Technology - optical spectroscopy and lasers ; 9/66 - 7/68

SHARMA, Purushottam Prasad (Ph.D.)
Assistant Professor of English

Post Doctoral Program at Princeton University - new methods and techniques of teaching English; 9/67 - 8/68

RASTOGI, Parmatma Nand (Ph.D.)
Assistant Professor of Sociology

Post Doctoral Program at Massachusetts Institute of Technology - research training in computer simulation of social systems; 9/67 - 8/68

BHALLA, Sushil Kumar (Ph.D.)
(left IIT/K for U.S.)

Doctoral Program at The Ohio State University - teaching and research in nucleation and kinetics of heterogenous liquid phase crystallization; 9/65 - 9/68

KAPOOR, Mahesh Prasad (Ph.D.)
Assistant Professor of Civil Engineering

Doctoral Program at Case Western Reserve University - extension of basic concepts of structural synthesis to the automated optimum design of structural system. Thesis topic: "Automated Optimum Design of Structures under Dynamic Response Restrictions"; 8/65 - 12/68

NIGAM, Prem Chandra (Ph.D.)
Lecturer in Physical Chemistry

Post Doctoral Program at Purdue University - equilibrium studies of ion exchange resins; 9/67 - 12/68

- 1969 -

SHARMA, Pran Nath (L.L.B.)
Assistant Registrar

Training at Princeton University - modern approaches to academic record keeping; 9/68 - 3/69

KUMAR, Ramesh (B.Tech.)
Foreman, Department of Metallurgical Engineering

Training at The Ohio State University - metal-flow characteristics including stress formation due to shock; metal-joining techniques; 9/68 - 3/69

BASU, Rabindra Nath (M.Sc.)
Senior Systems Programmer

Training at Carnegie-Mellon University - time sharing techniques for computer utilization in advanced operating systems at IIT/K; 8/68 - 8/69

MURTY, Divakarla V.S.S.N. (I.R.E. Diploma)
Foreman, Department of Electrical Engineering

Training at Massachusetts Institute of Technology - device fabrication of integrated circuits, television and image processing, TV programming; 2/69 - 8/69

KAUSHIK, Madan Mohan (B.Sc.)
Senior Technical Assistant, Department of Physics

Training at Case Western Reserve University and Education Development Center - development and management of physics laboratories; 3/69 - 10/69

BIDHI-CHAND, Kanwar
Workshop Superintendent, Department of Physics

Training at Massachusetts Institute of Technology - general electronics; specialization in laser electronics; 11/68 - 10/69

- 1970 -

SHARMA, Jagannath N.
Foreman, Central Glass Blowing Shop

Training at Massachusetts Institute of Technology - glassblowing, design and fabrication of research equipment; 9/69 - 4/70

KAPOOR, Surendra (M.Sc.)
Systems Programmer, Computer Center

Training at University of California, Santa Cruz - computer uses in administrative and accounting areas; 9/69 - 3/70

LAKSHMIDHAR, Koluvail V. (B.Sc.)
Senior Technical Assistant, Department of Civil Engineering

Training at Purdue University - modern techniques of soil mechanics and soil dynamics; 10/69 - 4/70

KRISHNAMURTY, Somayajula (B.Sc.)
Senior Technical Assistant, Department of Metallurgical Engineering

Training at Massachusetts Institute of Technology - crystal growing and cutting techniques; 11/69 - 5/70

SURYANARAYANA, Kota
Senior Technical Assistant, Department of Chemical Engineering

Training at The Ohio State University - control systems, development of supporting facilities for research and teaching laboratories; 12/69 - 7/70

PANDEY, Arun Chandra* (M.A.)
Associate Lecturer in English

Training at University of California, Los Angeles - utilization of language laboratories; 9/69 - 8/70

BHATIA, Baldev Lal (Ph.D.)
Lecturer in Mathematics

Post Doctoral Program at University of California, Berkeley - advanced studies numerical analysis; 9/69 - 9/70

- 1971 -

LAL, Peshawari
Foreman, Department of Electrical Engineering

Training at Massachusetts Institute of Technology - fabrication and testing of microwave components; 9/70 - 3/71

SRIVASTAVA, Jagdish C.
Foreman, Precision Shop (in Central Workshop)

Training at California Institute of Technology - supervising functions in tool room and precision shop, handling precision measuring instruments; 9/70 - 3/71

*continues on at Michigan State University as independently sponsored participant.

SIDDIQUI, Altaf Hussain (B.Sc.)
Associate Lecturer, Department of Chemistry

Training at Purdue University - modern methods of analyses in chemistry, use of instruments including NMR spectrometer; 10/70 - 4/71

SINGH, Lakhneshwar Prakash (M.Tech.)
Assistant Professor of Electrical Engineering

Training at Purdue University, Education Development Center (Bonneville Power Administration, Portland, Oregon) on-the-job training - new techniques for handling power system problems on digital computers; 1/71 - 6/71

RAY, Rajat Kumar (Ph.D.)
Assistant Professor of Physics

Post Doctoral Program at Massachusetts Institute of Technology - latest trends in research on semi-conductors, preparation of magnetic material, experience in low temperature studies of thin film; 9/70 - 7/71

KAPOOR, Om Parkash (Ph.D.)
Lecturer in Mathematics

Post Doctoral Program at Carnegie-Mellon University - latest developments in functional analysis and its applications in continuum mechanics; 9/70 - 9/71

RAO, Singiresu Sambasiva (Ph.D.)
Assistant Professor of Mechanical Engineering

Doctoral Program at Case Western Reserve University - Mechanical Engineering; Thesis topic: "Automated Optimum Design of Aircraft Wings to Satisfy Strength, Stability, Frequency and Flutter Requirements"; 1/69 - 9/71

VAIDYA, Madhusudan Laxman (M.Tech.)
Lecturer in Metallurgical Engineering

Training at University of California, Berkeley - completed all of the laboratory work necessary for his Ph.D. thesis (in the area of correlation of superplasticity with high temperature creep) which will be finished at IIT/Kanpur; 9/70 - 9/71

AGARWAL, Avad Behari Lal (Ph.D.)
Lecturer in Chemical Engineering

Post Doctoral Program at University of California, Berkeley - post-graduate research programs in chemical reaction engineering; course programs in computer-aided simulation and design of process systems and direct computer control; developed capability to teach post-graduate courses at advanced level and gained familiarity with sophisticated experimental skills; 11/70 - 11/71

ANGIRISH, Satish Chandra (High Vac. Tech. Cert.)
Senior Technical Assistant, Department of Chemical Engineering

Training at Princeton University - design and development of measurement devices; 5/71 - 11/71

BATRA, Jawahar Lal (Ph.D.)
Lecturer, Department of Mechanical Engineering

Doctoral Program at Purdue University - Program in Product Systems Design. Thesis topic: "Computerized Process Planning and Optimization of Multi-Tool Set Ups with Probabilistic Tool Life"; 8/68 - 12/71

- 1972 -

GOEL, Suresh Chand (B.Sc.)
Senior Technical Assistant, Department of Civil Engineering

Training at University of California, Berkeley - obtained experience in manufacturing techniques for developing load cells, test cylinders, strain measuring equipment; fabrication of components and accessories of pulsators, electrobalancing units and universal testing machines (built a 66 channel switching unit, a precision calibrator and a 75,000 pound load cell); 8/71 - 2/72

DAS GUPTA, Gopal Chandra (B.Sc.)
Senior Technical Assistant, Central Workshop

Training at Purdue University - modern management techniques for workshops; 9/71 - 2/72

CHAKRAVORTY, Maya (M.A.,Dip. in Library Science)
Assistant Librarian

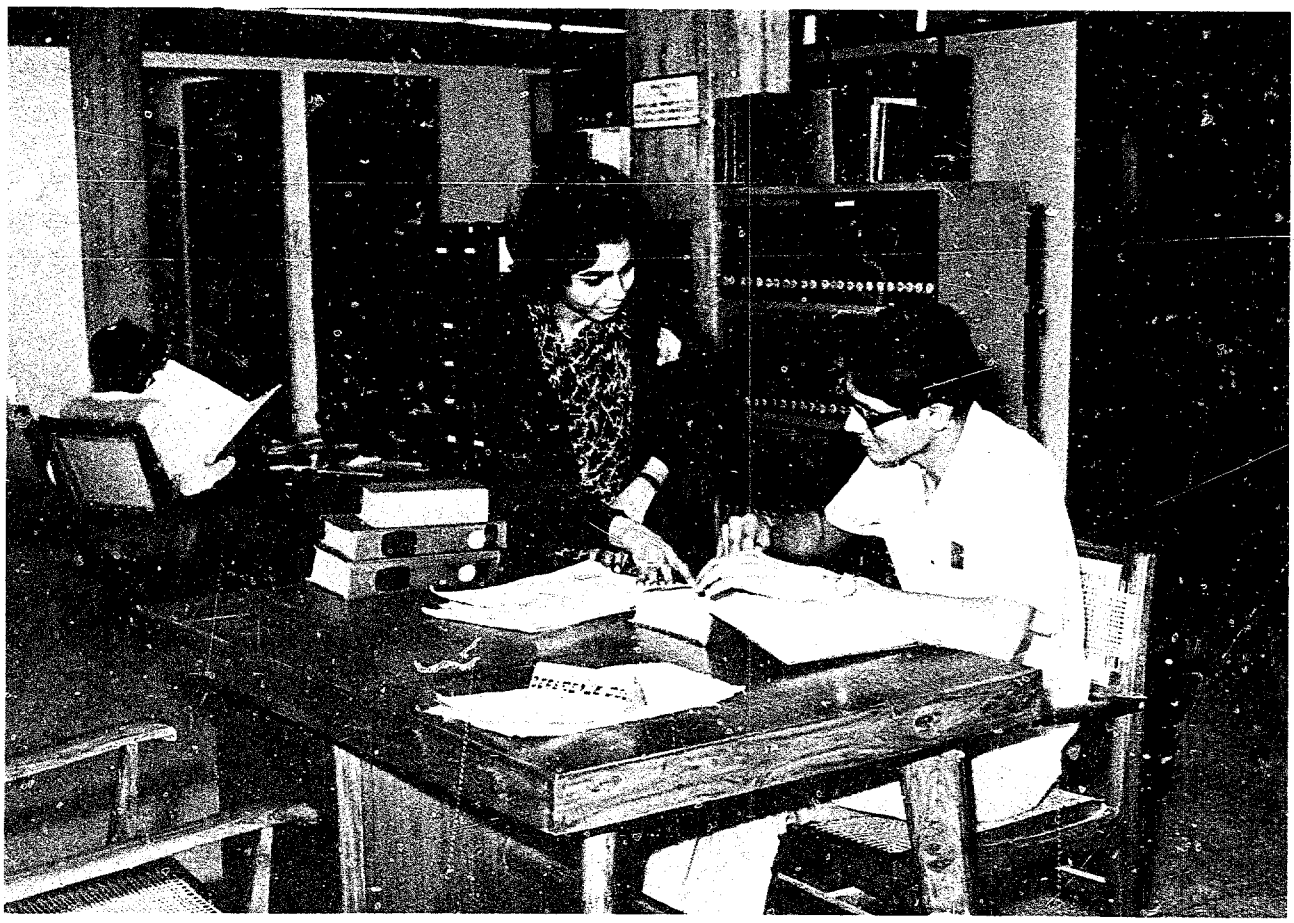
Training at Massachusetts Institute of Technology - latest methods, approaches and processing techniques used in modern academic, technological and research libraries; 9/71 - 3/72

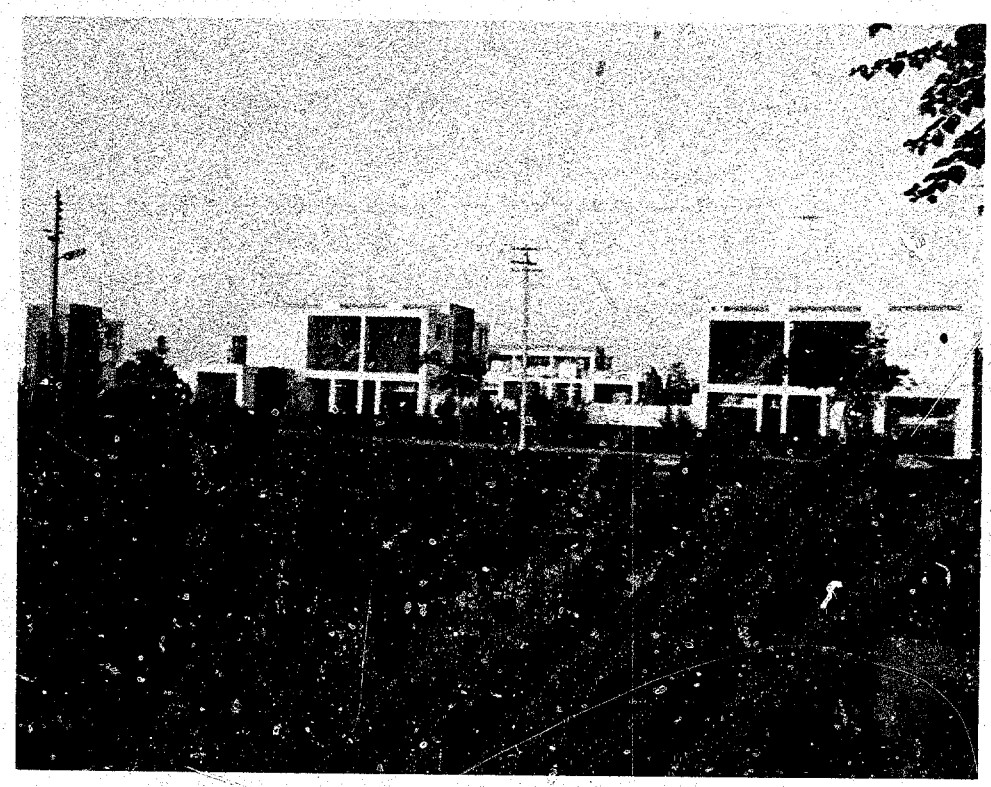
NARAYAN, Vatadahosahalli Aswathanarwnappa (M.Sc.)
Senior Technical Assistant, Department of Chemistry

Training at The Ohio State University and Purdue University - latest know-how in chemistry lab courses, especially in handling large lab classes and in lecture demonstration-experiments; 9/71 - 4/72

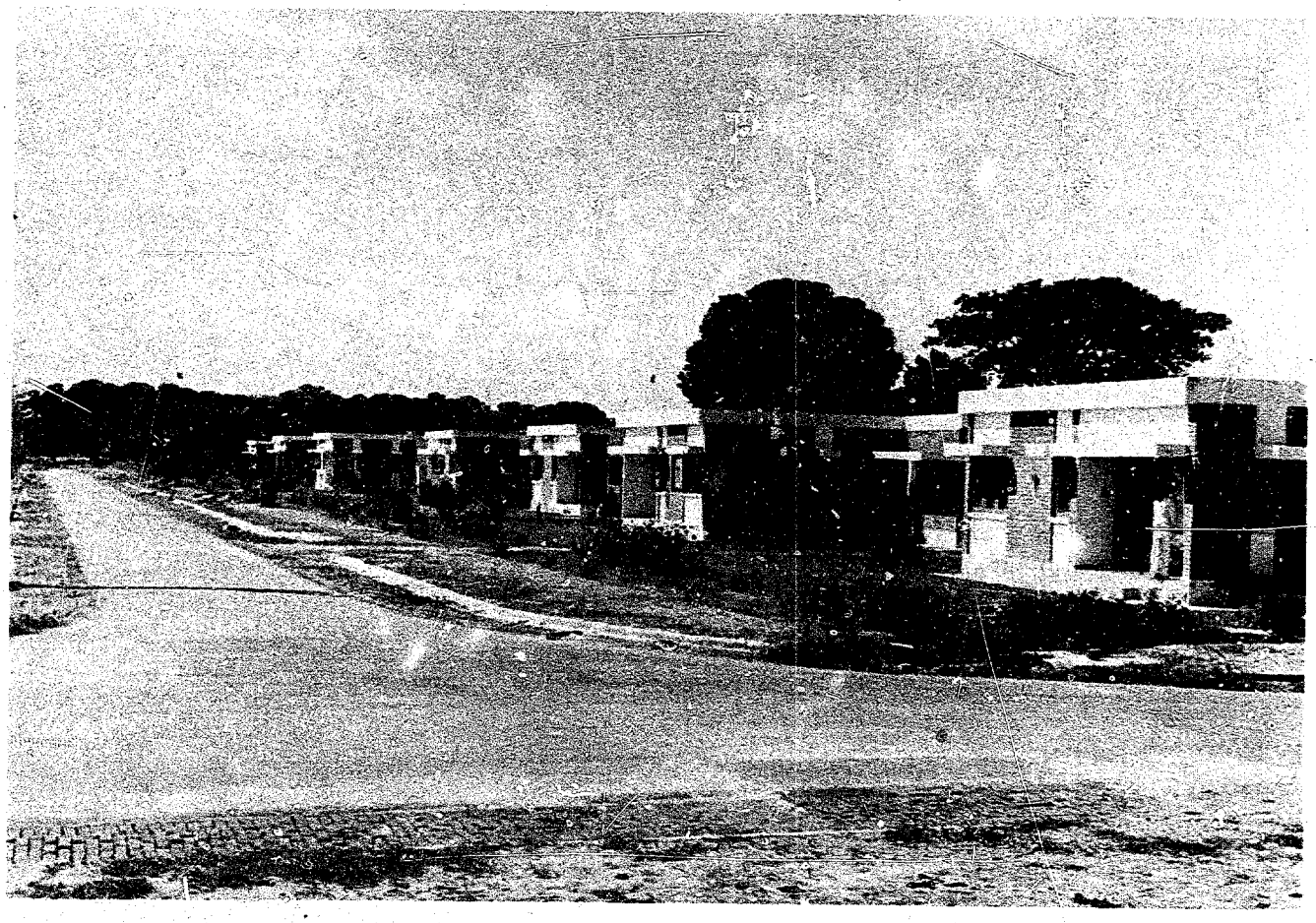
GUPTA, Govind Prasad (M.Sc.)
Senior Technical Assistant, (Programmer, Computer Center)

Training at The University of Michigan - know-how in implementing a limited time-sharing system on IBM 7044, soft ware development for IBM 1800, integrated administrative information system; 5/71 - 5/72





Examples of Faculty Housing, IIT/Kanpur.



APPENDIX D

FACULTY RECRUITMENT

One reason for the strength of the IIT/Kanpur faculty is that the Institution recruits Indian faculty from abroad, as well as from India.

Eleven faculty members were relocated in 1968 under a foundation grant.

Then, the big break for IIT/K recruitment of prospective faculty from abroad came in November 1963, when AID offered, and EDC accepted, an amendment to the KIAP Contract that provided for the use of U.S.-owned rupees for relocation purposes. Since then all new relocation commitments that have been made to prospective IIT/K faculty members resident abroad have been in terms of rupees.

Between February 1964 and June 1972, one hundred thirty-two IIT/K faculty members and their dependents accepted travel to India under the KIAP provision for relocation, under the condition that they would remain at IIT/K for a minimum of two years.

Scholars who have joined IIT/K and whose travel to India has been paid by KIAP

1 June 1972

Sl. No.	Name	Field	Former place	Date of Joining	Present Position
1.	J.C. Ahluwalia	Chemistry	Pittsburgh, Pa.	2.7.64	Asstt. Professor
2.	A.K. Nandi	Elect. Engg.	U.S.	6.7.64	left
3.	T. Sharma	Chemistry	Chicago	3.8.64	Asstt. Professor
4.	V.K. Deshpande	Physics	New York	8.8.64	Assoc. Professor
5.	V.R. Sastri	Elect. Engg.	London, U.K.	24.9.64	Asstt. Professor
6.	H.C. Agrawal	Mech. Engg.	Cleveland, Ohio	30.9.64	Assoc. Professor
7.	A.R. Das	Met. Engg.	Berkeley, Calif.	30.9.64	Asstt. Professor
8.	M. Gopala Rao	Chem. Engg.	Washington	1.10.64	Assoc. Professor
9.	P.A. Paranjape	Mech. Engg.	Schlieven, Switzerland	1.10.64	left
10.	K.S. Yajnik	Mech. Engg.	San Francisco, Calif.	15.10.64	Assoc. Professor
11.	A. Ghosh	Met. Engg.	Columbus, Ohio	30.11.64	Assoc. Professor
12.	M.N. Shetty	Met. Engg.	Vancouver, Canada	30.11.64	left
13.	A. Chakravorty	Chemistry	Cambridge, Mass.	3.12.64	Assoc. Professor
14.	A.S. Mehta	Chemistry	Cambridge, Mass.	17.12.64	left
15.	V.V. Paranjape	Physics	Liverpool, U.K.	17.12.64	left
16.	T.M. Srinivasan	Physics	Urbana, Ill.	25.3.65	Assoc. Professor
17.	T.R. Vishwanathan	Elect. Engg.	Toronto, Canada	30.6.65	Assoc. Professor
18.	H.N. Mahabala	Elect. Engg.	Toronto, Canada	30.6.65	Assoc. Professor
19.	C.S. Moorthy	Aero. Engg.	Rugby, England	2.7.65	Assoc. Professor
20.	N.C. Giri	Mathematics	Montreal, Canada	22.7.65	left
21.	C.V. Seshadri	Chem. Engg.	Pittsburgh, Pa.	24.8.65	Assoc. Professor
22.	G. Srikantiah	Mech. Engg.	Upton, N.Y.	26.8.65	Professor
23.	A. Vasudava	Chem. Engg.	Newark, N.J.	28.8.65	Asstt. Professor
24.	B.D. Misra	Humanities	Chicago, Ill.	25.9.65	Asstt. Professor
25.	S.K. Dutta	Aero. Engg.	Boulder, Colorado	29.9.65	left
26.	I. Sinha	Mathematics	Michigan	30.9.65	left
27.	S.R. Singamsetti	Civil Engg.	Iowa City	6.10.65	Asstt. Professor
28.	A.K. Srikanth	Aero. Engg.	Seattle, Washington	14.10.65	left
29.	P.S. Ramachandran	Chem. Engg.	Boulder, Colorado	21.11.65	Asstt. Professor
30.	A.H. Shah	Civil Engg.	Berkeley, Calif.	23.11.65	Asstt. Professor
31.	B.D.N. Rao	Physics	Menlo Park, Calif.	28.12.65	Assoc. Professor
32.	J.K. Sridhar Rao	Civil Engg.	Champaign, Ill	19.3.66	Asstt. Professor
33.	M.M. Oberoi	Mech. Engg.	Los Angeles, Calif.	6.7.66	Asstt. Professor
34.	B. Prasada	Elect. Engg.	Brighton, Mass.	19.7.66	Professor
35.	A.V.S. Prabhakararao	Civil Engg.	St. Louis, Missouri	25.7.66	Assoc. Professor
36.	Kamta Prasad	Humanities	Leeds, U.K.	4.8.66	Assoc. Professor
37.	S. Ranganathan	Chemistry	Basel, Switzerland	22.8.66	Asstt. Professor
38.	Y.R. Waghmare	Physics	Cambridge, Mass.	10.10.66	Asstt. Professor
39.	P.S. Maiya	Civil Engg.	Cornell, Ithaca	24.10.66	left
40.	A.V. Setlur	Civil Engg.	Lafayette, Indiana	5.12.66	Asstt. Professor
41.	P.K. Ghosh	Chemistry	Houston, Texas	23.12.66	Asstt. Professor
42.	H.S. Ray	Met. Engg.	Toronto, Canada	28.1.67	Asstt. Professor
43.	D. Balasubramaniam	Chemistry	Minneapolis, Minn.	1.2.67	Asstt. Professor
44.	D.N. Saraf	Chem. Engg.	Berkeley, Calif.	20.7.67	Asstt. Professor
45.	S.D. Agashe	Elect. Engg.	Urbana, Ill.	31.7.67	Asstt. Professor
46.	M.K. Verma	Humanities	Madison, Wis.	31.7.67	left
47.	Usha Kumar	Humanities	Ann Arbor, Mich.	19.10.67	Asstt. Professor
48.	R.N. Biswas	Elect. Engg.	Somerville, N.J.	6.11.67	Asstt. Professor
49.	S.K. Mallick	Elect. Engg.	Poughkeepsie, N.Y.	20.11.67	Asstt. Professor
50.	D. Ramakrishna	Chem. Engg.	New York	27.11.67	Asstt. Professor

51.	H. Ramamoorthy	Elect. Engg.	Toronto, Canada	6.12.67	Asstt. Professor
52.	V. Lakshminarayana	Civil Engg.	Houston, Texas	6.4.68	Asstt. Professor
53.	B.B. Guha Thakurta	Medical	Leek Staff, U.K.	1.5.68	left
54.	V. Vasant Ram	Aero. Engg.	Ennetbaden, Switzerland	17.5.68	left
55.	P.K. Kamthan	Mathematics	Ontario, Canada	7.6.68	Asstt. Professor
56.	K.V.L.N. Sastry	Physics	Frederickton, Canada	10.6.68	left
57.	A.P. Kudchadkar	Chem. Engg.	College Station, Tex.	12.7.68	Asstt. Professor
58.	Rajinder Agrawal	Elect. Engg.	Long Beach, Calif.	29.7.68	Asstt. Professor
59.	B.S. Mathur	Physics	New York, N.Y.	19.8.68	Lecturer
60.	J.D. Borawankar	Mathematics	Minneapolis, Minn.	27.9.68	Asstt. Professor
61.	B.L.S. Prakasa Rao	Mathematics	Urbana, Ill.	30.9.68	Asstt. Professor
62.	N.C. Nigam	Aero. Engg.	Pasadena, Calif.	1.11.68	Asstt. Professor
63.	J.L. Gulati	Mech. Engg.	Rugby, U.K.	30.11.68	Asstt. Professor
64.	T.K. Srikantiah	Aero. Engg.	Waterloo, Ontario	30.11.68	Asstt. Professor
65.	A.K. Jena	Met. Engg.	Cambridge, Mass.	26.12.68	Asstt. Professor
66.	Mamta Dutta	Chem. Engg.	Columbus, Ohio	16.4.69	Asstt. Professor
67.	R. Sharan	Elect. Engg.	Waterloo, Ontario	17.5.69	Asstt. Professor
68.	Gyan Mohan	Physics	Denver, Colorado	19.7.69	Professor
69.	P.C. Kapur	Met. Engg.	Lakewood, Colorado	21.7.69	Asstt. Professor
70.	H.S. Mani	Physics	Ann Arbor, Michigan	25.7.69	Asstt. Professor
71.	S.A. Naimpally	Mathematics	Edmonton, Alberta	30.7.69	Professor
72.	M.S. Tyagi	Elect. Engg.	Pittsburgh, Pa.	19.8.69	Asstt. Professor
73.	M. Ramamohan Rao	Mathematics	Kingston, R.I.	9.9.69	Asstt. Professor
74.	Anand Agrawal	Mech. Engg.	Durham, New Hamp.	13.10.69	Asstt. Professor
75.	P.T. Manoharan	Chemistry	East Lansing, Mich.	15.10.69	Asstt. Professor
76.	A.P. Shukla	Physics	Pasadena, Calif.	17.11.69	left
77.	V.V. Rao	Chem. Engg.	Wilmington, Delaware	2.12.69	Asstt. Professor
78.	G. Mehta	Chemistry	Columbus, Ohio	29.12.69	Lecturer
79.	A.K. Runchal	Mech. Engg.	London, U.K.	6.1.70	Asstt. Professor
80.	N.L. Arora	Aero. Engg.	Delft, Holland	12.1.70	Asstt. Professor
81.	Yudhbir	Civil Engg.	Orange, Calif.	16.2.70	Asstt. Professor
82.	T.M. Vishwanathan	Mathematics	London, Ontario	19.6.70	Asstt. Professor
83.	U.B. Tewari	Mathematics	Stockholm, Sweden	23.6.70	Lecturer
84.	T.C. Rao	Met. Engg.	New South Wales, Aust.	1.7.70	Asstt. Professor
85.	H. Veermani	Chem. Engg.	Seattle, Washington	31.8.70	Lecturer
86.	A.K. Bose	Library	Pittsburgh, Pa.	7.9.70	Librarian
87.	P.C. Joshi	Mathematics	Chapel Hill, N.C.	12.10.70	Lecturer
88.	N.C. Mathur	Elect. Engg.	Cambridge, Mass.	19.10.70	Visiting Assoc.Pr
89.	S.M. Aeron	Met. Engg.	London U.K.	22.2.71	Lecturer
90.	K.S. Gandhi	Chem. Engg.	Berkeley, Calif.	25.3.71	Asstt. Professor
91.	T.R. Ramachandra	Met. Engg.	Swansea, U.K.	15.4.71	Asstt. Professor
92.	S.C. Mehta	Chem. Engg.	Edmonton, Canada	16.4.71	Asstt. Professor
93.	Narsingh Deo	Elect. Engg.	Pasadena, Calif.	11.5.71	Visiting Assoc. P
94.	K.K. Sirkar	Chem. Engg.	Paterson, N.J.	17.5.71	Asstt. Professor
95.	Y.V.S. Ramamohan Rao	Humanities	Manhattan, Kansas	1.6.71	Asstt. Professor
96.	M.S. Rao	Chem. Engg.	Edmonton, Alberta	23.7.71	Asstt. Professor
97.	P.R. Banerjee	Humanities	Lancaster, England	24.7.71	Lecturer
98.	A. Paul	Met. Engg.	Sheffield, England	16.7.71	Visiting Asstt. P

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Sl. No.	Name	Field	Former place	Date of Joining	Present Position
99.	Dr. P.P. San	Humanities	York, England	1/9/1971	Asstt Prof
100.	Dr. A.K. Gupta	Aero Engg	Los Angeles, Calif	10/9/71	Asstt Prof
101.	Dr. S. Gupta	Elect Engg	Staffordshire, UK	13/9/71	Asstt Prof
102.	Dr. J.B. Shukla	Mathematics	Norway	14/9/71	Asstt Prof
103.	Dr. M. Chaudhry	Civil Engg	Illinois, USA	20/9/71	Asstt Prof
104.	Dr. Nagendra Singh	Elect Engg	Iowa	23/9/71	Lect
105.	Dr. Z. Mehdi	Mech Engg	Cardiff, Wales, UK	29/10/71	Asstt Prof
106.	Dr. R. Subramanian	Elect Engg	Cambridge, Mass	4/11/71	Asstt Prof
107.	Dr. Raminder Singh	Mech Engg	Berkeley, Calif	29/11/71	Asstt Prof
108.	Dr. V. Sinha	Elect Engg	Ljubljana, Yugoslavia	15/12/71	Asstt Prof
109.	Dr. A.K. Wagle	Chem Engg	Newark, Delaware	16/12/71	Lect
110.	Dr. M.M. Pant	Physics	London, Ontario	28/12/71	Lect
111.	Dr. O.P. Katyal	Physics	E. Lansing, Michigan	29/12/71	Lect
112.	A.K. Majumdar	Physics	Pittsburgh, Pa.	8/1/72	Lect
113.	S. Rajasekaran	Chem Engg	Prague, Czechoslovakia	19/1/72	Lect
114.	B.D. Agarwal	Mech. Engg	Chicago, Ill	8/5/72	Asstt Prof
115.	N.N. Majithia	Chem Engg	Manchester, England	15/5/72	Lect
116.	P.K. Basu	Chem Engg	Berkeley, Calif	19/5/72	Lect
117.	Anil Kumar	Chem Engg	Pittsburgh, Pa	31/5/72	Lect
118.	S.V. Babu	Chem Engg	New York, NY	1/6/72	Asstt Prof

Scholars projected through June 1972

Sl. No.	Name	Field	Former place	Position
119.	K.C. Jain	Chem.Engg.	Denver, Colo.	Asstt.Prof.
120.	R.D. Srivastava	Chem.Engg.	Monrovia, Calif.	"
121.	P.R. Bishnoi	Chem.Engg.	Edmonton, Alberta	"
122.	P.S. Deshpande	Chem.Engg.	Arkansas	"
123.	K.P.R. Pisharody	Chemistry	Mountain View, Calif.	Lecturer
124.	R. Prabhakaran	Mech.Engg.	Chicago, Ill.	Asstt.Prof.
125.	B. Sahay	Mech.Engg.	Waterloo, Ont.	Asstt.Prof.
126.	S.D. Nayak	Mech.Engg.	Bozeman, Montana	"
127.	R. Chawla	Mech.Engg.	Dorset, England	"
128.	T.E. Ramabhadran	Chem.Engg.	Rochester, N.Y.	Lecturer
129.	J.P. Gupta	Chem.Engg.	Philadelphia, Pa.	Asstt.Prof.
130.	O.P. Sharma	Aero.Engg.	Princeton, N.J.	"
131.	J. Banerjee	Mech.Engg.	Cali, Colombia	
132.	V.K. Garg	Mech.Engg.	Pittsburgh, Pa.	Asstt.Prof.

APPENDIX E

EQUIPMENT PROVIDED

Plans for the requisition of laboratory equipment, materials, and supplies not otherwise available in India, were developed by the IIT/K Equipment Committee in collaboration with the Director of IIT/K and the Program Leader. After approval at IIT/K, requisitions were sent forward simultaneously to EDC, the Government of India and USAID. Upon receipt of requisitions, EDC proceeded directly with requests for quotations, and the preparation of purchase orders. Under the Work Program as agreed to, USAID and the GOI would review purchase requisitions and within a 30-day period register questions and objections. EDC would then issue purchase orders and arrange for packaging and shipment to India.

Between 1963 and June, 1972, nearly 10,000 purchase orders were issued, providing $7,500,000 worth of equipment (including packing, shipping and insurance).

See the following lists for: 1) Individual Items That Cost $5,000 or More; and 2) Distribution of Equipment by Departments, in terms of percentages of costs.

Books purchased for the IIT/Kanpur Library, under the Purdue University Libraries collaboration project cost $720,000.

Additional costs for packing, shipping, and insurance averaged 15% of value. Most shipments went by sea; high value, small volume, delicate equipment, or equipment needed on an urgent basis, was shipped by air as an economy measure.

Approximate Breakdown of Equipment by IIT/Kanpur Departments*

Department	Percentage	Invoice Costs
Aeronautical Engineering	7.7%	$ 440,000
Chemical Engineering	7.0	400,000
Chemistry	10.2	580,000
Civil Engineering	7.6	435,000
Electrical Engineering	21.9	1,250,000**
Humanities & Social Sciences	0.7	40,000
Mathematics	0.3	15,000
Mechanical Engineering	11.5	655,000
Metallurgical Engineering	12.8	730,000
Physics	17.9	1,020,000
Central Services	2.4	135,000
	100.0%	$5,700,000

*This table is as of November 1970.
Packing, shipping, insurance not included.
Books and journals not included.

**This figure includes the IBM 1620 Computer System.

INDIVIDUAL ITEMS THAT COST $5,000 OR MORE

Serial Number	EPC P.O. Number	Item Description	Supplier	$ Cost
1.	01166	Automatic Mono Lift Truck, GLF-100	Automatic Division	8810
2.	01287	Air Plane, Piper , PA-18-150	American Aero Leasing	10992
3.	02051	Aircraft, Cessna, 182H complete with Accessories	Cessna Company	25082
4.	00622	Skid Mounted Plant, Liquid Nitrogen 12.5(m)	Superior Air Products	25206
5.	00703	Helium/Hydrogen Liquifier System	Arthur D. Little Inc.	39490
6.	00703	Compressor, Helium	"	14200
7.	01912	Booth Equipment System(incld. Tape Recorders, Tape Decks & Amplifiers etc.) for Language Lab.	Telecommunication Consulants	29325
8.	02899	Glass Working Lathe,with accs., Model 53	Woodland Lathe Mfg.	6580
9.	03060	General Engraving Machine, Model PI-3	Russel Halbrook	12710
10.	02518	Mass Spectrometer, Isotope Ratio	Nuclide Corporation	50976
11.	04207	Pore Volume Analyser, Surface Area, Mod. MIC 101	MI Numinco	6750
12.	00982	Gas Chromatograph, Model 770	F.M. Scientific	6995
13.	05583	Thermal Analyser, Du Pont 9000	Du Pont De Nemours	7375
14.	06792	Triple Chamber Diffusion Furnace, Type 300 SW	Thermo Products Corp.	6791
15.	00728	Graphite Tube Furnace With Strip Chart Indicator	Pereny Equipment Co.	7043
16.	04545	Resistance Furnace, High Temp and High Vacuum, Mod. 4611	Vacuum Engg.	8150
17.	04858	Crystal Furnace With Tank Assy. etc., Mod. 2805	NRC Equip. Corp.	11200
18.	02315	Surface Condenser(303 SQ.Ft.)	Graham Mfg.	8212
19.	00411	Spectrum Analyser, Mod. SPA 4D	Singer Matrics	8250

20.	01246	Rotary Vacuum Filter Press	Eimco Corporation	7510
21.	04067	Mass Spectrometer, Model MS-9AB	Central Scfic. Company	5872
22.	04421	Test Cylinder, Model GP-160/120/SA	Ametek Inc.	5110
23.	04421	Test Cylinder, Model GP-160/120/SA	,,	5110
24.	01237	Electron Microscope , TypePW6010	Philips	1295
25.	01674	Semi Micro Vacuum Recording Balance	Ainsworth	5139
26.	02332	Electron Beam Apparatus, MRC EBZ-93A	BBBB Material Research Corp.	21395
27.	05163	Compressor Set, Centrifugal	Energy Transformation Corp.	11720
28.	01098	Press, Iso Static, Loomis Model 220R-6-18-30	Loomis Engg. and Mfg.	5400
29.	00407	Induction Furnace, Converter Type	Ajax Magnethermic	5885
30.	00413	X-Ray Diffraction Unit and ACCS. Model XRD-6	General Electric Co.	27395
31.	04122	Rolling Mill with motor and accs.	The Fenn Mfg. Co.	10095
32.	00490	Testing Machine, Electromatic Universal	Tinius Olsen	14950
33.	00676	Torsion Testing Machine With 10,000Kg.,2000kg. Cap.	Tinius Olsen	9515
34.	05680	Creep Rupture Testing Machine, Reihl	Ametek Testing Corp.	9260
35.	05785	Electro Balanced Indication Unit, Model F400	Ametek Testing Equip.	10790
36.	02158	Vibration System for Power, Model 72	Unholtzdickie Corp.	12961
37.	02158	Shaker with Accelerometer	,, ,,	10290
38.	02158	Shaker with Accelerometer	,, ,,	10290
39.	02439	IRD Dynamic Balancing Stand, Model 109	American Avitron Inc.	5011

40.	03071	Vibration Test Equipment with Control Cabinet	Inter Ocean Export Assc.	5150
41.	00458	Spectrograph, Plane Grating	Jarrel Ash Co.	10210
42.	00701	Evaporator, High Vacuum, Model VE-401	Vacuum Electronics Co.	9058
43.	00896	Analog Computer, Desk Top	Electrinics Associates	13890
44.	01344	Visicorder No. 906T159 XFGH	Applied Physics Corp.	5200
45.	04189	Porosimeter, Model MIC903-013	Numinco	9550
46.	02356	Hot Wire Anemometer, Model D	Lumbard Testing Corp.	5400
47.	06735	Optical Mask Allignment System, Model B202	Micro Techn. Mfg. Corp.	6250
48.	05036	Detector, SPGA-3A	General Electric Co.	5640
49.	00527	Interferometer with Accs.	Intertech. Corp.	17600
50.	00651	Spectrophotometer, Model 1R4	Applied Physics	27846
51.	04128	Spectrophotometer, Infrared, Model IR-11	Beckman Instrt. Inc.	34950
52.	00512	Spectrophotometer, Infrared, Model 521 with Accs.	Perkin Elmer Corp.	34950
53.	00743	Spectrograph, Grating 3.4 meter	Jarrel Ash Co.	23755
54.	02445	Interchange Kit, ERI	Perkin Elmer Corp.	6400
55.	00746	Polariscope, PhotolasticMod.402-8-1/2	Polarizing Instrt. Co.	7320
56.	00604	Laser System	Lear Siegler	5055
57.	04391	Laser System, LH01B	Raython Comapny	17875
58.	00872	Wind Tunnel and Accessories	Princeton University	105588
59.	04122	Grooved Rolls (Set of 2) for Cold Rolling Rod	The Fenn Mfg. Co.	5050

60.	00731	High Temperature Attachment for X-Ray Diffraction Equipment Model SX-2B	Tem Press Research	6330
61.	00953	Tensile Testing Machine 5000Kg.	Instron Corp.	105588
62.	00399	Compression Testing Machine, Riehle Model, 135000 Capacity	Riehl Testing Machine	10030
63.	01325	Universal Testing Machine, Hudraulic	Tinius Olsen Machine	28060
64.	04233	Channel Strain Gage Plotter, Gilmore, Model-114	Gilmore Industries	7760
65.	04338	Geodimeter, Model 6	AGA Corp. of America	13079
66.	01035	Dynamotor, 40H.P., TypeDP-25	General Electric Co.	12870
67.	02471	Motor Method Unit with CFR-48 Crankcase Assy.	WAUKESHA Motor Corp.	8217
68.	02736	Laboratory Impulse Turbine	James Leffel Co.	9507
69.	03072	Dynamometer	General Electric Co.	7980
70.	03578	Electromagnet, Model 3800-V	Varian Associates	12500
71.	00812	Spectrometer, 3 Channel, Model Model 3303	Packard Instrt. Co.	9175
72.	01032	Computer, Channel Analyser With Taoe Control Unit	Nuclear Data Incorp.	13452
73.	02505	Channel Analyser, Model 115 400	Packard Instrt. Co.	8795
74.	04421	Pulsator, Model SC-10	Ametek Inc.	39250
75.	00104	Central Processing Unit with Accs.Model 001	IBM Corp.	33408
76.	00104	Core Storage, Model - 1	IBM Corp.	14840
77.	00104	RPQ 898005 F/C1, 8620, Model 5	IBM Corp.	17480
78.	00104	Tape Unit, Model # 1	IBM Corp.	8800
79.	00104	Tape Unit	IBM Corp.	8800

80.	00104	Tape Unit, Model # 1	IBM Corp.	8800
81.	00104	Card Read Punch, Model 001	IBM Corp.	12000
82.	00104	Alphabetical Accounting Machine, Model A01	IBM Corp.	20140
83.	01930	Tape Recorder, Type 8100	Minneapolis Honeywell	9605
84.	01025	Computer and Accessories, TR-20	Electronic Associates	15665
85.	01025	Computer and Accessories, TR-20	Electronic Associates	15665
86.	06254	Test Bench, Hydraulic, Model KT-NU-1000	Kennet Corporation	6750
87.	00733	Air Cimpressor Boing, Model 502-12B (Air Craft)	Boeing Plane Company	21870
88.	04215	Complete Flow Axial Compressor, Model AX-IA	Energy Transformation Corp.	10177
89.	03022	Wind Tunnel, Supersonic Aircraft	Aero Lab. Co.	10950
90.	02474	Open Channel Hydraulic with Accs., WF-16(107)	Ann Arbor Instrts.	7610
91.	03030	Tellurometer, Model MrA-3 Mark II	Tellurometer Company	9995
92.	03049	Steroplotting System, Model CE-101	Keuffel and Esser Company	5950
93.	01105	Lowbetta Manual System, Model DININ-A	Beckman Instrt. Com.	7140
94.	06372	Tape Recorder, Digital, Model PI-1207	Precision Instrt. Co.	6050
95.	04532	Accelerator, Van De Graff, Model AN-2000	Hi Voltage Engg.	59685
96.	00215	Spectrometer System, EPR, V-4502-12	Varian Associates	52435
97.	00240	NMR Spectrometer System and Accs.	Varian Assocates	5[illegible]20

98.	02891	Conversion Kit with Accs.	Varian Associates	12000
99.	01034	Induction Generator, Model 51-RF-20	Ajax Magnethermic Corp.	8550
100.	01702	Complete Television System with 30 Receivers	Lake Systems Corp.	36420
101.	05689	Three Parameter Data Aquisition System	Nuclear Chicago Corp.	8135
102.	04511	Synthesizer Unit, P/N 2368 with Converter	Servo Corporation of America	9579
103.	00104	General Electric Variator	IBM Corp.	6722
				$ 1640251

Items 75 through 82 and item 103 make the IBM 1620 Computer System. This listing excludes those IBM items which are less than $5000 each. The total cost of such excluded items is $13552.

APPENDIX F

Mid-Point Assessment

(1966)

Excerpts from "Five Years of Progress". 1962-66 (An Overview Report to the Steering Committee).

In 1966, as the Program neared its "projected mid-point, with five years past and another five to go, it seemed appropriate to look at what had been accomplished so far and to consider how to make the Program most effective during the next few years".

"Following plans discussed and approved by the Steering Committee, a team of eight members was selected from the Consortium Institutions. Each member had recognized standing in his field, and each had experience in the accreditation program of the Engineering Council for Professional Development. ..."

The 1966 Team membership was as follows:

Stuart W. Churchill, Chairman
Chemical and Metallurgical Engineering
The University of Michigan

Warren J. Kaufman, Professor
Sanitary and Radiological Engineering
University of California, Berkeley

Frederick C. Lindvall, Chairman
Engineering and Applied Science
California Institute of Technology

C. Harvey Buchanan, Head
Humanities and Social Studies
Case Western Reserve University

A. W. Tucker, Co-Chairman
Department of Mathematics
Princeton University

Harold M. DeGroff, Head
School of Aero and Engineering Science
Purdue University

Thomas B. King, Head
Department of Metallurgical Engineering
Massachusetts Institute of Technology

B. R. Teare, Jr. (Team Chairman)
University Professor of Engineering
Carnegie-Mellon University

In India, their assignment was to view IIT/K in the light of IIT/K's own statement of objectives. Before the team went to India, IIT/K faculty responded to questions on the ECPD Questionnaire Form, in preparation for the visit. In the first instance this was a self-study by IIT/K.

It was the opinion of the Team that in five (six) years of existence, IIT/K had made excellent progress in building a strong faculty that was dedicated and enthusiastic about teaching, research, and service to the IIT/K and India. In their report to the Steering Committee, they stated:

"The Director pointed out that it has not been an easy task to build such a faculty. Because of the innovative nature of the IIT/K the traditional type of teacher cannot make an effective contribution to it. The qualifications sought in a faculty member are: 25 to 40 years of age; a doctorate; post-doctoral experience; a potential for making a significant contribution to the total IIT/K program which includes undergraduate, graduate and continuing education, research, and professional service to industry and the nation. Only a small elite fraction of those in the right age range have the desired education and experience. Once found it is not necessarily easy to recruit them for Kanpur. With such qualifications they have to be started at the rank and salary of Assistant Professor. This is higher than the traditional beginning rank in Indian universities. (A parallel stepping-up has occurred in the United States; the rank of Instructor is disappearing in engineering faculties.) ....

".... The attractions are not financial. Some (faculty) have made material sacrifices to join IIT/K. Monthly salaries in rupees for any of the professorial ranks are about the same or less than salaries in dollars for the same rank in the United States. The mature professionals returning to India were motivated by patriotism and high ideals of service, and by the opportunity to work in a challenging and satisfying atmosphere, to build a new institution of outstanding quality in their own country, one that would take its place among the best in the world. Some of the younger faculty were attracted by its already good (and growing) reputation and by its superior equipment and facilities.

The retention of the core of excellent faculty - who are always faced with opportunities elsewhere - will require a continued drive toward better support activities and the establishment of some new ones. This means continual salary increases to meet world-wide competition, continued expansion and improvement of research facilities, and additional amenities to improve living conditions. Thus, the building of an excellent faculty will impose additional administrative and financial costs as time goes on....

.... Faculty are allowed special leave and travel expenses to attend meetings of professional societies in India. With the Director's approval they may also engage in private consulting work. The Faculty consultants must report the amounts of remuneration received and also credit one-third of the amount to IIT/K if its facilities are used.

By U.S. standards, faculty loads are reasonable in some areas. In others they are high, especially in view of the diversity of courses that some individuals teach and the work also done on curriculum building and laboratory establishment.

Retirement benefits are provided through contributory provident funds to which the faculty member and the IIT/K each contribute 8-1/3% of the base salary. Sixty is the retirement age.

Appointees at all four ranks - Professor, Associate Professor, Assistant Professor, and Instructor - enjoy permanent tenure after one year of probation. The team of visitors was apprehensive that this policy may make it difficult to build an outstanding faculty, in which every post is filled by a member who has either present or potential excellence. A faculty differs from organizations in industry and government where there is room for a hierarchy of excellence and where professionals are assisted by other (lesser) professionals. However, in the academic environment, each professor works as an individual with his own separate responsibilities. When he has subordinates, they are subprofessional technicians or students, not other faculty.

Some faculty start at the higher ranks because of sufficient professional experience and accomplishment by which they can be judged with reasonable accuracy. However, many are normally employed shortly after obtaining their doctorates, but before any significant accomplishment by which they can be judged. If this is the case, assurance that a candidate meets IIT/K standards of excellence is extremely difficult to obtain and a single year of probation seldom provides sufficient additional information. For one thing, the transition into a new position and a new environment temporarily retards professional development. For another, the nominal year melts down to a fraction of a year because decisions must be made with respect to reappointment well before the end of the year.

Permanent tenure for faculty is traditional in universities all over the world; faculty members expect it, value it

highly, and might refuse positions without it. In various controversial areas it is needed to protect the integrity of teaching. However, tenure has less significance in science and technology where there is less dependence upon personal views.

The granting of permanent tenure after only one year is a tradition in Indian universities that will be difficult to circumvent. The following alternative procedures are therefore suggested for consideration. One, to bring in new faculty even at the lowest ranks only if they have demonstrated real accomplishment. The effect of this may reduce the fraction of faculty at Assistant Professor rank. The other, to use the highest of standards in evaluating reappointment at the end of the first year....

... The students were impressive in their intelligence, alertness, personal qualities and academic performance....

Admissions to the IIT/K are by competitive examination and personal interviews. The examinations are given jointly for all the IITs, on a nationwide basis.... The very high selectivity of the admission procedure is shown by high quality of the students.

One disadvantage of the system is that students must choose their major field at age 15 or 16 when many are too young to have acquired sufficient information to choose wisely. While the top 10% are permitted to change majors at any time in the 3-year Common Engineering Program.... The rules on changing should be relaxed....

Student self-government seems to be more advanced than in the United States.... During the students' first three years a system of faculty counselors provides general counselling in academic and personal matters and recommends remedial

measures. The Student Placement Office was established in 1965.

The essential educational value of extra curricular activities is offered through the Gymkhana - a student government organization concerned with games, sports and cultural activities...."

The Evaluation Team "agreed that the various curricula" ref: Final Report - Chapter II - "were on a par with those in the best American schools.... The philosophy of education puts primary emphasis on understanding, not memorizing; on fundamental principles, not specialized knowledge.... On the other hand, it is generally agreed that the approach leans to the theoretical, and that there is a need for more application to the real systems of the engineering world in order to get the deeper understanding of theory that results from applying it....

Graduate work and research are just as important in the IIT/K as undergraduate education. This is in line with international and American standards....

In answer to the question that sometimes arises as to whether research and graduate study are needed in a developing country which is not in the forefront of technology it may be observed that the goal is to catch up with technological developments, and at the same time to adapt advances to a different milieu. Therefore, the answer is clearly in the affirmative.... Each new technology must be modified for the advancing country. Some of the developmental steps in the prototype should be hurdled rather than followed blindly. Their 19th-century problems must be solved by 20th-century methods.

India urgently needs more qualified teachers of engineering: such teachers should, of course, have the highest level of educa-

tional preparation. Professionals with the doctorate will be equally needed in industry and government. Sometimes this need is not fully recognized. In the United States, for example, one still hears leaders in industry deprecate the expansion of graduate education, but the hard fact remains that industry hires engineers with doctorates and pays them well - 75% more than those with bachelor's degrees. The tongues say 'no', but the dollars say 'yes'. ....

Cooperation between the institutes of technology and industry and government is necessary for building strong technology in India. The Kanpur-held concept includes a significant contribution to governmental, industrial, and social organizations apart from educationally-centered activities. This means that the Institute's research program will include work that is important to the nation, that its faculty will undertake development and consulting that helps industry and government, that it will offer courses to update and improve India's technological manpower, as well as making regular courses reasonably available, that it will permit the use of large facilities such as the library and computer center by industry and government (not necessarily gratis)....

These activities meet not only the obligation of service, but also strengthen the IIT/K by providing an input of challenging problems to stimulate the faculty and to enrich education....

The campus is attractive and well planned. Facilities to date (1966) are good.... Emphasis is given to interdepartmental and interdisciplinary programs and to the sharing of expensive equipment among departments.... The central-research laboratory concept seems to be working well, although some faculty members state that its facilities are not always available on an ideal basis....

What seemed of greatest importance to the Team was that engineering practice on the campus should serve as an ever-present example of good engineering to the students. As one member of the faculty put it, "Education is a 24-hour process; the student learns from all of his environment, not merely the classroom." If he sees taps leaking everywhere, he gets the idea that it is normal for taps to leak. On the other hand, if he sees around him models of good engineering, then he learns to think of this as a norm. Thus, there are not only the economic and the aesthetic aspects, but also a professional responsibility of having good engineering and maintenance throughout the IIT/K.

IIT/K recognizes its need for facilities other than classrooms, lecture halls and laboratories. The facilities to complete the cultural and intellectual life needed to attract and hold a superior faculty will include housing, schools, shopping and cultural areas - to mention a few.

The library is outstanding. IIT/K recognizes its importance and it is developing into a first-class facility.... The Institute is to be commended highly for its Computer Center... (which) ... offers a wide variety of courses to students, faculty, scientists from industry and government, and top-management personnel..."

The Team's 1966 reports to the Steering Committee consisted of separate reports in the various academic areas, and an overview from which these excerpts have been taken. The latter ended with a summary list of twenty more or less specific recommendations, on topics as follows:

i) Need for continual expension and improvement to attract and retain high quality faculty.

ii) Review of tenure and promotion policies.

iii) Review of selection procedures.

iv) Lowering of restrictions on changing of majors.

v) Relative autonomy of departments vis a' vis institutional goals.

vi) Increasing number of electives.

vii) Strengthening of Humanities and Social Science offerings; adding economics to core curriculum.

viii) More practical training.

ix) Continued development of external work, and summer and conference programs.*

x) Expansion of sponsored research.

xi) Strengthening of administrative structure (very high priority).

xii) Improving utilities services (high priority).

xiii) Improving shop facilities, services and stores.*

xiv) Better secretarial help for faculty.

xv) Improvement of "amenities" including schools,* shopping and cultural areas and medical services.*

xvi) Acceleration of transfer to IIT/K of responsibility for purchasing and cataloguing library materials.*+

xvii) Continue development of computer center.*

xviii) Improve keeping of student records.*

xix) Improve communications between faculty and administration.

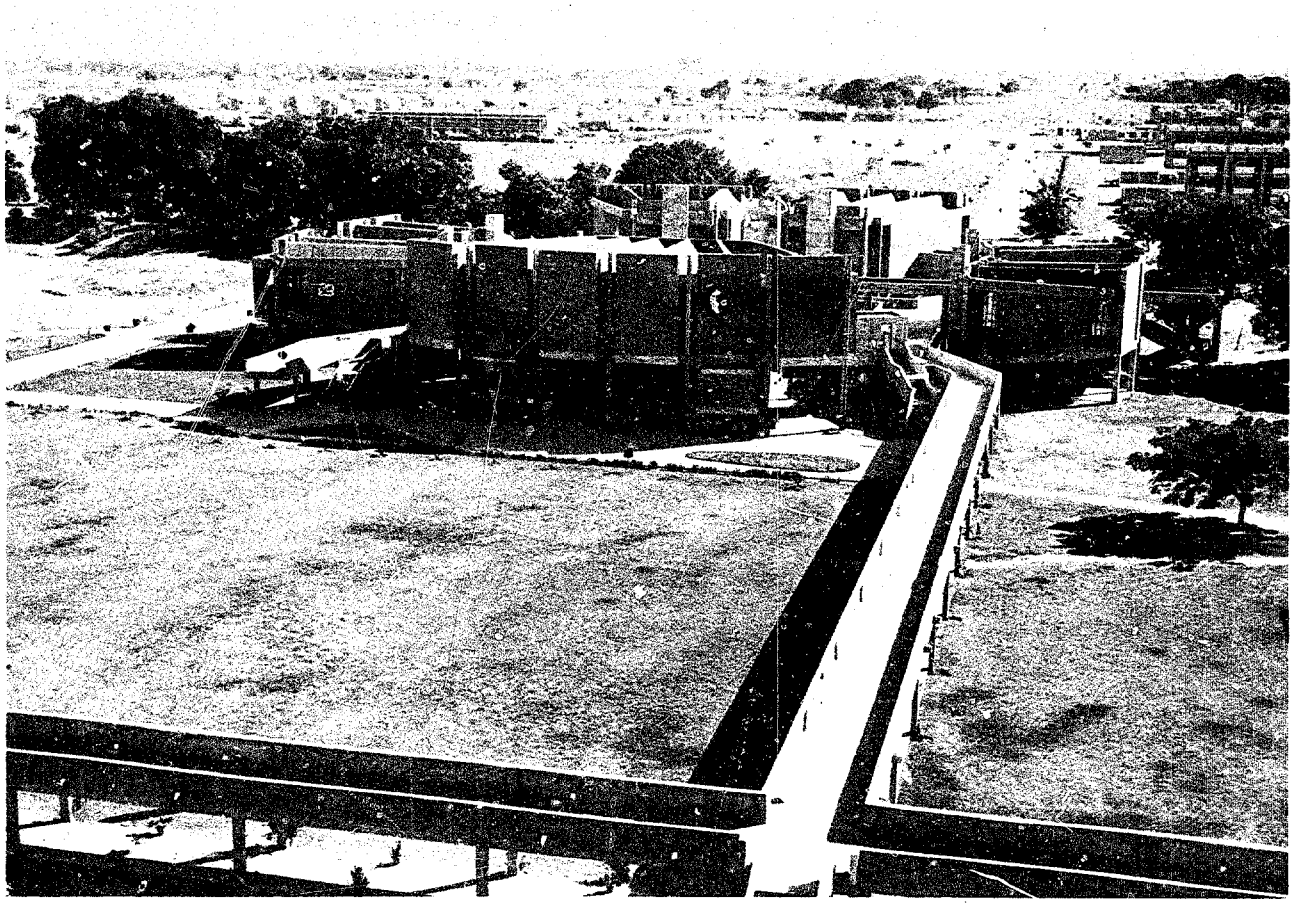
xx) Increased financial support from Government of India.

* Area in which Kanpur Indo-American Progam has been represented by one or more Staff Members.

+ Action completed, 6/70.

Conclusion (ed) All Topics that appeared in the Team's list of recommendations have been subjects for consideration by IIT/K. If sponsored research is subsumed under item xx, very substantial improvements have already been made on most of them and more are being made on a continuing basis.

Academic Buildings on IIT/Kanpur Campus
were designed by Kanvinde and Rai, New Delhi.



In foreground is the Lecture Hall Complex.
In background are Student Hostels.
At far left, rear, are Faculty Houses.

APPENDIX G

INVITATIONAL TRAVEL

IIT/Kanpur Computer Conference

"HIGH SPEED COMPUTATION METHODS AND MACHINERY - 1964"

1. Dr. F.S. Acton	Princeton University
2. Dr. R.S. Barton	Control Data Corporation Canberra, Australia
3. Dr. J. Bennett	University of Sidney Australia
4. Dr. S. Baltran	Cuidad Universitaria Mexico
5. Dr. L. Carter	System Development Corporation Santa Monica, California
6. Dr. David Evans	University of California Berkeley
7. Dr. B. Gilchrist	Service Bureau Corporation New York
8. Dr. Moriguti	University of Tokyo
9. Dr. C.L. Perry	University of California San Diego
10. Dr. A. Van Wijngaarden	Mathematisch Centrum Amsterdam, Holland
11. Dr. M. Wilkes	Cambridge University United Kingdon
12. Dr. H.D. Huskey	University of California Berkeley

Visitors to IIT for whom international travel, etc. was provided by the Program since inception

Sl. No.	Name	Institution	Month & Year	Purpose
1.	Leonid V. Azaroff		Aug. 66	Material Science Education Conf.
1a.	John E. Dorn		Aug. 66	-do-
2.	Morris Cohen		Aug. 66	-do-
3.	K. Neil Stanton	Purdue Univ.	Dec. 66	Computer Methods in Power Systems Engineering
4.	A.H. El-Abiad	Purdue Univ.	Dec. 66	-do-
5.	J.M. Smith	Univ. of Calif., Davis	Nov. 67	Winter School on Chemical Reactor Design & Analysis
6.	R.J. Adler	Case Inst. of Tech.	Nov. 67	-do-
7.	John R. Hulme	Fairchild Semiconductor	Aug. 68	Integrated Circuits Applications Seminar & Silicon Technology Conference
8.	Donald E. Troxel	Mass. Inst. of Tech.	Aug. 68	-do-
9.	Robert S. Pepper	Spraque Electric Co.	Aug. 68	-do-
10.	G.T. Whyburn	Univ. of Virginia	Oct. 68	Topology Conference
11.	John Isbell	Case Western Res. Univ.	Oct. 68	-do-
12.	A.H. Stone	Univ. of Rochester	Oct. 68	-do-
13.	R.A. Alo	Carnegie Mellon Univ.	Oct. 68	-do-
14.	D.E. Hudson	Calif. Inst. of Tech.	Oct. 68	Intensive Course on Dynamics of Structures and Foundations
15.	F.W. Hutchinson	Univ. of Calif., Berkeley	Dec. 68	All-India Symposium on Refrigeration, Airconditioning and Environmental Control in the Cold Storage Industry
16.	W.J. Weber	Univ. of Michigan	Feb. 69	Symposium on Industrial Wastes
17.	N. Khachaturian	Univ. of Illinois	March, 69	Course on Optimization in Structural Design

Sl. No.	Name	Institution	Month & Year	Purpose
18.	Ernest J. Henley	Univ. of Houston	Oct. 69	Conference on Design & Analysis of Chemical Process Systems and Short Course on Evolutionary Operation
19.	William F. Schreiber	Mass. Inst. of Tech.	Oct. 69	-
20.	J.S. Anderson	Univ. of Oxford	Nov. 69	Winter School in Solid State Chemistry
21.	Norman Menyuk	Mass. Inst. of Tech.	Nov. 69	-do-
22.	J.M. Honig	Purdue Univ.	Nov. 69	-do-
23.	Richard Arens	Univ. of Calif., Los Angeles	Dec. 69	Conference on Functional Analysis and its Applications
24.	Ky Fan	Univ. of Calif., Santa Barbara	Dec. 69	-do-
25.	J. Schwartz	New York Univ.	Dec. 69	-do-
26.	H.W. Dommel	Bonneville Power Administration	Jan. 70	Intensive Course on Computer and Control Methods in Power Systems Engineering
27.	John E. Goldberg	Purdue Univ.	Jan. 70	Course on FORTRAN Language and Computer Programming and Course on Computers in Structural Analysis & Design
28.	Richard L. Fox	Case Western Reserve University	Jan. 70	-do-
29.	Sheldon Rubin	Aerospace Corporation, Los Angeles	March 70	Intensive Course on Design for Vibration Environment
30.	Alfredo H.S. Ang	Univ. of Illinois	March 70	Seminar on Structural Safety

Sl. No.	Name	Institution	Month & Year	Purpose
31.	William G. Hunter	Visiting Prof. at Univ. of Singapore	April 70	Lectures, Seminars relating to Design & Analysis of Chemical Process Systems
32.	Ven Te Chow	Univ. of Illinois	Oct. 70	Intensive Course on Water Resources Evaluation
33.	Roger J.M. DeWiest	Princeton Univ.	Oct. 70	-do-
34.	H. Broida	Univ. of Calif., Santa Barbara	Dec. 70	Symposium on Combustion and Propulsion
35.	Robert M. Fristrom	John Hopkins Univ.	Dec. 70	-do-
36.	L.S. Beedle	Lehigh Univ.	Dec. 70	Intensive Course on Plastic Analysis and Design
37.	L.C. Tillotson	Bell Telephone Industries	Dec. 70	Winter School in Communication Sattelite Systems Design
38.	F.W. Sarles	Lincoln Lab.	Dec. 70	-do-
39.	Richard R. Hughes	Univ. of Wisconsin	January 71	Intensive Course on Strategy of Process Design
40.	Marshall Sittig	Princeton Univ.	Aug. 71	-
41.	Henry Feuer	Purdue Univ.	Oct. 71	Lectures
42.	Paula Feuer	Purdue Univ.	Oct. 71	Lectures
43.	D.R. Dawdy	Colorado State Univ.	Jan. 72	Intensive Course on Computer Application in Hydrology
44.	J.W. Delleur	Purdue University	Jan. 72	-do-
45.	Y.K. Lin	Univ. of Illinois	Feb. 72	Intensive Course on Probabilis Methods in Engineering
46.	M. Shinozuka	Columbia University	Feb. 72	-do-

APPENDIX H

Kanpur Indo-American Program

Fiscal Reports

I. DOLLAR EXPENDITURES 1962-1972

(Actual & Estimated
as of
1 June 1972 - in Thousands of Dollars)

Technical Services		
Salaries	3,895	
Travel & Transportation*	248	
Other Direct Costs	671	
Overhead	1,018	
Fee	49	
Total		5,921
Equipment		7,419
Participants		290
		$13,630

($ thirteen million six hundred thirty thousand)

*Most international transportation under this Program - including that of U.S. Staff, return to India travel of IIT/K Faculty, and dependents, and Participant travel was paid for with Rupees.

II. TRUST FUND RUPEE EXPENDITURES 1962-1972

(All Categories, Cumulative Actual and Estimated - as of 1 June 1972 - in Thousands of Rupees)

A. U.S. Personnel Costs		
Overseas Differential Allowance		3614.
Quarters Allowance		1666.
Education Allowance		804.
International Travel:		
Staff		7508.
Executive Visitors		31.
B. Local Personnel Costs		
Salaries & Benefits		3115.
C. Participant International Travel		261.
D. Commodities		276.
E. Other Costs		
Local Travel & Per Diem		1217.
Vehicle Operation & Maintenance	663.	
Collected for Non-official Use	-92	
Net to Project		571.
Office, Housing, Misc.		1426.
Freight on Project Equipment		901.
IIT/K Faculty Travel from Abroad to India (Reverse Brain Drain)		506.
F. Conferences, Short Courses (International Travel plus Local Costs)		814.
TOTAL: Rupees		22710.

(Rupees twenty-two million, seven hundred ten thousand)