Kakodkar Committee Report

NITs as Drivers for Quality Higher Technical Education - The Way Forward

MINISTRY OF HUMAN RESOURCE DEVELOPMENT
GOVERNMENT OF INDIA

Dear Madam,

A Committee was constituted by MHRD to look at NITs in the country and to make recommendations on the way forward. This was following a similar review of the IIT system.

Need for a high level of technological capability in the country in the context of growing importance of emerging knowledge economy and inclusive development that we seek, cannot be overemphasised. We need to quickly empower our vast youth resource with the capability to leverage high technology. Institutions like NITs and IITs are key assets in this context not only for development of human resource and technologies by themselves, but also through their outreach to other domains in the country engaged in similar mission.

The Committee has carried out extensive consultations to fulfil its mandate. We are happy that several of our recommendations have already seen concurrent implementation.

The Committee would like to thank the Government for the confidence reposed in us. We feel certain that implementation of all recommendations as given in this report would lead to a significant improvement in further raising the level of our institutions with greater synergy between them.

With warm regards,

Yours sincerely,

Amita Sharma *Sandeep Sancheti* *S S Gokhale* *Ashok Jhunjhunwala*

Anil Kakodkar

Honourable Smt. Smriti Zubin Irani
Minister of Human Resource Development
Government of India
New Delhi

Kakodkar Committee Report

NITs as Drivers for Quality Higher Technical Education - The Way Forward

Report submitted to MHRD

June 2014

NITs as Drivers for Quality Higher Technical Education

- The Way Forward

Kakodkar Committee Report

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Executive Summary

A committee was constituted by the Ministry of Human Resource Development (MHRD) to review the existing NIT System and suggest a roadmap for the future. This exercise was on the lines similar to that carried out for IITs and followed the Kakodkar Committee's report "Taking IITs to excellence and Greater relevance", submitted in April 2011. Some of the takeaways from that report are reflected in the current document as well.

The Government of India has set up a significantly large higher technical education infrastructure in the country in the form of institutions like IITs, NITs, IIITs, IISERs, etc. These institutions, by and large, lead the higher science and technical education domain in the country in terms of quality. Recently, the system has seen significant expansion and several new institutions have been added. NITs constitute the largest segment in this domain and students coming out of NITs have over a period of time made significant contributions to the engineering and technology scene in the country. Several NIT alumni have provided outstanding leadership in their respective fields of work in India and elsewhere in the world. To further enhance technological capabilities in the country, both in the context of quality human resource as well as technology development inputs, it is necessary to move up further in terms of excellence within these institutions as well as create greater synergy with the rest of higher technical education domain in the country.

The stories of the growth of IITs and NITs in India have followed very different scripts. The IITs began their existence under a common Act and thus developed according to a pattern similar to one another in terms of evolution, academic tradition, governance, funding and autonomy. The NITs, on the other hand, had diverse beginnings and consequently have had a more difficult task to arrive at a common standardized platform created by the NIT Act, which came later. However, with the Government of India giving strong logistics support as well as generous financial assistance, the NITs have rapidly developed to be considered among the best technical education institutions in the country. Notwithstanding their encouraging growth, the functioning of NITs still continues to be dogged by some of the legacy issues. In order to remove these systemic flaws, the Committee proposes forging greater horizontal linkages at multiple levels of contact between IITs and NITs. This will enable the NITs to emulate the successful model of growth of the IITs and institute their best practices. Moreover, a synergetic collaboration between IITs and NITs

will exponentially increase the quality of engineering education in India and significantly contribute to the national growth.

The NITs have a major role to play towards national development. They need a bold and inspiring leadership for fulfilment of the stated vision and mission. In order to transform themselves into pioneering institutes of technical higher education, NITs need to install quality assurance and quality sustenance measures in all their academic and administrative processes. The focus should be on proper policy and planning through need analysis, research inputs and consultations with the stakeholders. Some of the key areas that need to be recharged are high quality faculty, innovative research, excellent teaching, learning and evaluation methods, industry linkages, and institutional social responsibility. Moreover, the overriding aim of NITs must be to attract the brightest engineering talent in the country and shape them into excellent researchers or competent teachers. For that to happen greater synergy must be developed with IITs and other reputed institutes. The committee has come up with a number of recommendations on the above mentioned points.

Each of the 30 NITs must have an integrated framework for quality assurance of its academic and administrative activities. This will enable them to significantly contribute to the industrial and technological development of the country. The NITs must identify niche areas for strategising and implementing their action plan. Some of these are research, innovation and patent formation, collaborative undertakings with industry especially in MSME sector; S&T based societal development, etc. In this regard, the 8 NITs in the North East of India have a more challenging role to perform— to help the region to develop and be on par with the growth rate of the rest of the country.

ICT for the NITs acts like a force multiplier. NITs must deploy and upgrade the IT infrastructure and associated facilities. Each institute must facilitate extensive use of computer-aided / on-line teaching, virtual labs, e-learning resources, connectivity with National Knowledge Network, etc. Faculty must also undergo training in using high-end technology to effectively deliver pedagogical activities of teaching and evaluation. ICT can facilitate a platform for collaborative and group learning for students with continuous evaluation and feedback on an individual basis. Faculty research and student projects must also be configured with ICT tools. Extra financial support must be provided to each NIT to develop its library as learning resource center with emphasis on electronic resource management for e-learning and e-repository. The NITs must also develop resource sharing networks/consortia with IITs, IISc and foreign institutes.

It is important that NITs become active partners in the fast moving ICT enabled education paradigm not only for their own growth but also to play its part in the technological revolution in the country. The report cites specific ideas in this regard.

The key recommendations of the Committee can be broadly summarised as under:

1. Student centric learning leading to higher problem solving skills, project mode teaching, active learning in which design is an integral part and collaborative/cooperative learning pedagogies, should be the focus of the NITs education system. ICT should be leveraged for significant benefits in this regard.

2. NITs must transform themselves into premier providers of technical higher education in India. To actualize this potential, NITs must put in place systemic changes in a planned manner. Of foremost importance is to clear faculty backlog in NITs and filling of posts with young talented teachers. NITs must draw up an internal quality assurance framework on the basis of identification of thrust areas. Along with review of the teaching learning process, NITs must adopt faculty empowerment strategies that ensure continuous professional development. NIT and IIT interaction must be actively pursued over several areas of mutual benefit like faculty-student exchange, collaborative research, trainee-teacher scheme, etc.

   NITs must also aim to engage industry in providing fresh inputs and greater support in the teaching learning process. Industry experts may be co-opted in academic boards to help in designing and developing an updated curriculum. The course content must be modified with market inputs and industry application to provide students with real-life learning and to leverage gainful employment for them. NITs must also seek industry support in establishing incubation centres, research parks and entrepreneurship development cell.

3. The NITs need inspiring leadership not only achieve the vision, mission and goals of the institution but also to build organizational culture. Therefore, the selection process for appointment of top-rung officers of NIT must be stringent in standards. The posts of Director, Chairman and members of Board of Governors must be filled by persons of redoubtable credentials. They must have a proven track record in academics and administration. They must govern the institutions by following the principles of participation

and transparency. All efforts should be made to extend autonomy, create innovative practices in teaching and research, and promote mobility of faculty between IITs, NITs, CFTIs, industry and other research organizations for enhanced synergy between institutions.

4. NITs should create and adopt the best practices. They can learn and share with one another on a variety of academic, administrative, and financial matters. This could be done through frequent interaction between different functionaries of these institutes such as the Director, Deans, Associate Deans / Professor Incharge / Faculty In charge and Administrative/Finance Officers; through faculty and student exchanges in formal as well as informal ways; and, through admission processes and participation in cultural, sports and technical activities.

   Each NIT must put in place an efficient management system that will deliver its quality policy plan in all the constituencies (academic and administrative). All its systems and processes must be performance-oriented with accountability to all stakeholders and must be run in a transparent manner. Governance of NITs must be in strict accordance with the Acts, Statutes and Ordinances laid down by the Government and the Council. Each NIT must optimize resource mobilization through its R&D, consultancy, technology licensing, and alumni network. It must explore all avenues to raise significant corpus of funds to support innovative programs and research projects.

5. Any new quantitative expansion of NITs would require capital funds on lines similar to the one mentioned in the IIT Review Committee report. Funds need to be allocated to individual NITs on need basis such as up-gradation of inadequate research laboratories or phasing out obsolete infrastructural facilities. The quantum of funds to be released should be commensurate with the grading of that particular NIT. The report gives details of the process.

6. Monitoring of institutional performance should be done through a mechanism of open, transparent and fair external evaluation (for individuals, departments as well as institute as a whole) including third party rating. These mechanisms should be rigorous and periodic in nature. MHRD should grant financial incentives for better performing institutes.

7. The assessment of faculty should be done on a measurable performance grid in terms of all attributes (such as teaching,

academic research, industrial consultancy and research as well as administration and outreach) in which a faculty is expected to contribute. Methodology should also be evolved for measuring institution and department performance based on feedback and peer assessment.

8. The institute should have mechanism to identify outstanding faculty and staff who deliver high level of performance and contribute to the system in terms of key aspects of expected institute deliverables. Such faculty/staff must be recognised and rewarded appropriately.

9. NITs in the North East and J&K region have special challenges as well as opportunities. On the one hand, they must devise strategies to reach out and make engineering education more accessible to local students. On the other, they must also plan to invest human and capital resources for the development of the region and bring it on par with national growth rate. Specific recommendations for these NITs have, therefore, been made in the report.

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CHAPTER 1: Preamble

MHRD vide their order F.23-12/2009-TS.III dated 14th November 2011 (Annexure I a) constituted a committee under the Chairmanship of Dr. Anil Kakodkar to review the NIT system, to define a road map for the future of NITs, and to create synergy among NITs as well as between NITs and other national institutes like IITs, IISc, IISERs, IIITs and IIMs. The composition of the Committee and its detailed terms of reference are indicated in the order. Towards the end of the Committee's work, a few NIT Directors were also co-opted vide F.23-12/2009-TS.III dated 24th October 2013 (Annexure I b). The Committee held 21 meetings (Annexure II), had discussions with NIT Council members, Directors, and a section of Faculty, Staff, Students and Alumni of NITs and collected data related to various aspects relevant to NITs.

India's advantage in the present day world in terms of her demographic dividend is well recognized. This clearly has been a key driver to our relatively faster GDP growth. Greater technological capability on the part of our youth is expected to have a significant multiplier effect in this regard. As we move up the economic ladder in the present-day globally competitive environment, it will become extremely important to secure a relative technological edge over other nations. To attain the top position without recourse to superior innovation and technological capabilities is clearly not possible. Established institutions like the IITs and some of the better engineering and technology institutions, including NITs, have distinguished themselves in creating such an impact. However, we need to realize the performance of these premier institutions on a scale commensurate with the size of our population.

In 1981 there were only 20000 students admitted to engineering per year and many students desirous of engineering education were denied admission. Today, the situation has improved. Due to the tremendous growth in the number of both Government and private engineering colleges, engineering education has become far more accessible to the youth of this country. The next challenge that we now face is to improve the quality of engineering education. Surveys have shown that a majority of engineering graduates do not have the requisite skills to fit into the job market. There is a huge gap between what the industry needs and what our technical institutions are providing.

The challenge before NITs, therefore, is to scale up their quality of education so as to empower graduates with the skills and competencies required in a globally competitive world.

To achieve competitive technological edge, we must create, on a large scale, an innovation ecosystem where front line research is delivered through the hands of students and entrepreneurs. *In such an eco-system, there is a higher chance to translate new knowledge acquisitions into new technologies and innovative products. This should be our second and equally important challenge.*

NITs, by far, constitute the largest technology education system in the country. Thus this system has to be in the fore front in accomplishing these national objectives. There are three dimensions to quality engineering and technological education:

- To boost learning all the way up to current frontiers of knowledge in chosen disciplines in an ambiance of research that pushes the knowledge frontiers forward
- To increase learner's proficiency in procedural knowledge and facilitate the practical application of such learning in a variety of activities
- To ensure learner's acquisition of requisite skill sets for the purpose.

NITs working in concert with other technology institutions in the country, can indeed make a major contribution in this regard. Together, we need to produce a large number of high quality engineering graduates to meet the needs of our industry. We also need to feed top class students into world class research that could create technological leadership for the country and make a significant difference to industry and society around. NITs through their collective size can do this on a scale that would make a difference to the country and in the process create a model that could be scaled up even further. *NITs thus need to strongly link up with IITs, other NITs, and CFTIs to create synergy for large scale national research effort on one side and link up with industry and society to contribute to the process of national development on the other. It is expected that such efforts would also lead to a significant enhancement of the quality of education.*

1.1 NITs: Their Evolution

Eight Regional Engineering Colleges (RECs), two in each region: east, west, north and south were setup in the late fifties and early sixties as joint and co-operative ventures of the Central and State Governments concerned with a view to educate and train required technical manpower for the industrial projects envisaged in the Second Five-Year Plan (1956-1961). These institutions were registered as autonomous bodies under the Society Registration Act 1860 and affiliated to the State Universities in their respective regions. Gradually 17 RECs were setup in the country. The main focus of RECs was to provide undergraduate technical education and training in different branches of engineering and technology. Further, these RECs were also established to function as pace setters and to provide academic leadership to the technical institutions in their respective regions. In 2006 the number of NITs increased to 20 with the inclusion of three Government Engineering Colleges (at Raipur, Patna and Agartala).

The Program of Action (POA), 1992 of the National Policy on Education, 1986, had recommended that "in order to enable the RECs to effectively act as pace setting institutions and to provide leadership to the technical education institutions in respective regions, steps will be taken to give maximum autonomy and detailed review will be conducted for deciding the future thought and orientation so as to broaden their horizon by improving the existing management structure."

Whereas each of the five older IITs were setup in the fifties and sixties through liberal financial assistance and faculty-staff exchange / training with one of the leading universities of a foreign country, RECs were not direct beneficiaries of such a facility. However RECs did receive some program based assistance from time to time. One notable example of such co-operation was in the form of UK-REC Project. In January 1994, India and UK signed a MoU under the Technical Cooperation Project to provide assistance to eight RECs in four technical themes: Design (Allahabad and Jaipur), Energy (Bhopal and Tiruchirapalli), Information Technology (Surathkal, Warangal) and Materials Engineering (Nagpur, Rourkela). The objectives of the scheme were to achieve improved teaching skills, develop the curriculum,

equip the laboratories, develop management information system and strengthen links with the industry.

The Union Government according to POA 1992 setup a High Powered Review Committee (HPRC) under the Chairmanship of Dr. R. A. Mashelkar, DG-CSIR in 1996. The Committee submitted its report in 1998. The salient features from Chapter 9 "Mission Statement and Vision for Future RECs" are as under. Each REC will:

- establish a fully autonomous, flexible and transparent management system with a view to creating an intellectual academic environment conducive to the creation of conditions in which the institution can be recognized as self-regulating centre for higher technical education;
- train and educate at undergraduate and post graduate levels, engineers and technologists of outstanding ability to occupy leadership positions in the industry and profession;
- create facilities and environment to prepare students to meet the challenges of the development of the various sections of society and economy, by equipping them with up-to-date technical knowledge, analytical and practical skills, management competencies and a creative and innovative approach to problem solving;
- develop collaborative links and lasting partnerships with other academic institutions, national laboratories, industry and service sector with focus on curriculum development, training and placement, dimensions of the state-of-the-art technology, research and development, resource sharing;
- carry out research and development and offer consultancy in engineering and technology catering to the needs of the industry;
- offer continuing education programmes for participating engineers;
- undertake research and develop models and approaches for innovative delivery of educational programmes;
- create conditions in which all the faculty are encouraged to perform their envisioned multiple roles most effectively and efficiently;
- provide within the college an environment where staff are encouraged to maintain their intellectual curiosity and improve their technical expertise through a continuous staff development programme;

- ensure appreciation of special needs of rural and remote areas and take deliberate steps to address the needs through education, training and research;
- proactively encourage the selection, adoption, development and transfer of technology;
- encourage intellectual, physical, aesthetic and ethical development of students through the provision of appropriate resources;
- develop policies and mechanisms for encouraging resource generation at institute level with a view to achieve financial self-reliance in a time bound manner;
- create a culture of cost centre operation of various resources and facilities for their optimal utilization
- recognize alumni as a committed pool of resource and utilize their services for the growth and development of the institution;
- take deliberate steps to create linkages with national and international institutions and organizations through joint research, student and faculty exchange and networking of physical and human resources.

The report gave 123 recommendations on various aspects for transforming these institutions into teaching and research institutions. Most of these objectives and recommendations remain valid even today and NITs need to strive to realise them in full measure.

In 2003, seventeen RECs were upgraded as National Institutes of Technology (NIT) with greater functional autonomy and single point financial support from the Central Government. These institutes were granted Deemed to be University status (under University Grants Commission Act, 1956 (3 of 1956)) with effect from 26th June 2002. In 2006 three GCEs were inducted as NITs.

In August 2007, NIT Act 2007 (29 of 2007) was promulgated in which NITs were pronounced as Institutes of National Importance under an Act of Parliament. In May 2009, the first Statutes of NIT were notified by the Central Government. Transformation from "college" to "Institute of National Importance" status created new opportunities as well as posed certain challenges. One of the challenges for NITs was to evolve a mechanism for setting up a comprehensive academic and

administrative system after their delinking from the affiliating universities. Each institute inherited a set of problems including a significant backlog of high quality faculty as well as appropriately trained supporting staff. Notwithstanding these problems, each institute was leveraged with certain privileges that befitted its status as a National Institute, including 50% student enrolment from outside the state and availability of assured financial support. The grant of greater degree of autonomy also enabled these institutions to take several new initiatives such as modification of curriculum and introduction of new courses, promotion of research and development etc. The first decade as NITs was thus a rapid learning experience with some success stories. In 2009 ten more new NITs, most of them in the NE region, were added taking the total number of NITs in the country to 30. (Figure 1)

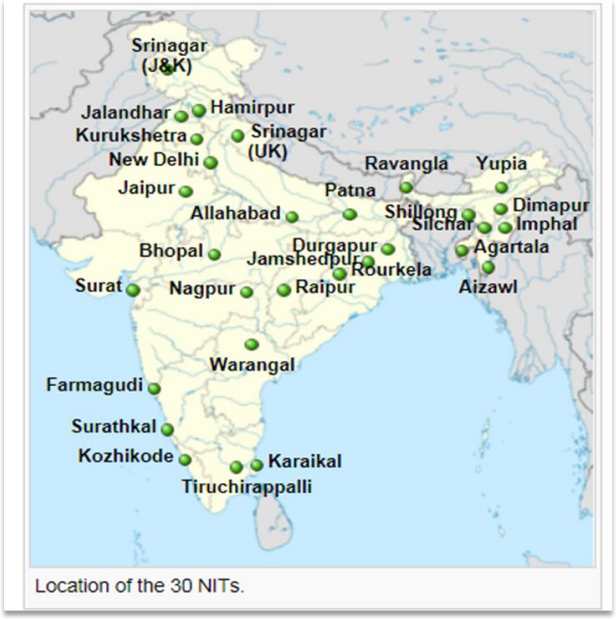

Figure 1 India NITs map

World Bank Assisted and MHRD piloted Technical Education Quality Improvement Project (TEQIP) was started in December 2002 and continued till March 2009. Even though it involved technical institutes across the length and breadth of the country, NITs have also significantly benefitted. In addition to modernizing laboratories and small infrastructural additions, the major gain was from opportunities provided to the faculty and staff to upgrade knowledge and skills. TEQIP Phase-I envisaged continuous quality improvement through upgradation of infrastructure, training of teachers, periodic visits by the auditors as well as advice by mentors which helped them to set up their

autonomous system. Currently TEQIP Phase II (started in 2011) with emphasis on research and PG education is under implementation. NITs along with other higher technical education institutions should significantly benefit from this.

Table 1.1 shows growth pattern of various NITs with respect to UG/PG intake, faculty and staff. During the past 15 years, UG admissions have more than doubled whereas PG admissions have grown 4.6 times. During the same period faculty strength has increased by merely 17% and non-teaching staff has been substantially reduced. Faculty student ratio which was 10.8 in 1998 has deteriorated to 24.25 in 2013. It is evident that there is substantial expansion in physical infrastructure (class rooms, laboratories, hostels and quarters etc.) but insignificant increase in faculty and staff to match the increase in student intake and also enhanced focus on PG education and research.

Table 1.1 REC (1998) to NIT (2013): Human Resource pattern in 15 years for 17 Old Institutes

REC / NIT	UG + PG Student Intake		Faculty		Non teaching Staff	
	1998	2013	1998	2013	1998	2013
Allahabad	NA	814 + 531	119	160	455	254
Bhopal	NA	937 + 523	150	212	518	338
Calicut	NA	1038+375	160	204	292	218
Durgapur	310 + 70	847 + 359	118	170	335	190
Hamirpur	220 + 0	529 + 425	67	110	203	216
Jaipur	350 + 54	942 + 650	167	161	432	178
Jalandhar	290 + 0	737 + 210	123	108	239	181
Jamshedpur	270 + 110	610 + 128	147	100	132	204
Kurukshetra	310 + 86	932 + 468	227	128	319	218
Nagpur	310 + 121	738 + 380	143	178	369	189
Rourkela	330 + 90	580 + 650	161	234	451	309
Silchar	220 + 0	604 + 370	77	113	311	203
Srinagar	NA	632 + 90	116	82	587	93
Surat	409 + 30	750 + 425	108	177	246	109
Surathkal	386 + 235	862 + 597	165	194	356	218
Trichy	423 + 254	884 + 524	113	231	337	253
Warangal	310 + 210	740 + 831	151	192	464	306
Total for 17 NITs	4138 + 1260	9641 + 5817	1765	2070	4194	2783

*1998 data based from Mashelkar Committee Report
NA: data not available

1.2 NITs Today

In 2013, the thirty NITs face a daunting task. Much is expected from these Institutes. These Institutes have been at the forefront in providing critical quality manpower to Indian industries as well as R & D organizations. Some of the alumni of these Institutions have become successful entrepreneurs, leading academicians, and enterprising magnates in private industries as well as major PSUs. A few have launched highly successful careers abroad and have made a name for themselves. Despite this, the RECs/NITs have not been noticed or placed in the same league as the IITs which were also established around the same time in the mid-fifties and early sixties. Some NITs have done significantly better as compared to others in R&D by conducting joint projects with foreign universities and by locating themselves advantageously in relation to major industrial centres. Nevertheless, the overall outreach of the NITs has been poor, and consequently these institutions of national importance suffered from lack of brand identification and recognition.

In recent years, NITs have been on the path of growth as was expected from them. Tables 1.2 to 1.7 below show critical data during 2009 – 2013 for all the NITs:

Table 1.2 Faculty data from 2009-2013 at Various NITs

Faculty Data	2009-10	2010-11	2011-12	2012-13
Professor	527	502	532	647
Associate Professor	818	836	881	904
Assistant Professor	1564	1492	1490	1448
On Contract	383	402	479	573
Teaching Assistant	93	98	152	178
Total	3385	3330	3536	3573

Table 1.3 UG student Intake data from 2009-2013 at Various NITs

UG Students	2009-10	2010-11	2011-12	2012-13
B.Tech Programs	175	176	176	171
Intake	13039	15114	15130	15376
Admitted	12556	14482	14938	15122
Total	43981	50943	55669	58375

Table 1.4 PG student Intake data from 2009-2013 at Various NITs

M Tech	2009-10	2010-11	2011-12	2012-13
#M. Tech Program	277	294	299	326
Intake Capacity	6179	6952	7172	7832
Admitted	3970	4465	4892	6347
Total enrolment	7105	9012	9508	10861
Degree Awarded	2640	3004	3688	3754

Table 1.5: PhD student Intake data from 2009-2013 at Various NITs

PhD Scholars	2009-10	2010-11	2011-12	2012-13
# Part Time Admitted	272	437	342	447
# Full Time Admitted	381	389	494	930
Total enrolment	953	1161	1656	2154
Degree Awarded	180	264	295	348

Table 1.6 Research Publication data from 2009-2013 at Various NITs

Publications	2009-10	2010-11	2011-12	2012-13
National Journals	1038	1340	1693	1741
International Journals	1136	1174	2253	2597
National Conference	1309	1310	1531	1336
International Conference	860	1346	1832	1454
#Books published	47	53	83	86

Table 1.7 Funding data from 2009-2013 to various NITs

Funds (Rs. Lakh)	2009-10	2010-11	2011-12	2012-13
Non-Plan				
Budgeted	61838	60430	79306	95766
Expenditure	68722	68253	83173	92220
Plan				
Budgeted	88147	118447	129329	112345
Expenditure	63508	76640	71891	96483

1.3 NITs in years to come

In the present day globalised economy and highly interconnected world, the role of technology is expanding at a rapid pace. Technology and innovation have now occupied centre stage in advanced economies as distinct from the earlier era where raw materials harvesting, processing and manufacturing of products were dominating the scene. In India, given the stage of our development, our large size, as well as the potential of our youth, we need to strive to achieve and enhance our competitive edge in all technological aspects of agricultural and industrial activities. This is necessary for garnering a larger share of the market (in India and abroad) resulting in domestic value addition.

Given this context, we need to pursue our course in three main directions.

- **Protection and rejuvenation of livelihood support infrastructure:**

Agriculture and MSMEs (micro, small and medium enterprises) are two sectors that provide the largest employment in rural and urban areas respectively. While the initial technology inputs have enabled these sectors to reach where they are today, absence of new technology infusion as well as lack of sustained linkages with knowledge and research domains are leading to the onset of saturations and loss of competitiveness. In such a scenario, the means of providing livelihood and generating employability for our youth in these sectors have become reduced considerably. *We, therefore, need to create a new paradigm of sustained engagement between the knowledge and research domain parked proximately with livelihood domains in agriculture and MSME sectors.* We need to usher in a new paradigm wherein the livelihood and technology development activities reinforce each other synergistically and ensure security of food and livelihood

- **Bridging the gaps to meet key national challenges:**

In the Indian context, food, water, and energy nexus, climate change related adaptation, sustainable energy supply, urbanisation, infrastructure etc. are some areas of crucial

importance that require integrated technology solutions. These issues are likely to become more intractable with time. An integrated approach is necessary as piecemeal solutions can lead to unpredicted consequences, which at times may do more harm than good. Quantitative understanding of issues and their solutions need to be worked out. *Thus, our higher technological institutions need to nurture comprehensive research programs that can be fed into national decision making and planning.*

- **Realisation of technology leadership:**

In today's highly interconnected and competitive world, technological leadership and innovation capabilities are key determinants of economic strength. In this context, our innovative ecosystem needs considerable nurturing and expansion. This calls for a major cultural shift from an existing silo mentality to an ambiance of networked working that leverages complimentary capabilities without unnecessary barriers. To be successful, domains of higher education, research, technology and application development, entrepreneurship and commercialisation have to be integrated into a holistic environment of optimal teaching and learning. *In the absence of a quick initiative in terms of achieving technological leadership in areas of our strength, we run the risk of one way invasion by foreign knowledge technology products into our markets that can seriously compromise our financial autonomy by triggering in economic imbalances.*

As recognised earlier, while the capacity to educate engineering graduates in the country is large enough, there is a serious question about their quality and employability. (Annexure III--Excellence in Higher Education). CFTIs and more particularly NITs have a more responsible role of creating young engineers who do not only meet the need for capable engineers for present and future engineering and technological endeavours in the country, but also effectively participate in addressing challenges linked to all the three technology need segments as described above. Clearly, the level of challenges would vary a lot depending on the specific issue being handled. We also need to recognise that the capability profile among different NITs also has a wide spectrum. There is thus a scope for every institution to select programs that they can handle and contribute to the industry/society at large.

The choice and implementation of new viable programs will enable the NITs to face future challenges by exponentially improving the quality of teaching and learning and by carrying out industry-oriented research work. *The country-wide network of 30 NITs can in this manner contribute significantly to national development, besides setting their own benchmarks of excellence.*

Shortage of faculty is a serious problem across all institutions. IITs have been a main source for providing high quality faculty to engineering education institutions through their masters and PhD as well as other specifically designed programmes. *With expansion in technical education system in the country, NITs will have to enhance their research capability and provide high quality faculty in sufficient numbers for these institutions and compliment the efforts of IITs.* NITs need to evolve clear strategies to encourage research and development, which in turn is expected to enhance quality of education at all levels. In order to achieve this daunting target/ objective NITs shall harness research to supplement technological advancements. These institutions have to act as knowledge generating centres of the country and must interact closely with one another and with other research institutions across the globe.

CHAPTER 2: NITs as the Best Engineering Education Providers in India

Education, research, and engagement with industry are the three key performance areas of an academic institution in the area of engineering and technology. There needs to be considerable synergy between these three areas. Additionally, undergraduate engineering education must stress on technological innovation and research in frontier areas for overall national development. *The Committee, therefore feels that all NITs must necessarily fulfil the role of providers of the best UG engineering education in India, on par with the established IITs and certainly better than any other public / private institute.* Further, high quality PG education and relevant research should be stressed by NITs. The key objective should be to advance knowledge and its application to fulfil the specific needs of industry and society at large. Though some of the NITs are doing well in this regard, it is necessary that all NITs come up to the desired level of excellence in due course of time.

In order to equip our engineers with the professional skills to manage technologies of tomorrow, teaching at undergraduate level should have adequate coverage of basic sciences with exposure particularly in areas of interface between new upcoming technologies and related science disciplines. Due importance should be given to research at the undergraduate level with emphasis on multi-disciplinary approach and on need-based outcome that yields products that have commercial possibilities or have practical application. This is possible only if faculty are involved in serious research activities both in domain knowledge as well as in pedagogy.

The committee has recommended a series of methods and processes towards fulfilling these objectives. Each one of them must be meticulously implemented with periodic evaluation of results.

During the past decade, most of the NITs have adopted ICT based learning (audio visual systems, LCD projectors, internet, etc.) in their institutes. The next step is extensive use of shared resources or content through NKN such as remote lectures, establishment of virtual class rooms, enhancing delivery of courses by incorporating MIT Open Courseware, NPTEL etc. In all these processes the conventional pedagogy has to be suitably modified and adopted by students as well as teachers. Use of ICT enables

multitude of activities such as incorporating external resources, collaborative learning, learning management systems as well as evaluation and record keeping. By allowing integration of audio video simulation and participation the quality of learning is expected to go up.

2.1 Leveraging ICT for high quality teaching

After years of experimentation, the use of ICT (Information and Communication Technology) by high-quality teachers and students is finally having some impact that is felt globally. Many higher education institutions worldwide are using ICT for various education related activities such as developing course material; delivering content and sharing content; conducting quizzes and tests; evaluation and feedback; communication between learners, teachers and outside world; creation and delivery of presentations and lectures; academic research; administrative support and student enrolment. Some of the programs that have created impact in the e-Learning space include NPTEL (National Program on Technology Enabled Learning), MIT open Courseware, Coursera, Khan Academy etc. to name a few. Considerable progress has been made in the NPTEL program in recent years. Khan Academy which offers free videos and tutorials on almost any topic to learners across the globe also provides tests based on their skill level and performance (Khan Academy, 2013). MIT Open Courseware by far the most popular open source online learning platform, in its eleven years of existence has offered courses on wide ranging topics and is working towards certification of courses learnt through this medium. Coursera is an initiative that partners with top Universities around the world to offer courses to students for free. The use of ICT makes quality teachers and content available to students located anywhere in the world. It is crucial to note that all of the above mentioned platforms are stand-alone and directly reach out to students bypassing the local University set up. Though they have achieved considerable success and popularity it is yet to be determined whether such a system can bring about sustained quality in education. *The Committee therefore recommends a calibrated approach, where direct-to-student mode would supplement the teaching at NIT, rather than bypass it. NITs also need to develop and deliver e-course materials using various platforms like MOOCs (Massively Open Online Courses) etc.*

The power of ICT can be used to enable newer and better methods of teaching by creating interactive and engaging educational contents. It can be potentially used to establish a student-centric approach to teaching and learning by encouraging inquiry, invention, interactivity and learning by doing. NITs should leverage ICT in improving pedagogy and the quality of content in the following ways:

- **Live delivery of high quality lectures using video on high speed internet:**

With NKN (National knowledge Network) connectivity being established, it is possible to connect the best teachers from IITs and NITs to a large cross-section of students across the country. *Top faculty from premier institutes can deliver live lectures to students situated in different colleges and also use high quality multimedia resources to illustrate and consequently enhance the learning of a wider student community. The idea behind such lectures is not to bypass the local classroom set-up or the teacher, but to complement local teaching. Each class could have at least one course for which live lectures are delivered every semester for all the NITs simultaneously. These sessions can be carried out for 1/3rd of the number of lectures allotted to a selected course and can be delivered live by the best faculty in the country via communications hardware and certain software to students from different colleges. These sessions will simulate and bring into play the dynamics of any live classroom session with the added dimension of technology-enriched content and delivery through screen sharing, 'push to talk', text chat, etc. The goal would be to utilize high quality pedagogical resources - human in the form of skilled instructors as well as technological like multimedia resources, to make learning accessible and assimilable to the student community at large.*

The technology for this is mature and ready. Such programmes can commence within the next six months and can be scaled fairly soon.

- **Interactive eBooks:**

ICT tools can be used for the creation, distribution and sharing of multimedia content, which will provide a rich educational experience to the students. For example, tools for publishing and creating interactive eBooks (Electronic Books) for

courses have been developed in the last few years. In these interactive e-Books, the core textual resource can be augmented with appropriate videos, animations, illustrations, translations, links to external reading material, quick presentations and quiz/assessment modules. Dictionary and translation tools can also be embedded to make these e-Books a comprehensive self-learning tool. Taking it a step further, creating a collaborative learning forum for discussion and text chat capabilities in the eBooks will enable students to interact with each other while reading the eBook as well as post doubts and comments on the forum. *Along with the designing of such interactive eBooks, efforts have to be taken to encourage teachers from premier institutions to create content using such tools and to aid in their adoption by the students. This has to be done pro-actively in the next few years.*

- **e-Quizzes and evaluation:**

The use of ICT in education also presents educators with the scope of using innovative methods to test and assess the learning outcome of students. Conventional techniques of evaluation can be replaced with creative alternatives such as educational games. Subjective (exact answer) as well as objective (short answer/ essay type) tests can be conducted and evaluated using ICT tools, where the scope of evaluation can be both computer based and human based. Furthermore, continuous monitoring of performance is also possible. *Adopting ICT for conducting quizzes and evaluation would not only be more attractive for the students but will also aid instructors to test the learning competency of the student in a more effective fashion. The wide usage of these testing mechanisms will boost the quality of the entire teaching, learning and evaluation process.*

- **Student performance tracking and feedback:**

Of all the advantages brought in by technology, the greatest is its scope to individually track student performance and provide feedback on: when did the student study, how long did he/she study, which section did he/she spend more time on, how many times was a quiz attempted and other such information. *Analysis of the collected data can be provided in the form of reports to the student, teacher, parent and other stakeholders involved. This way, educators will able to get a clear understanding of the strengths and weaknesses of student. Teachers will also be enabled to*

customize their lesson plans, teaching methods and evaluation techniques according to the needs and capabilities of students.

- **Platforms for collaborative learning and group learning/ Tutorials:**

Group learning in the age of technology can be extended beyond the limitations of time and space. Tutorials are an important supplementary e- educative tool based on the concept of peer learning through pre-planned informal study circles. It brings together students and teachers on a web based platform simulating a classroom set up for both teaching and learning purposes.

The collaborative nature of these study groups will enable more effective delivery of new course content and foster participatory learning with/without the virtual presence of the facilitator. This web based application essentially looks to integrate crucial aspects of follow-up and revision into current curriculum delivery practices through a virtual interactive mechanism that is both synchronous and in real time.

Virtual groups can be formed to view a video (a recorded lecture), share a document, read a book, or any other resource in a synchronous fashion while being able to text, audio and video chat simultaneously. This results in synchronous learning and enables an ICT based collaborative learning/tutorial platform. Such tutorials augment the learning done by any student in a classroom.

- **Virtual labs for lab experiments and practical learning:**

Majority of educational institutions in India lack good laboratory infrastructure due to the high costs involved in setting them up. In this scenario, technology alternatives that can overcome these constraints and supplement classroom teaching are gaining popularity all around the world. Virtual labs are an upcoming technological component that looks to provide virtual hands-on experience to students on experiments undertaken remotely at a premier institute. By creating an opportunity to work on a real lab experiment tailored to suit their syllabus and curriculum, it provides students and teachers alike, a chance to access resources and material normally available only to select students at a few premier institutes.

Virtual laboratory is one such tool that consists of several technologies such as simulations, animations, videos and remote triggered experiments which facilitate user interaction. Also, it

allows for institutions to share costs and enables proliferation of quality labs. By setting up virtual labs across the country, students can complement learning by doing. As mentioned previously, it is one of those few technological options that enables cost effective and space saving opportunities for innovative learning and thinking.

Some of the NITs are already an integral part of virtual Labs initiative. This should spread across all NITs in a time-bound manner.

- **Direct to Student Open Online Courses:**

Open courses are online courses that aim at large scale interactive participation and open access via web. They are typically courses which are not credited and are available free of cost. In addition to conventional educational resources such as reading material, videos, problem sets etc., they also enable the creation of an interactive user forum of students, teachers and tutors.

The initiative to use and support MOOC in NITs should be augmented.

2.1.1 Expected benefits for NITs

The committee believes that by leveraging ICT, the following benefits can accrue to the participating institutions.

- High quality pedagogical resources that have so far been available only to students in select institutions will now be available to a wide cross section of students. These include qualified and skilled teachers as well as well-crafted content.
- An active learning environment can be created to ensure greater student involvement and interest, for example, tutorials that aim to engage students in an interactive set up for group study purposes.
- Engineering labs are expensive to set up and require skilled manpower. Hence, students in several colleges do not get exposed to many hi-tech labs. Virtual Labs will fill that gap by making available these labs to students across the country. This will greatly improve the quality of engineering education being imparted.

2.2 Teaching by Industry personnel

This is discussed in detail in section 3.2.3

2.3 Group Learning: Partial evaluation in groups to encourage students to learn and perform in groups;

The prevailing examination system in the NITs (and in almost all educational institutions in India) evaluates students on the basis of individual performance. However, once a student graduates and joins the industry, assessment of his/her performance is done not only as an individual but also as a team player. Therefore the ability of an individual while working in a group matters. Unfortunately, today's education neither develops it, nor tries to measure it.

It is also known that students learn best in a group because collaborative learning motivates even weak learners to catch up with the better ones. *Hence, NITs should include group performance in the evaluatory mechanism of students and give due weightage to such activity in the individual's score. Each institution could evolve its own mechanism for this purpose. Some indicative ideas are given below:*

At the time of joining the institute, students may be grouped together in small groups (eg. 10 students across departments in a group). In some select courses in the first year (eg. in three to four courses), certain small percentage (eg. 15%) of marks may be allotted to group learning. The average marks of all members of the group in the subject could be taken as group marks earned by each individual. Alternatively, the group marks can be determined by making students participate in group discussions or project presentations. The remaining larger portion (eg. 85 %) of marks will be based on individual performance. The outcome of such learning and evaluation will help develop in the students knowledge as well as skills like leadership, team bonding, etc. The National Education Policy also highlights the importance of skill-formation along with knowledge formation as necessary attributes of a 21st century graduate. By incorporating group-based learning and evaluation, the NITs will thereby align their practice with directives of the national policy.

From second year onwards, the groups may be reconstituted, this time the group being formed by few (eg. 10)

random individual members in a department. Again, in select courses (three to four courses in each year), a small percentage (eg.15%) of marks will depend on group performance (may be determined through group discussions), whereas the larger portion (eg. 85%) will be assigned to individual's performance.

In the final year project, students may be encouraged to form groups across departments and work together on a project to address a real life issue/product development involving interdisciplinary capabilities. Each such project should be eligible for up to 15% bonus marks which should be given during evaluation of the project.

Group learning activities should have similar evaluation pattern which is decided through a discussion at an appropriate forum.

2.4 Strengthening NIT Faculty

NITs cannot become the institutes providing the best engineering education in the country without having top-quality faculty. *In order to realize the avowed objective of NITs, it is necessary to bring in some changes. First, NITs must attract and hire high quality faculty and clear any backlog in recruitment drives in the future. Second, the senior/existing faculty should also be motivated towards excellence in teaching, technology development and research, to help institute reach better category as envisaged in section 3.1. Following initiatives may be worth pursuing in the immediate future.*

- *Faculty should undertake academic industrial sabbatical to upgrade their knowledge and skill to fulfil the ever changing demand and requirement. Faculty should ensure academic rigor and excellence along with the research.*

- *International faculty/experts may be invited to NITs in visiting/adjunct mode of teaching assignment. Their expertise and experience will add value to pedagogy and research for the benefit of faculty and students. It is suggested that to begin with the number of such faculties can be limited to 5% of the sanctioned strength*

- *Faculty recruitment shall be as per four tier flexible system following the broad guidelines of MHRD and*

decided by individual BoG considering various aspects mentioned in 2.7.1. All the regular posts are direct recruitment posts and should be filled by rolling advertisement and / or periodic open advertisement at all India level. At least 50% of the faculty in any NIT must be recruited from states other than its own location. Due care shall be taken to fulfil the GoI reservation policy.

- *Faculty appointments at all levels should promote interdisciplinarity wherever possible. To support such requirement, joint appointment of faculty with industries and between two departments / centres should also be facilitated by respective BoG.*

- *BoG should spell out the duties and responsibilities of faculty, expecting 40 Hrs of working / week. Apart from teaching, faculty should carry out academic and industrial research and consultancy and also carry out administrative responsibilities from time to time and extension services.*

2.4.1 Motivating the best UG students in the country to be the faculty tomorrow

Currently, there is a severe shortage of faculty in technical education in the country. The proposed scheme is expected to fill the gap between demand and availability of quality teachers by encouraging fresh NIT graduates to take up teaching positions in their alma mater while simultaneously pursuing their Masters cum Ph.D. program from the IITs. The scheme should be available to top 15% of the engineering graduates who can fulfil their aspirations to receive their degree from leading prestigious Institutes in the country. The present faculty crunch could also be partially solved by implementing the "Trainee Teachers" scheme as proposed herein.

The Objective of the program is to enhance teaching quality and to address the faculty shortage issue. Some of the best engineering graduates (i.e. top 15% meritorious students from the IIT, NIT, IIIT, IISER, NISER and other AICTE/UGC approved Institutions/Universities) should be motivated and mentored. They would be appointed as Trainee Teachers at NITs. While initially they would assist in teaching, they would simultaneously go

through part-time M. Tech. and Ph.D. programs of IITs to acquire higher academic qualifications, which is a pre-requisite for faculty at NITs and IITs. Following are the broad objectives of this scheme:

a. To create high quality teachers

b. To provide attractive teaching-cum-research career path to the UG student

c. To enlist bright UG students under the **Teach and Earn while you Learn** program and provide them with top class training for vertical mobility and career progression as teacher or researcher.

The key Aspects of the Scheme would require each NIT to work out a perspective plan for faculty recruitment for next five years based on existing vacancies, projected growth, faculty recruitment through other channels, retirements and expected resignations. The plan should be considered and approved by the respective BoG keeping in view that it is consistent with MHRD approved projections and norms for the institute. The number of Trainee Teachers to be admitted in a year should be determined by distributing the admissions roughly equally over a period of five years. The perspective plan for faculty recruitment should be reviewed periodically. Concurrently other channels of recruitment of faculty should also be pursued and should be factored in the perspective faculty recruitment plan. More details of the proposed scheme are provided in Annexure-IV.

The scheme will be financially supported and reviewed every year by MHRD and after 3 years by an external committee. The number of teachers recruited through trainee-teacher program could also be a factor towards tier-evaluation of the NIT.

2.4.2 Continuous Teacher Training Programs and Certifications

Along with recruitment of quality faculty, it is equally important to ensure continuous upgradation and enrichment of faculty. The proposed plan aims to achieve this objective by developing a teacher training program that will be implemented in all NITs.

The broad guidelines for the program include:

A teacher training program should be accompanied by evaluation and certification. Five levels of program, involving training, evaluation and certification is proposed.

Each level could be a sixty days program spread over a period of two years. It could consist of two five to eight days programs, which are conducted in person as summer or winter-school, at some of the best institutes in the country. The remaining programs may be offered as on-line programs by making use of NKN or any other available network. The virtual sessions may be conducted on Saturdays with live or pre-recorded feeds in the form of lectures, tutorials, lab demonstrations, etc. Each program would involve assignments and evaluation, and certification would be provided only on the successful completion of the program by the candidate.

The five-level certification course would focus on content as well as pedagogy. A young teacher is expected to clear the five levels in ten years. On clearing each level of certification, the teacher should be incentivised by the Institutes..

The evaluation could include recording and examining of some of the regular classes of the faculty.

The number of teachers at various level of certification could count towards tier-evaluation of the NIT.

2.5 Strengthening and creation of infrastructure facilities

Keeping in view the growth plan and objective of the institute, the physical infrastructure should be created / strengthened on need basis which is commensurate with the vision, mission and objectives of the institute. The present report makes its recommendations on the basis of a primary assumption, which is that continuous creation and up-gradation of infrastructure is central to any institutional growth. The following are some of the suggested measures:

i. Some of the facilities could be created in form of department, centre or centre of excellence etc, a few of which may be permanent and other can be of limited period of existence.

ii. All such departments, centres etc. should have critical mass in term of human resources, financial support and physical infrastructures etc.

iii. The earning out of corpus funds (institute main corpus fund and deprecation corpus fund) should be used to create

critical infrastructures or germinate new initiatives as decided by BoG.

iv. The institutions should have a memorandum of understanding for sharing of costly resources amongst NITs and CFTIs, especially those that are nearest to each other.

v. For optimal use of the space of the infrastructural resources, mirroring of academic time table may be considered.

vi. The laboratories / library facilities (equipment / softwares) should have requisite specification / capacities to support teaching learning, research, consultancy, testing and other such activities.

vii. Where ever possible NITs should operate on fully residential mode for faculty, staff and students. Special residential facilities should also be created to attract international students as well as faculty on campus.

viii. Where ever possible creation of infrastructures like hostels and maintenance of buildings (both academic and residence), roads, electrical works, water supply, greening of campus, IT etc. shall be outsourced.

ix. Controlled / guided use of infrastructure and lab facilities (equipment and software) should be promoted for better internal resource generation through avoiding duplication of facilities and sharing of high end resources.

x. Alumni / industrialist etc. should be encouraged for creation / contribution to endowment funds and development of targeted infrastructural and research facilities.

xi. Aggressive / active use of funding avenues from national and international (FIST) should be taken up for development of infrastructure in niche areas.

xii. NITs should proactively work towards creating electronic / smart campuses supported with wired and wireless network with adequate capacities, reliability and security.

2.6 Motivating best UG students early towards R&D Career

One of the key drivers of national growth is cutting-edge research and development. It is, therefore, incumbent on NIT policy makers to formulate action plan that will encourage bright B.Tech students to pursue research in the latest disciplinary trends. Only path-breaking research with industry orientation undertaken by young scientists will make India the preferred destination of research tie-ups with multi-national companies, besides fulfilling the expectations of local industry. Furthermore, it is the research output of NITs and IITs that will strengthen the triple helix structure of university-industry-government.

NITs have bright B. Tech students. But only a few of the top fifteen percent opt for research career in India. A program to enable such B. Tech students, at the end of 3rd year, to go for a direct PhD at IITs is being designed. They would complete the fourth year credits at IITs (which would be transferred to NITs for award of their B.Tech degree) and move on to do their qualifying examination and pursue research. In this mode a student is expected to complete PhD in about five years. There would be no compromise in academic standards. It is expected that such a scheme would be floated by IITs and the students of NITs could take advantage of this.

GATE qualifications will not be required for the students who are in top fifteen percent of their class at NITs for being considered for direct PhD admissions at IITs. If they get selected, they would carry out their fourth year program at IITs. It is proposed that ten courses at IIT should be treated as equivalent to fourth year's credit requirement at NITs for award of the degree.

Top rated NITs could also start a similar scheme after some time following a review.

2.7 Evaluation and Reviews

In order to be recognized as premier centres of engineering education both nationally and globally, the NITs must subject themselves to a process of continuous evaluation and gradation. The process may include internal and external auditing of all processes and systems that are related to institutional academics and administration. Periodic evaluation of the NITs by Third Party

Rating must be made mandatory to ensure quality sustenance and quality enhancement.

2.7.1 Annual Faculty Review Process

For effective and efficient functioning of an autonomous Academic Institution, attention to be given to multiple spheres of activities such as high quality teaching, research, administration, policy making, setting vision, defining strategy, managing relationships, academic and financial planning etc. Whereas it should be the endeavour of both the teaching faculty and non-teaching staff to work in unison for the progress of the Institute, it is equally important to identify personality traits and individual professional strengths in each of the spheres of the activities mentioned above. One needs to nurture these to build both academic and administrative leadership which are most essential for the enhanced performance and growth of the institutions.

In principle, the respective Board of Governors should decide roles, responsibilities and review or appraisal process for the faculty and the non-teaching staff of the NIT. However considering legacy issues, broad non-prescriptive guidelines need to be formulated to minimize anomalies and major disparities or discrepancies amongst various institutions. RECs were primarily undergraduate teaching institutions until a decade ago. Over a period, NITs are expected to be research universities similar to IITs. Two major distinctions between IITs and NITs are (1) relatively smaller numbers of faculty in NITs compared to IITs and (2) currently nearly 30% faculty in NITs is without PhDs as opposed to 100% faculty with PhD in IITs. This has a significant bearing on the specific job requirements in terms of (a) NIT faculty would be required to undertake/share greater administrative responsibilities, (b) faculty without PhD would have to spare considerable time in achieving the higher degree (PhD) and (c) on account of (b) above, unable to attract any significant research grant or devote more time for other activities including academic, industrial research-consultancy and administration. *Therefore, Boards of NITs must define and institutionalize a faculty appraisal process that rewards teachers for doing quality work and motivates them to raise the bar in academic excellence, research innovation and administrative efficiency. This scheme of professional evaluation will help faculty in actualizing their*

potential and transforming their respective institutions into centres of excellence.

All the activities carried out by the faculty should fulfil personal professional aspirations and should align with overall goals of the department, institute, society and nation at large. Faculty of NIT is expected to engage in the following four major activities with indicative percentage time allotment for each:

1. Teaching (UG/PG & B Tech Projects) 35-40%
2. Academic Research (PG/PhD Guidance) 15-30%
3. Industrial Consultancy and Research 10-35%
4. Administration and Outreach 15-20%

Faculty member is expected to address these components in varied measures depending on aptitude, competency and time management. The faculty evaluation/appraisal would be against each of these four areas. The percentages mentioned above are only indicative and may be suitably altered by the Board as the institute progresses towards becoming Research University. Due weightage of the above should be given during promotions, awards and additional assignments.

For freshly inducted faculty, orientation program should be organized to familiarize them with duties, responsibilities and avenues for professional enhancement. In the initial stages, the faculty may focus primarily on teaching aided by the mentoring support of senior faculty. For all other items (2, 3 & 4) new faculty should be co-opted along with senior faculty to provide handholding in the initial stages. For example, considering the fact that most of the non-PhD faculty would not be able to apply independently in the Industrial Consultancy and Sponsored Research, s/he should be inducted as a co-investigator.

For teaching aspect, effective course and instructor evaluations should be considered. Such evaluation is primarily used for course improvement, promotion, teaching award decisions and assigning students for internal projects and course support in the form of Teaching Assistants. Such a course and instructor evaluation is only one of the indicators of teaching effectiveness and should be used in conjunction with other measures of teaching quality such as student learning outcomes, observations, document analysis, self-review etc.

In addition to the teacher-evaluation being carried out for each course, each NIT faculty would be required every year to carry out a self-appraisal. The appraisal would begin with detailing his / her next year goals, including time planned for each activity. The goals could be provided in four categories consisting of (i) Teaching courses and B.Tech / M.Tech project guidance, (ii) Academic Research including Research Guidance, (iii) Industrial Consultancy and Technology / Product Development (including incubation of companies) and (iv) Administration and Outreach. For each category the plans for the next year and percentage of time spent would be estimated.

The second part of the appraisal would consist of self-evaluation and rating carried out by faculty as against the goals and plans set-out previous year. In some detail, evidence of each activity and reasons for rating would be provided.

Apart from teaching, for other aspects, individual faculty should submit annual self- assessment report that includes:

- Statement of the faculty member's accomplishments and professional activities during the review period
- Statement of the faculty member's plan for the future in teaching, service and research as applicable and any additional requirement
- Brief explanation of how faculty member's activities connect and support the mission and expectations of the department/section and the Institution

These essentially should be very brief and limited to a page so that the review process does not become cumbersome. Above statements in faculty's own words would bring ownership and accountability. Attempt should be made to balance assessment both in quantitative as well as qualitative terms.

Review Committee would comprise the Head of the Department as Chair, senior faculty from the host Department and one other senior faculty from the allied Department. Critical comments – both positive and negative should be communicated to the concerned faculty in writing.

In case of senior faculty, including Professors, Head of the Department, Deans, the review will be carried out by a committee comprising two members of the Board of Governors. Performance

of the Director may be assessed by the Chairman, Board of Governors and MHRD HE Secretary / Additional Secretary, albeit with different set of parameters. If required, the committee may seek to meet the concerned faculty in person for interaction, suggestions and guidance.

Clarity, transparency, unbiased professional approach in the review process will bring in the confidence amongst all the concerned. Review period should cover the complete academic year and the calendar for the same should be announced at least couple of months before the end of the academic year.

Superior Faculty performance could be based on weightage attached to (in the order of merit) innovations in teaching, Awards, Books, Publications & Articles, Citation in High Impact Journals, Grants received, administrative responsibilities, outreach activities etc.

Systematic performance appraisal and evaluation may be used for deciding annual pay raise that will depend on the market forces. Sustained superior performance over a specific period should merit awards of excellence in three distinct categories: teaching, research, and administration. These awards for the faculty will be decided by the Board of Governors.

The appraisals each year would be examined and commented upon by a departmental-level committee for young faculty and institute-level committee for senior faculty. Once in three years, the self-appraisal for the past three years (including comments of the above committee) would be sent for external peer-review.

2.7.2 External Evaluation of Institutions

The external institute evaluation would be carried out at departmental level and institute level.

The Departmental Visiting Committee (major and minor) will carry out comprehensive departmental audit every year. However, in alternate year, the review will be minor (one to two days visit) and major (two to three days visit). The objective of the Visiting committee would be to push quality in teaching, R&D, industrial collaboration and leadership and the evaluation is expected to enhance academic and research programs in the department. The committee would be appointed by the Governing

Board of each NIT and would consist of two members from the academia and two representatives from the industry. Each person would have tenure of four years and half the team is expected to retire every alternate year.

Each NIT would have to undergo an 'External Institute Minor Review' once in three years and a 'Comprehensive Review' every six years. This review would be used in determining the tiered rating of the institute.

One of the objectives of the external review is to bring all the NITs under the same benchmarks for their collective growth and brand building. The review is also expected to understand the critical parameters of the functioning and improve upon them on need basis, to bring better transparency to the functioning of NITs, particularly, at the higher level of planning and execution, to evaluate overall NIT system as well as individual NITs on broad parameters and to permit funding of the Institutions based on their overall performance.

The review committee would be set-up by the Governing Board of NITs and the names of the committee members would be approved by the NIT Standing Council. The review committee would consist of two reputed persons from academia, two persons from the industry, one eminent citizen and one NIT alumnus. Each member is expected to serve a maximum of nine years, with a third of the members to retire every three years.

2.7.3 Third Party Rating of the NITs

To strengthen itself and to become the best engineering education institution, NITs have to subject themselves to extensive review, evaluation and rating on a continuous basis. This would also include a Third Party Rating involving continuous survey of students, faculty and stake holders, yearly internal and external peer-review of faculty as well as departmental and institute level periodic evaluation.

NITs should provide information which showcases its technical education ecosystem including its structure, details of various institutions, overview of technical education as well as information for students including admission process, scholarship / loans, awards etc. on its websites. The website should also contain details like programs offered by each institution, faculty and their qualifications, fees for various courses, recognitions, quality of

programs, accreditation details, infrastructure provided by the NIT, alumni, placement record etc. in a standardised format. The information needs to be constantly updated.

NIT Council should appoint a reputed agency to assess the quality of information submitted and rate the institutions using a common methodology. The established Indian rating agencies like CRISIL (Credit Rating Information services of India), ICRA (formerly Investment information and Credit rating agency of India Limited) and CARE (Credit Analysis and Research Ltd), which have a credible history of assessment and rating and independent review of industry, could be asked to provide this service.

The rating agency would carry out continuous on-line and in –person survey of students, faculty and other stakeholders. In order to provide a proper overview of this whole exercise, NIT Council should create a Committee comprising experts from academia as well as industry to assess the rating process and methodology, to review efficiency in execution and to advice on policy matters.

These ratings would be in addition to the accreditation done by NAAC (National Assessment and Accrediting Council) /NBA (National Board of Accreditation) and other such quality monitoring agencies.

CHAPTER 3: Excellence in Product Development and in R&D through Industry Interaction

It is by institutionalizing and consolidating the concrete measures that are spelled out in this development road map that the NITs can achieve global reputation and brand recognition. A systematic implementation of our policy plan in a phased manner with internal quality check mechanism will ensure that the NITs can truly fulfil the vision and mission for which they came into being in the first place – to be one of the best providers of engineering education in India. Their reputation should make them the institution of choice for young high-school graduates in India and abroad. The thirty NITs, as they mature, are expected to take about 30,000 UG students every year. *It is important for each NIT to strive that the closing rank in entrance exam is not more than 1.5x of the total seats that they have.* Since the admission process has reservations, in each category the closing rank should not exceed 1.5x. When this kind of quality assurance at the entry level into NITs is in place, they will have the platform to leap frog to higher levels of excellence.

3.1 Moving on to the next Tier

Moving on from being the best teaching institutes, each NIT should strive to become and be known as an institute leading in technology development with a strong industrial interface and / or an institute having a strong research focus. The best institute would be indeed leading in teaching, in technology-development (with industrial interface) as well as in research. The present Committee sets high expectations from the NITs. The proposed plan envisages the gradual transformation of NITs from flagship providers of engineering education to leading lights in technology development in the country. In order to fast track this transformation, the NITs must develop strong vibrant linkages with the industry and produce pioneering research. In order to realize this aim, the Committee proposes the following three-tier plan for grading each NIT.

Tier AC: *An institute with Excellence in Teaching and developing in technology development and in Research*

Tier AB: *An Institute with Excellence in Teaching + Excellence in either technology development (industry interaction) OR Research and developing in the other*

Tier AA: *An institute with Excellence in Teaching + technology development (industry interaction) and Research*

NITs should be graded to belong to one of the three tiers. Each institute may want to have excellence in teaching cum technology development cum research and their desire to progressively move in the direction needs to be encouraged. However, at each stage, they must show that they have excelled in each of the functions as they move up the tier.

The tiers could be awarded based on

a. Departmental Visiting Committee Report
    i. Program education objective
    ii. Program outcomes
    iii. Departmental infrastructure and labs
    iv. Curriculum upgrade

b. NIT review done once in three years
    b1. Academic and industrial research and interaction
        i. Level of engagement with Industry
        ii. Research output including resources generated
        iii. R&D projects, Patents and awards
        iv. Number of UG students joining directly in PhD program
    b2. Teaching enhancement
        i. Number of teachers who have participated in trainings at different level of certification.
        ii. Number of teachers engaged in Industry sabbaticals.
        iii. Use of ICT enabled learning
        iv. Group learning activity
    b3. Administration and Governance
        i. Training and Placement
        ii. Faculty recruitment and retention.
        iii. Skill upgradation of faculty and staff
        iv. Number of teachers who have been hired through teacher-trainee scheme

c. Feedback from Stakeholders
    i. Students and parents
    ii. Faculty and staff

iii. Alumni, Funding Agencies, NGO, Industry, Govt Departments
iv. Overall rating

The tier-award will be done by a committee nominated by the Standing Committee of NIT-Council. It will have members from academia as well as industry. Institute at different tiers could be given different levels of autonomy as well as incentive / support in terms of funding. .

3.2 Technology Development with Strong Industry Interface

There is one NIT in each state and many of them are situated in smaller cities/towns. A significant percentage (50%) of their UG intake is from within the State. *NITs could turn their location into an advantage, if they can contribute significantly to industrial sector development in the State. In fact, the best NITs, over the years, would convert their location into a large industrial hub in the State. This does not mean that they would not work with industries outside their State. To begin with it should explore opportunities to work and interact with any industry anywhere. However, the long-term goal would be to become a centre of industrial hub for the concerned State.*

3.2.1 Today's Institute Industry Interaction Scenario

Today, Indian academia has relatively little interaction with industry. Most of the times, the faculty and industry leaders speak a different language and do not understand each other. Academia is focused either on teaching or academic research with the sole aim of publishing in journals. Academia would like public and private industry to support their research. However, most of the funding for R&D projects currently comes from Government agencies such as DST, DRDO, DAE, DIT etc. Industry largely imports technology as they need quick results yielding commercial success. Very few industries do in-house R&D as they do not have full confidence in the Indian academia and when they do, they tie-up with foreign universities.

The only interface that industry has with academia is meeting their HR requirement. The industries, by and large, have complained that the graduating engineering students are not job-ready. In fact, a series of industry-sponsored reports over the last

few years confirm that nearly 78% of engineers who graduate each year do not possess even the minimum knowledge and skills required to be hired by companies. In the last few years, some of the top IT companies in India like Infosys and Tata Consultancy Services have started their own academia-industry interface programs. These industry-driven programs aim to train students in work skills and make them employment-ready. Such programs also impart training to faculty so that they can administer the industry-specific modules to their students on campus.

However, while the kind of industry initiatives mentioned above are praiseworthy, the reach and outcome of industry linkages with institutions in the country generally remains poor. The few tie-ups that have materialized in recent times have had very little to show in terms of technology development or R & D. Moreover, the courses designed by the industry are limited to specific skill-building in students so that they become productive employees. This kind of job-centric courses can hardly help students in developing scientific temper and critical thinking, qualities that are needed foremost to make India a knowledge leader.

3.2.2 Breaking the shackles

The limited joint technology development and joint R&D that has been carried out between industry and academia show that quite significant benefits can be achieved in relatively short time. *What is needed is for industry personnel and academia to start interacting in all kinds of ways (for purposes beyond just hiring of graduates). The Committee proposes the following measures to strengthen institution-industry linkages:*

1. *Involving industry personnel in some teaching including as adjunct faculty*

   To involve industry experts in designing, developing and teaching the curriculum

2. *Having industry cells at NITs (along with the involvement of State Government)*

   To open Industry and Entrepreneur Cell in all NITs with the support of the State Government

3. *Sabbatical at industry*

To facilitate exposure of faculty to the industry by providing sabbatical leave in the form of deputation of faculty to industry

4. *Innovation eco-system, entrepreneurship and incubation and Research Park*

   To develop an innovative ecosystem wherein government, faculty, industry experts, students and researchers are involved in collaborative ventures leading to national growth and also, to set up Research Parks and make them hubs

5. *Involving industry persons more proactively at Senate and Board level and in evaluation as well as rating of institute*

   To involve industry experts more proactively in governance, leadership and management of NITs

3.2.3 Teaching by Industry personnel (enriching the courses)

One of the ways by which the institute can handshake with industry is to enlist the support of industry experts in teaching and evaluation. The NITs can invite industry representatives as adjunct faculty whose rich experience in different industry sectors can give a practical application to conceptual teaching and learning in the classroom. There are many highly qualified and highly talented personnel in the industry. Their expertise can enrich various aspects of curriculum delivery. Such personnel that may include distinguished alumni may be invited to deliver 10-12 high quality lectures on selective course topics. These industry-personnel could use video and digital communication links for teaching at NITs. Concerned NIT faculty should facilitate such interaction and be the overall in-charge of the subject. The faculty at NIT must also be present in the class and participate in discussions.

This will result in several other benefits. To some extent, it will address the shortage of quality faculty at NIT. More importantly, it will bring in a new dimension to the teaching of the courses. Industry-personnel will invariably bring certain practical aspects into the class thus enriching teaching and learning. At the same time, the very process of co-ordinating with the industry personnel will enable the NIT faculty to establish a link with the industry. Through this linkage the NITs can strengthen their R & D

processes, plan exchange programs for faculty and industry personnel both at campus and on site, and develop summer training and exposure programs for faculty with the industry. Most importantly, the linkage will bring in several benefits to the student stakeholder. First, students will find their learning process more meaningful when their course content is related to its industry application. Second, students will have more opportunities for doing summer internships or course project when the institutes where they study have strong association with the industry. Finally, students will have greater chances of gainful employment in terms of campus placement when the institute gets regular industry visits. The industry person is likely to get involved with the institute and may serve on its board in future.

A typical course has 40 classes. 12 to 15 classes will mean about a third of the course. It will be desirable to gradually introduce this practice in about 50% of UG courses. The key would be to integrate these lectures with the rest of the course.

It may be desirable that the industry person involved in teaching visit the institute once for two to three days. These teachers should be paid suitable honorarium.

3.2.4 Industry Cells at NITs

CII (Confederation of Indian Industry) or FICCI (Federation of Indian Chamber of Commerce and Industry) or ASSOCHAM (Associated Chambers of Commerce and Industry of India) could help create an industry-connect cum technology development / transfer cell at each NIT. NIT will provide the infrastructure. The cell will be funded a third each by MHRD, State government and Industry-bodies. The cell will be managed by a person appointed by the industry organisation. It will be managed by a board consisting of a third of the members form industry-organisation, a third from state government (including industry secretary and finance secretary of the state) and a third appointed by the institute board/ NIT Council.

The objective of Industry-Institute-Interaction Cell will be to work towards increasing industry linkages with the institute. It will work towards Industry-Institute Research Collaboration, patent generation and exploitation with an objective that the NIT can earn substantial part of its research spending through industry and commercialisation of its patents and technology. The cell will also help in Entrepreneurship Development through incubation and

training to increase innovation driven entrepreneurs/start-ups. Further, it will strive for development and deployment of scientific/ technological solutions (jointly by Industry and Institutions) to solve challenges confronting the States in the key areas such as water, energy, waste management, food and healthcare. To make it a success, NITs and Industries should work together to ensure active participation of senior Government functionaries.

3.2.5 Sabbatical for faculty at industry

It is desirable that NIT faculty spend some time at industry, especially in summer. Number of faculty spending such time could be one of the benchmarks while determining the grading of NITs in categories.

3.2.6 Industry personnel as adjunct faculty

It may be desirable for NITs to appoint some industry persons as adjunct faculty and NITs may workout mechanism for this. While they may or may not have Masters or PhD degrees, their experience and achievements in industrial R&D sector should be par-excellence. They can spend part of the time at NIT and participate in teaching, project guidance, research guidance and technology development. *Further, for encouraging multi-disciplinary research culture, person not connected with engineering may also be inducted under this category, if required.*

3.2.7 Innovation Eco-system, Entrepreneurship, incubation and Research Park

The NITs will have a crucial role to play in the emerging status of India as a knowledge super power. Moreover, by 2020 the country's demographic trends suggest that we will be adding 25 million youth as first-time entrants into the job market out of which 5 million will be engineers. Therefore, Engineering institutes in the country face the formidable challenge of not only providing quality technical education but also ensuring gainful employment to students. This would need inculcating a culture that nurtures new ideas and trains as well as empowers students to carry the worthy ones to their logical end. NITs should establish a full eco-system for the purpose. This would help ventures for new technologies and products to emerge. More importantly this would become an excellent training ground for students to be capable technology and innovation providers in their further professional life.

3.2.7.1 Innovation eco-system

Driving innovation and entrepreneurship has many benefits for NITs. Successful innovation, especially when it is aimed at addressing major problems faced by society/industry or opportunities in the market place, requires development of novel technologies. These result in patents and publications, traditional measures of the performance of faculty and a research institution. Innovation and entrepreneurship also have a positive impact on teaching. First, the faculty has first-hand knowledge of what is relevant and useful to the industry. Thus, faculty can make classroom teaching more meaningful for students by relating it to industry and market place. Experience has shown that introducing real-world examples and insights that are not available in most textbooks is very exciting for students. It keeps their interest in the course high and motivates them to move towards innovation and entrepreneurship. Another positive impact on teaching is that the faculty can invite R&D personnel from industry to give guest lectures. This again improves the learning experience. R&D personnel from industry can even become adjunct faculty, teaching entire courses and guiding student projects. Apart from enriching the academic environment, this reduces the teaching load on the full-time faculty so that they can spend more time on their academic pursuits. [Reference: Kakodkar Committee Report of IITs]

3.2.7.2 Entrepreneurship, incubation and Research Park

Experience has shown that innovation thrives in an ecosystem where three sets of people interact in an informal and formal environment. These include a faculty member, an experienced R&D person from an industry and a youngster / student. The faculty member brings in breadth of knowledge and the ability to apply knowledge and techniques from one field to solve problems in another. An experienced R&D person from industry knows how to convert a lab prototype into a product, which is manufacturable, which works in the field on 24x7 basis and is found to acceptable and desirable to the user/consumer and, most important, which has commercial prospects. The strength of a bright youngster/student is that s/he does not know that "it cannot be done" and is therefore ready to plunge into work 16 hours a day and night-outs once motivated. When these three sets of people

interact, innovation thrives. [Reference: Kakodkar Committee Report of IITs]

Recognising that it already had two of these three set of people on the campus, IIT Madras brought in R&D personnel adjacent to its campus by setting up IIT Madras Research Park. They have even evolved a credit system to measure the involvement of the industry with IITM, and do not allow industries to stay at the Research Park unless they meet a minimum credit requirement. *NITs may learn from this and from similar experience in academic institutes worldwide to innovate and adopt suitable model for their own purpose. It must be noted however that a Research park flourishes only when the institute already has sufficient experience in working with industry. Many NITs have yet to get there. They can begin by creating small space on campus itself and get some industry to temporarily house its R&D there. As it gains in experience, they could build full-fledged research parks.*

NITs should work with the state government to carve out significant land around NIT campus for future industrial complex. NITs should work with the state government to bring industry to these areas.

It must be noted, however, that Innovation (and specifically entrepreneurship) requires a good commercial understanding. Because of their lack of industrial training and exposure, most faculty members in IITs or NITs do not have this understanding. With inadequate understanding of modern commercial and business practices, the research carried out by the faculty may not touch the issues that are important for the industry. Additionally, focus on innovation and entrepreneurship requires a change in the mind-set of faculty members. They need to be convinced that notwithstanding the academic nature of their vocation, the commercial prospects and business viability of products and processes with which they are involved on campus are as important as their role as teachers and researchers. They need to learn about these issues from industry through sponsored projects, consultancy, and interactions with industry. [Reference: Kakodkar Committee Report of IITs]

To be effective, these programs must be led by those faculty members who understand, through experience, what innovation and entrepreneurship is. The incubation cells should focus on providing training and support in commercial issues

rather than simply space and computers. The NITs need to have enlightened policies regarding sharing of royalty income. The faculty should be encouraged to feed some of the royalty into the next innovative idea, taking only a fraction as honorarium. The NIT should not take a large fraction of royalty in the beginning, or a large equity for its help in incubation. Such policies often succeed in killing the goose before it lays the golden egg. NITs have to first nurture innovation and entrepreneurship before they start thinking of serious resource generation out of this. [Reference: Kakodkar Committee Report of IITs]

3.2.7.3 IPR Policy

The same guiding principle is true with the IPR policy. NITs have very little experience in generating and making significant revenue out of IPR. It needs to learn that. It needs to figure out what it takes to generate IPR which will bring in large commercial gains. To learn this, it needs to work with industry and in the beginning give more than it wants to take. As it gains experience, it would not only learn to generate significant commercially viable IPR, but also to get the right commercial value for it. NIT administration sometimes does not understand this and tend to hurt the budding academic-industry interaction, in its attempt to gain more. [Reference: Kakodkar Committee Report of IITs]

Innovation is inherently inter-disciplinary in nature. For example, in the 1960s Gary Starkweather at Xerox brought together expertise in optics, electronics and mechanical engineering to invent the laser printer which has revolutionised printing.[1] NITs have built departments as silos. Little inter-department work is done, and in fact when some faculty from different departments start working together, they are often even discouraged. Inter-disciplinary programs have therefore rarely come up and even if they do, it is finally one or the other department's baby. [Reference: Kakodkar Committee Report of IITs]

The NITs must evolve their own individual policy for encouraging diversity and flexibility in academic activities. Similar facilities in western education system have been highly successful. It is not easy to register a Masters student between an engineering

1 W. Brian Arthur, The Nature of Technology: What it is and how it evolves, Free Press, 2009, pp. 117-118.

and Humanities department or engineering and management department. If one does so, both the departments would make it difficult for the student/faculty, for they simply do not know how to manage this. There are many instances of Indian B.Tech students from Chemical, Mechanical or Metallurgy who went to the US to do a PhD in CSE or EE and have carried out excellent research. Many NIT departments insist while recruiting, that a potential faculty member must have the basic degree in the same department, even if otherwise the person is very good. All these are counter-productive as far as creating a climate for innovation is concerned. [Reference: Kakodkar Committee Report of IITs]

Engineering curriculum (B.Tech/M.Tech) in Indian institutions, including IITs and NITs, have followed the same old traditional curriculum for decades together. It progresses from basics of sciences, to basics of the discipline to advanced topics in the discipline. There is some flexibility to take electives, but these are often towards the end of the degree and are carefully restricted to fit students into a predetermined mould. This well-structured curriculum does not allow a student the freedom to do courses across departments, take off for a semester and try participating in a start-up and come back, or take up some project work instead of a course. The curriculum is designed for mass of ordinary students. It does not cater to exceptions. The structure goes against promotion of entrepreneurship and innovation. [Reference: Kakodkar Committee Report of IITs]

Enterprises born out of universities convert its research into products and processes. This brings in a new dimension to the research. It enables faculty and students to learn commercial aspects and make their research so much more relevant. Incubation in universities is thus a must for innovation. Innovation by its exploratory nature is prone to failure. Over four decades, Stanford University produced only 6,400 patents, a very small fraction of its paper publications during that period. Less than 1% of these patents earned royalties of over $1 million. Thus, the story of innovation is one of many failures, learning from the failures and occasionally succeeding, but very, very rarely hitting the jackpot. Innovation needs to be pursued with single-minded focus for 10-20 years to achieve even modest success. [Reference: Kakodkar Committee Report of IITs]

The NITs have set out on the road to innovation through incubation. In this regard, only preliminary steps have been taken

so far and a lot of ground needs to be covered in the future. Significant changes in promotion policies, academic structures, curricula and mind-set of the faculty, students and administration are required. These systemic changes will enable the NITs to forge ahead on developing new technologies and producing advanced research, which will be in sync with national needs. The challenge is enormous and the NITs must take bold steps to fulfil the national objective. [Reference: Kakodkar Committee Report of IITs]

To foster scientific temper and innovative work among students, the NITs must introduce a clutch of new electives in the undergraduate and postgraduate curriculum. The thrust areas of these electives must be industry-linked product design and may be inter-departmental in approach. MHRD has rightly encouraged a comprehensive effort in this area. Senate of each NIT should discuss the details and carry this forward. A generic concept note prepared by India Design Council is available at Annexure V for perusal and appropriate action at the level of each NIT.

3.2.8 Involving industry persons in the Board as well as for Evaluation and Rating

NITs will benefit by involving talented industry personnel in all aspects of its governance. The NITs can co-opt the brightest minds from the industry as experts on their Departmental Visiting Committees as well as honorary members of the Board of Governors. A select list of highly talented youngsters working in industry should be prepared by the Chairpersons of the four industry associations (CII, FICCI, ASSOCHAM and NASSCOM (National Association of Software and Service Corporation)) for participating at these institutions and to nurture them. The industry persons should have right qualification, experience, attributes and attitude so that institute will be benefitted to the fullest extent. They should be willing to spend at least 15 days in a year in the institute to make a difference. The Chairman BOG and the Director of each NIT would identify industry persons from the list for induction on Board and the Visiting Committees and to help nurture these institutions

Similarly, the NIT Council should involve industry personnel in reviewing and rating the NITs.

3.2.9 Creating the Right Culture

Institutions like NITs have to undergo fair amount of transformation in order to realise the set objectives. Bold leadership, efficient governance and systematic management are required for the NITs to excel in the field of technical education. The policies and practices that direct each NIT must involve collective decision-making and joint responsibility. Every stage of the quality improvement process must be monitored by a system of checks and balances. These must be internalized as the best practices of the institute for serving the interests of all stakeholders.

To initiate this quality-driven process, the NIT Council must ask each NIT to draw up a well-defined action plan that meets its requirements in a time-bound manner. These requirements are the following:

1. **Seeking formal feedback from industries** that have been recruiting students for last 3-4 years on courseware and course content for new programmes, deletion of courses and revision of courses including a subject wise assessment of courses taught. This input along with feedback from alumni and students leaving the institute on courses and teaching should be the basis of changes to be made consistent with curricula followed at some of the best institutions worldwide. Such inputs should also be used for assessment of teaching performance of individual faculty. This should be a sustained process to be pursued every year. Vacation period should be used to do revisions to be made for the coming year.

2. **Set up an industry advisory group** that could identify other programs such as special courses for industry personnel, exposure of faculty and students to problems of industry and their engagement in addressing them through well-defined projects, identification of visiting faculty from industry who could teach a significant portion (up to 25%) of specific courses along with evaluation of courses, projects etc.. NITs are also well placed to support MSME sector industries in the neighbourhood by way of taking up several relevant short / long term projects. Identification and facilitation of such projects could be done by industry association/industry advisory group of the institute jointly.

3. Board of each institute should **define targets for getting R&D projects** from different S&T funding agencies by different departments of the institute.

Clearly, defining activities as above and their implementation would need broad based discussion on a number of platforms within the institute. Adoption of a comprehensive value system and a matrix for individual performance assessment system would naturally create a positive thrust towards faster forward movement in the direction of change that we are seeking. System of departmental as well as institution level reviews as recommended elsewhere in this report would create an accountability mechanism at the level of the department as well as the institution.

In addition to academics and research, a culture of user/stake holder informed participatory decision making should also be encouraged in other domains in the institution.

3.2.10 Finally …

To encourage academia-industry interaction, the nation needs policies to incentivise industry engaging with academia and translating research to product commercialisation through tax benefits, partial capital support and purchase preferences.

MHRD has started funding centers in frontier areas of technologies at various institutes in the country. It is recommended that at least some of these centers should be industry-oriented. Ideally, these centers should have at least one IIT, at least one NIT and a medium / large scale industry, with the objective of taking research all the way to product commercialisation.

Finally, it is critical that the faculty who participate in industry action are rewarded. The committee recommends yearly NIT level and council-level awards for faculty who make substantial contributions in working with the industry. At the same time, NITs need to figure out a way to use faculty work with industry and in technology-development in faculty promotions. At the same time, NITs need to assign proper weightage to faculty participation in industry related work in their assessment for promotion of faculty. This system of incentives and rewards will encourage faculty to take up research projects, technology innovation and product patent that are linked to the industry. It will serve as a corrective for the existing system of faculty

promotion that is based only on academic research and publication and follows a time-scale model.

3.3 NITs as high-quality Research Institutions

While some of the faculty at NITs have been carrying out research in different areas, most NITs have a long way to go before coming close to what an excellent research institute should be. A research institution would require that most faculty members involve themselves in in-depth research, have several PhD students and have high quality publications every year in quality journals. NITs should also encourage research and development activity through creation and engagement of post-doctoral fellowships in various important R&D initiatives from time to time. These faculty members and research staff would be expected to motivate their undergraduate researchers to get into research programs. The suggested recommendations in this report for encouraging NIT students to get into research early through induction into a PhD program at the end of their third-year, would be a step in the right direction.

It is also recommended that NIT faculty should get sponsored projects from various funding agencies including industry in the thrust and developmental areas. Such faculty members should be incentivised to participate in various reputed conferences/workshops at national and international level for their professional development. The BoGs of each NIT may devise schemes to create a pool from the funds received as institute share in Projects and from IRG such as consultancy earned as has been done by IITs. Such schemes are expected to motivate others to write and submit research projects and get involved in knowledge generation, create synergy between industries and also shall address to futuristic issues.

The conversion of NITs into high-quality research institutions will need the proactive work of a new generation of faculty. The NITs must expand their faculty profile by inviting international faculty from top technical colleges abroad, engaging industry captains in their academic programs, and aggressively following the seek and search method for appointing faculty. The NITs must explore and tap into all possible resources and diverse funding agencies for recharging their R & D program. NITs must also conduct a number of teacher training programs to reorient faculty towards research. Finally, NITs must successfully run the

trainee-teacher scheme (as recommended in this report) to attract young talented researchers as faculty.

One way of fast tracking the growth of NITs in the area of research and innovation is to develop a synergy with the IITs, which already have a proven track record. Mentioned below are some of the ways in which NITs can collaborate with IITs:

3.3.1 Joint research projects between NITs and IITs

NITs and IITs constitute a sizeable number of centrally funded technical institutions. This implies that the two foremost engineering education systems in India are primarily responsible for engineering human capital for the country by bringing out high quality graduates who have good domain knowledge to produce pioneering research leading to the development of cutting-edge technology. It also means that these institutes must serve the national interest by adding engineers with skills and competencies that are required by the industry. Hence, maximising synergy between these two groups of institutions is very important. Together they can address the challenge of increasing research output, meeting faculty shortage and attracting best students to become faculty. In order to bring these institutions closer to each other, it is proposed to group them in the following way:

1. A group can be formed with one established IIT (IITK, IITM, IITD, IIT Kharagpur, IITB, IITG), one new IIT and four NITs (two/three established and two/one new). IIT-Roorkee + IIT Hyderabad may be grouped with three NITs (at least one new). IIT BHU + IIT GN may be grouped with three NITs (at least one new).

2. For each group, three faculty members from IITs belonging to different disciplines may be invited to be members of each NIT Senate. Also, two faculty members from each of the NITs may be brought in each of IIT Senate.

3. For each group, one faculty (preferably Professor) from each IIT nominated by respective Director of IIT may be brought in Governing Council of each NITs.

4. NITs should stop in-house faculty PhD program. Non-PhD faculty from NITs must register for their PhD program in IITs or other reputed high quality CFTIs or Universities abroad.

5. IIT faculty and NIT faculty should be encouraged to take joint project, where work should be done at both places and frequent visits and exchanges (faculty + project staff + student + research scholars) to the other institution should be encouraged. MHRD should budget Rs 25 Crores per year towards this (no one project should exceed Rs 50 lakhs). Industry involvement in such projects could be a bonus.

6. MHRD is in process of setting up of several centers in frontier areas of technology. It may be desirable to setup some such centers as joint-centers involving at least one IIT and one NIT. At least a third of the total funding should go to NITs. Undergraduate students at NITs may also be involved to carry out research at such centers and several of them should be encouraged to go for early PhD induction program.

7. Getting some high-performing + bright younger NIT faculty to IITs for a year / semester on sabbatical (define new rule) and a reciprocal arrangement for younger IIT faculty should be encouraged. A special incentive of Rs 25K per month of visit should be provided to faculty for this purpose. They will draw their salary and be given appropriate campus accommodation at visiting institutes.

8. We should encourage natural formation of India-level academic group consisting of faculty-researchers from IITs and NITs in different areas. As and when such groups mature, some funding from MHRD can be provided towards travel and meeting expenses. It would be desirable then to have national level academic conferences in the discipline at IITs / NITs where most faculty and research scholar participate (National Conference on Communications is an example).

9. Some high-performing senior IIT faculty should also be invited to spend a semester at NITs. A special pay of Rs 2 lakhs / semester should be provided to such senior faculty.

10. Necessary change in policies must be made to facilitate mobility of researchers, project staff and NTS of between IITs and NITs.

3.4 Linking NITs in North East and J&K to regional development

There are as many as 8 NITs (2 old and 6 new) in north east and a NIT in J&K. Half the admissions into these institutions are reserved for local students. This facility not only provides great opportunity to local students to become engineers, it also makes possible the economic and social development of the region.

Development in North East and J&K is constrained by several factors. While these constraints are real and need to be quickly addressed, availability of qualified NIT graduates from the region in significant numbers is an opportunity that should not be lost sight of. Even from education perspective, linking education with development brings in rich dividends in education itself since that enables first hand engagement for students in understanding and addressing developmental issues. Such opportunities in an institution like NIT can also open up routes to several neighbourhood development initiatives. Linking industry and Governmental agencies into this process can make such initiatives more impactful benefitting both the development process and education of students at NITs. Psychological integration between students at NITs who come from different parts of the country including those from North East as well as between students and people in the neighbourhood would be an added gain.

An empowered SPV (special purpose vehicle) to implement such an initiative should be created with joint partnership of all stake holders (Government, industry, NITs). The SPV with its offices located in individual NITs should be enabled to explore economically and socially important developmental opportunities in the neighbourhood in which students can participate and contribute (this could form the project work which students are any way expected to carry out). The NIT Director along with one/two faculty members will take charge of the administration of the local SPV. While Governmental agencies could use such a vehicle to implement their programmes, industries must also open up and spread their business linkages through such a SPV before they think that time is ripe for them to do their business by themselves. All NITs are already linked through NKN. Recognising the value of linkages between education and development, a special dispensation for use of NKN by the SPV would solve the initial hurdle of ICT infrastructure in the North East for IT business opportunities by the SPV. This would create good entrepreneurship

training ground for young students of NITs. Apart from ICT related business opportunities, there are other opportunities like value addition to agro-forest produce, consultancy work related to infrastructure, mineral resources development and incubating innovation arising from students and their linkages with the neighbourhood. The SPV must also be fully involved with academic activities such as streamlining project work, fine tuning courses, providing support in teaching and evaluation etc. The NITs must possess a sense of ownership for the SPVs and must create an environment conducive for carrying out quality work.

At apex level the SPV may be set up by MHRD with participation of DONER (Ministry of Development of North Eastern Region), NE Council and representative industry associations. There should be a formal understanding between MHRD and industry in terms of development in North East and participation of NITs in the process. The SPV will be governed by a Board of Management, chaired by the President of Industry Association with other directors drawn from different stakeholders. The CEO/MD should be a professional appointed by the GoI in consultation with the Chairman of the Board.

The SPV will set up a local office at each of the NITs which will work as a profit centre. CEO/MD of the SPV may chair the local board that will govern the functioning of the local office with the Director of the concerned NIT being the co-chair. One or two key faculty from NIT as well as representatives of State Government (responsible for industry, education and planning) and other stake holders in the region may also serve on the local board. There should also be cross representation between NITs to enable sharing of best practices. Each local office must work as separate profit centre to be managed by a professional CEO responsible to the local board. Appointment of the CEO of the local office will be done by the central SPV in consultation with the concerned NIT Director and concerned State Government representative. Each NIT must provide land for setting up of local office of the SPV on its campus.

These local offices of the SPV at individual NITs will also act as industry cells as described in section 3.2.4.

Government of India (MHRD, DONER and NE Council) must launch this SPV with adequate equity support and with ownership involvement of all NITs in the region. {Suggest 20 crore

by DONER, 10 crore by NEC and 10 crore each by each of NITs (MHRD)}.

3.5 Conclusion

The report envisions NITs to be transformed into India's finest engineering institutes in the next 10 years. Along with IITs, they must contribute immensely to the shaping of India as a knowledge super power. They must bring in technological revolution by empowering engineering graduates with industry skills and produce research that yields benefits for the society at large. What is required to achieve the projected growth of the NITs is a strong self-belief, determination and hard work on the part of all stakeholders.

CHAPTER 4: Leadership*

The NITs require bold leadership and good governance to carry out its vision and mission. Leadership involves goal-setting with clear and visible values aimed at creating strategies, systems and methods for achieving excellence, stimulating innovation and building knowledge and capabilities. While leadership is reflected in bold decision-making and affirmative action, it also manifests itself in the willingness to share responsibility, to instil trust and to elicit cooperation from all levels of academic and administrative processes. The growth of NITs into centres of excellence needs the fullest participation of all stakeholders who are involved in implementing the policy plan charted out herein. It is the concerted efforts of directors, Government officers, industry representatives, faculty, students, alumni and administrative personnel that will translate into positive outcome for the NITs. Each NIT must have a perspective plan that is characterized by generic indicators that are common to the plans of other NITs. Simultaneously, the plan of individual NITs should reflect some unique features that are tailor made to local and regional needs. There must be complete clarity in what needs to be done and how it is to be done. Each of the constituent members of the Board must have well-defined duties and responsibilities. At the same time, there are specific guidelines that must shape and direct the processes involved. These are spelt out in the following manner.

4.1 Chairman and Board

Each NIT will function under the guidance and leadership of its Chairman and Board of Governors. The BoGs must set time-bound targets to be achieved with respect to the following factors:

- student intake and merit-based admission
- curriculum design and development
- teaching, learning and evaluation
- student support and progression
- training and placement
- capacity building of faculty

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*One of the characteristics of strong and enlightened leadership is that it understands its current status, limitations and weaknesses of the institutions they lead and not consider that they are greater than all other institutions. Such an attitude would imply that even a path to move up higher would be closed. Likewise, those who attribute causes for their limitations as being only "outside" would go no further.

- industry linkages
- research and development
- alumni network
- infrastructural development and resource mobilization
- institutional social responsibility

In order to monitor the progress of NITs along the above-mentioned parameters, there must be a foolproof system of internal and external audit including peer review and feedback mechanism.

Chairman of BoG should be nominated on recommendation of the Chairman of the NIT Council based on suggestion of a nomination committee for a three year term. He/she should spend sufficient time and play active role for the development of the Institutes.

The top leadership positions (Chairman, BoG members and Director) shall continue in their respective positions unless relieved by the competent authority upon completion of the term of their office.

Active involvement of external members in the functioning of Boards would be crucial to Board being able to effectively realize its objectives.

To fulfill its goals, the BoGs must solicit the active participation of external members. The Boards must recognize that the experts are busy people who occupy positions of great responsibility in the public/private sphere. Therefore, *special care needs to be exercised to ensure that the*

Board meetings are fixed sufficiently in advance taking convenience of all members into account. The exact modalities to be adopted should become a part of standard procedure to be adopted by each Board. As far as possible, the Board meetings should be organized at the institute and sometime should be devoted for interaction with individual Departments to get exposed to their activities and problems faced.

The Board should have full autonomy for spending public money within the allotted budget and regulatory norms. Government should, however, retain emergency powers to issue directives and take other necessary corrective measures.

4.2 Director's Selection

The Director of the NIT is the most important position and determines the present and future of the institution. He / she should be an individual in the field respected by all for his/her capabilities and track record, but also must be an inspiring leader, capable manager and a passionate team person. The Search cum Selection process for the Director should enable identification of such a person with high degree of success. It therefore cannot be based just on an interview. Some detailed back-ground check and evaluation of his / her past performance is essential. Search cum Selection Committee should consist of Chairman of the NIT Council as Chairman, eminent people from academia and industry, Chairman of standing committee of NIT Council, Chairman of BoG and Secretary MHRD as members. Council shall be empowered to approve the Directors nomination. The process of selection of Director must be started well in time to ensure an overlap between incumbent and Director Select for at least one month. This will do away with the need for a stop-gap arrangement and will ensure a smooth transition from one Director to the next

Once selected, the Director should have a free hand in taking institute forward within the framework of NIT Act and Statutes, duly guided by the Board of Governors.

Functions of Director have several dimensions. Aspects like external stakeholder linkages, planning for change to meet emerging needs, continuous refinement of processes to improve efficiency, capacity building etc are some aspects that should engage constant attention of the Director. There are other aspects related to day to day functioning that also need focussed attention. Position of Deputy Director along with that of a Director is thus necessary for larger institutions like old NITs.

The NIT Director's role is multi-dimensional. It is primarily directed by concern for quality assurance and quality sustenance in all aspects of academic and administrative domain. These areas include strategic planning, academic and administrative reforms, industry linkages, MOUs with foreign universities, fiscal budget and resource mobilization, capacity building, research and technological innovation, and contribution to societal welfare and national growth. Apart from these core

areas, the Director is also required to handle the nitty-gritty of day-to-day functioning of the Institute.

Given the nature and extent of his duties, the Committee proposes that under the overall guidance and mandate of the Director, the Deputy Director should take care of the routine functioning of the Institute. This would enable Director to focus on dimensions like strategic planning and external linkages. The Deputy Director will lead the Institution in the absence of the Director.

The Director shall invite name(s) of persons suitable for the various functional position(s) from relevant group of faculty and make appointments following the prescribed process. The Deputy Director will be appointed by the Director with the approval of BoG.

It is preferable to ensure that all the administrative positions, especially Deputy Director, not to be co-terminus to that of Director, to ensure continuity in the affairs of the institution. In case it becomes necessary, in-charge Director can be selected by BoG from among five senior-most faculties.

4.3 Transformational Challenge

Having evolved from different backgrounds, NITs have a higher transformational challenge. IITs have evolved following more or less a common framework over the years. They could therefore be a good model for the NITs to emulate.

The Committee recommends creating greater synergy between NITs and IITs with horizontal interaction in the form of collaborative ideation and planning. One way is to promote the sharing of best practices and of innovative programs between these institutes. The reciprocity of ideas and practices will help remove some ill-founded notions of the IITs being the 'Big Brother' of technical education in India. It will foster a vibrant partnership between the NITs and the IITs in a spirit of equality. The Committee also would like to draw the Government's attention to the urgent need of filling up backlog of faculty posts in the institutes.

4.4 Learning from Each other

The 30 NITs together are an ecosystem that has the possibility to generate a large number of inter-institute ventures and programs. The Committee recommends the following:

- *Sharing and learning from best practices of different NITs*
- *Introduction of a common leadership development program for faculty of all NITs*
- *Inter-institutional faculty exchange program to bridge North-South-East-West geographical barrier*
- *Greater exchange of infrastructural resources including library, laboratory and instrumentation facilities*
- *Sharing of management information systems (MIS) and of standard operating procedures (SOP)*

Periodic Directors' Conference duly serviced by a core group (rotating membership with overlap) could be a good platform for sharing best practices and organizing orientation / training programs for faculty and staff at different levels covering various aspects of functioning of NITs.

NITs require transformation to new system consistent with its Act and Statutes.

4.5 High professional competence in Administrative and Financial domains

The NITs need to bring in a high level of efficiency in administration and finance for optimum utilization of resources. The proper functioning of its support systems will have a multiplier effect on the overall quality of each NIT. When an institute has a capable and efficient office system running, it provides a hassle-free environment for faculty to focus and carry out its primary activities, that is, teaching and research. This in turn becomes conducive for the institute, the departments, the centres and cells to function smoothly. The Government, therefore, needs to provide financial support to the NITs to completely revamp the administrative and finance set-up by bringing in the latest office automation systems and promoting e-governance.

The administrative leadership in NITs thus needs to have the ability to translate needs of Academic Leadership and envisioned Academic and Research programs into action through an efficient and rule bound system that facilitates objective oriented implementation.

An area that needs significant attention is the question of building up of corpus and its efficient management. The ability of the institution to support new innovations of value to the institution depends largely on availability of a sizeable corpus at hand. There is also a need to generate sufficient donor confidence. The NITs must prioritize resource mobilization and devise strategies to generate funds through internal and external sources such as donations, consultancy, self-financing courses and so on. *The NITs may co-opt experienced professionals in the role of consultants and seek their advice on management of human resources and finance. Such experts may also be inducted into special administrative committees on contractual basis.*

A vertically integrated Administrative and Finance framework linked with different layers of the academic and research activities with the objective of playing a facilitating role at all layers should be established by adequate delegation of financial power.

Once there are well designed systems and competent people to lead administration and finance, several activities can be largely automated and outsourced making the administration and finance set up lean and economical.

Further the institutes should also proactively engage in enhancing internal resource generation through variety of activities ultimately leading to better financial self-sufficiency / autonomy.

4.6 Create Awards at NIT Council Level

NITs need to create yearly awards at Council level. The selection for awards must be done by a committee appointed by the Council for this purpose every year. Awards may be conferred in the following categories: (i) Best faculty in teaching, (ii) Best faculty in R&D, (iii) Best faculty in technology development and industrial interface and (iv) Best faculty in administrative role.

CHAPTER 5: Governance

Most of the older RECs are quarter to half-century old. The Governance structure of RECs had wider participation from the state in which the REC was located. The funding pattern also had a certain non-plan component from the state government. There are subtle differences including organizational structure, recruitment and career progression policies, funding etc. among various RECs. There are also differences in institutional culture.

In contrast, IITs had their Act and Statutes promulgated right in the beginning in 1961 that enabled them to have standard procedures and practices in faculty and staff recruitment, student admissions through common entrance examination and broader aspects of governance and organization structure, funding pattern etc. The five founding IITs were setup with generous financial assistance from the Government of India for development of physical infrastructure like classrooms and laboratories. The aim was to establish the IITs with world class facilities. Moreover, the IITs also had the advantage of extensive collaboration with faculty of foreign universities. With adequate Government aid and academic autonomy, the IITs were able to build a brand image for themselves.

When in 2002, RECs were converted into NITs, there were several external agencies for regulating their activities: AICTE granted approval for introduction of new courses; UGC conferred the Deemed University status; MHRD sanctioned recurring and non-recurring grants; and in certain cases, Council of Architecture provided for additional requirements. Because the NITs came under the purview of multiple regulatory bodies, it led to some unwarranted problems. However, the situation improved drastically under the TEQIP-I project, as the NITs came to be placed in a system that assured greater academic autonomy, increased financial assistance and more flexible review mechanism. The NITs thereon have had greater opportunities to put in place best practices and innovative programs and grow professionally.

The NIT Act was promulgated in August, 2007 and the first statutes were notified in 2009. In due course of time some more amendments were made to the Act, and there is a possibility

that few more may be enforced in future. Amendments to the Statutes in the past and the present have been effected through the Board of Governors and with the final approval of the Government of India.

The NIT Act and the Statutes define the role and responsibilities of all the leading functionaries and authorities. They identify statutory bodies such as Board of Governance, Senate, Finance Committee and Building and Woks Committee – the composition of each has been decided and modified by the Ministry of HRD from time to time. Legal/statutory governance framework is thus already in place. There is, however, a need to nurture an atmosphere that motivates everyone to move towards higher levels of excellence, supports new ideas that can make a positive difference, encourages and rewards high performers and inculcates team spirit.

Governance framework in NITs should thus be exclusively driven by passion for excellence and be conducive to the institutions becoming magnet to attract high quality teachers and researchers who could take the institutions to a much higher level of excellence. This would need a peer informed flexible approach to preferentially support creative ideas and an approach to pursue co-ordinated research in large groups to address some grand challenges. Apart from research to address important questions in the knowledge domain, NITs should also address challenges before industry and society with a holistic approach. This would require generating projects, seeking funding support and engaging in consultancy to solve problems of stake holder interest. Enhancing quality of human resource in education as well as industry domains through continuing education programs should be another key pursuit of the institution. The value system within the institution should encourage and motivate faculty in these directions with a high degree of excellence and impact. This needs a broad minded outlook with a liberal approach. An optimum combination of top-down and bottom-up approach is required in the governance of NITs. This would prepare the junior faculty to take up higher responsibilities at appropriate time. On a residential campus, it is absolutely essential that everyone participate in institute building exercise. NITs should ensure that administrative acumen builds up quickly at all levels involving the entire faculty. NITs can accelerate their growth rate by employing best practices, networking with reputed national institutes (IITs,

IISc, IIMs) as well as international universities, strengthening research and innovation, and leveraging alumni support. Over and above these, a strong leadership with committed zeal and industry will be the driving force of NITs. Administrative leadership is provided in the NITs through its various statutory bodies. The Committee recommends changes in the composition of these bodies as specified later in the document.

The Act and Statutes broadly defines role and responsibilities for Director, Deputy Director, Deans, Registrar and the Head of the Department. These need to be relooked to modify as well as to provide additional details to bring clarity and transparency. (Annexures VIII & IX provide the necessary suggestions)

Each NIT must draw up its organizational chart to clearly define the various levels of decision-making process. This will be based on available human resources and priorities envisioned by the concerned NIT. Such a chart should be approved by the Board and wide publicity be given for transparency and better functioning of the institute. The entire process must elicit the active participation of all stakeholders.

Annexure VI "Proposed Multilayer Structure (Descriptive)" lists out key features of the bottom up and inclusive approach where maximum numbers of faculty would participate in Institute administrative activities and gain experience. It focuses on activities to be carried out internally by respective NIT with minimal intervention from outside.

Each NIT must also constitute additional statutory sub-committees such as Grievance Cell, Anti-Sexual Harassment Committee, Anti-Ragging Committee, Disciplinary & Welfare Committee etc. as per the guidelines issued by the relevant statutory authorities.

Care must be taken to select external members having relevant expertise and experience and who will commit time to the Institute for attending meetings. The meeting schedules must be drawn after ascertaining their convenience and notified well ahead of time to ensure maximum participation. Under special circumstances, Chairman of Committee may permit e-participation. Except for ex-officio members, others who do not attend three consecutive meetings without valid reason should be eased out from such responsibilities.

5.1 Procedures

It is true that a decentralised bottom up governance structure facilitates an inclusive approach to governance with opportunities to learn administrative and managerial skills. However, such a framework must be based on well laid manuals and procedures so that all actions remain self consistent, transparent and well defined. It is highly desirable to have a decentralised bottom up model of governance operating in the NITs since it promotes equity, access and inclusiveness among all stakeholders. However, such a model must also strictly function according to procedural norms and institutional conventions. *Hence it is mandatory for all NITs to formulate their own academic and administrative procedures as well as purchase policy.*

The administrative manual must contain all relevant information regarding service rules viz. duties and responsibilities of teaching and non-teaching staff, leave, travel concession, etc. Some broader aspects of purchase procedure are shown in annexure VII. The hostel manual should have all information regarding admission to hostels, room allotment, mess facility, payment of bills, discipline, various hostel committees i.e. mess committee, discipline and welfare committee, etc.

It was observed that most institutions have developed their own automation systems (MIS) of various kinds with varying level of success. But still they are not commensurate with requisite levels of analytics and intelligence. Therefore, it is timely that *a scalable solution be developed for systemic automation including procurement, administrative and academic work flows. This may be taken collectively for all the NITs through a consortium approach which can be adopted in an incremental fashion.* During discussions it was felt that it is doable within a span of 18-24 months including computerized storage and filing of existing data. If implemented, this effort will take NITs to a greater height.

This is another area where much can be gained by sharing of information and practices within NITs without compromising the autonomy of the institute.

5.2 Internal Performance Audit

All administrative support processes in an NIT should be subject to annual internal performance audit. Internal audit must be done by teams constituted by the Director. Each team must comprise at least one or two external members from the alumni and the industry, other than the mandatory members from the institution. The internal audit team should go into a detailed review covering all academic and administrative aspects like stakeholder satisfaction, adherence to rules and procedures, statutory compliances, findings of external audit and possible improvement in processes for delivery of services. Report of the internal audit team should be reviewed at the level of Directors, Deans and Registrar for corrective action.

Administrative support processes must also be subject to review by external assessment agencies.

5.3 Non Teaching Staff

The Non-Teaching Staff (NTS) is a vital cog in the NIT administrative machinery. Their contribution has a direct impact on the institution's performance and therefore due importance must be given to its constituency. The scope of NTS work extends to teaching, research, administration, finance, sports, library, hostel, and other facilities.

Right since the inception, the number of NTS grew from time to time based on the policies of respective states where these institutions (RECs) were located. The role and strength of NTS has kept growing from the very inception of NITs (then RECs). The "Sarangi Committee" was constituted in 2005-06 to resolve several issues connected with service conditions of NTS.

It is understood that respective Boards of each NIT must manage all matters related to NTS. The following points may be considered by respective NITs appropriately:

1. NTS should be provided adequate opportunities for up-gradation of their skills and qualification as well as for career growth.

2. Based on training need analysis (TNA), NTS should be encouraged to attend at least one training program in 5 years. The

key areas for NTS training may be identified as office automation with software and hardware knowledge, data and financial management, e-bookkeeping, archiving system, time-management, etc. Such training programs may be conducted in the institute itself or outside.

3. NTS should be encouraged to develop multi-tasking skills for their effective involvement in a wide range of institutional activities.

4. NITs can outsource work related to campus upkeep and maintenance like security, sanitation, mess, cafeteria, etc. However, it must be ensured that the contracted vendors provide quality service at all times.

5. NITs should hire research project staff on contractual basis for 3-5 years. During this period they can gain experience as well as higher qualification, if possible. If NITs can provide opportunities for vertical mobility to outside talent, it will have more takers for its projects and fellowships.

CHAPTER 6 Participation of Alumni in Institute affairs

Alumni of any institute have strong emotional attachment with their alma mater. They are the brand ambassadors of the institute spread far and wide. Alumni have been and shall continue to be an important resource for any institution of learning provided alumni linkages are nurtured and their involvement with institute affairs is facilitated. Each NIT with their existence over several decades has a significant pool of its own alumni. A good number of them occupy eminent positions and can contribute to the further growth of their parent institution. NITs must therefore activate its own alumni network by identifying and strengthening its association in all those areas where the alumni can provide support. Some of the broad institutional areas where the alumni can play a vital role are:

- Financial support by the alumni in the form of donation, endowment, scholarship, fellowship. Also, resource mobilization by alumni through its own networks
- Academic support by way of guest lectures and talks, research consultancy and support, industry collaboration, tie-ups with foreign universities, feedback
- Administrative support in the form of strategic planning and goal-setting,
- Support for institutional social responsibility by helping in community outreach programs and extension activities in the NIT neighbourhood

To establish a strong proactive alumni association, NITs must first prepare a comprehensive alumni data base with information on alumnus as individuals as well as batch-wise groups. *NITs must form Institute Advisory Committee with prominent alumni on board to perform the following specific functions:*

1. *Contribute to institute reaching higher levels of excellence through proactive participation in a variety of ways and by being an important stake holder bridge for input of ideas and resources and visibility of performance.*

2. *Motivate, inspire, and advise the current students through mentorship program in which each alumnus could mentor group of student.*
3. *Share their experiences and help the current students to plan for future through live lectures/ presentations.*
4. *Assist in keeping the Alumni web portal lively by actively posting on the portal, make the Alumni Magazine popular among the alumni with contributions in the form of articles, messages, inspiring stories etc. and assist in designing / manufacturing of souvenirs and promote their sale through alumni chapters.*
5. *Sponsor various co-curricular and extra-curricular activities, scholarships, development of labs/ buildings etc.*
6. *Assist the institute in training and placement activity.*
7. *Encourage students to take up entrepreneurship like start-up ventures by way of discussions, meetings, combined research, etc.*
8. *Facilitate in teaching, and developing new areas of research through collaboration*
9. *Develop mechanism to recognize alumni for their distinguished services to NIT in particular, and to society at large.*
10. *Induct alumni as members of various committees i.e. Institute Advisory Committee, Department Evaluation Committee, NIT Evaluation Committee, Senate, BoG, etc.*
11. *Support development of the institute through financial contributions and efforts to mobilise financial resource generation.*

CHAPTER 7: Recommendations

A major challenge before us is to enhance technological competence of our youth to a requisite level and on a scale commensurate with India's human resource pool through enhanced quality of engineering education in the country as a whole. For this purpose we need to create a learning and innovation eco system, in which there is a higher chance of translating new knowledge acquisitions into new technologies and innovative products while providing competent professionals in large enough numbers for reengineering of modern India. NITs need to strongly link up with IITs, other NITs, and CFTIs to create synergy for large scale national research effort on one side and link up with industry and society to contribute to the process of national development on the other. It is expected that such efforts would also lead to significant enhancement of the quality of education. In this context the committee has made following recommendations:

1 *Dr R A Mashelkar report recommendations for transforming NITs into high quality teaching and research institutions remain valid even today and NITs need to strive to realise them in full measure.*

Chapter 1.1

2 *30 NITs constitute a large system well spread throughout the country. They can be very effective contributors to national development in a manner that also leads to their moving upwards on the excellence ladder. There is scope for every NIT to do so regardless of their present status.*

3 *NITs need to take quick initiatives for achieving technological leadership in areas of our strength. In the absence of such an initiative, we run the risk of one way invasion by foreign knowledge technology products into our markets that apart from causing economic disadvantage can also seriously compromise our national autonomy.*

4 *With expansion in technical education system in the country, NITs shall have to enhance their research capability and*

provide qualified faculty in sufficient numbers for higher technical education institutions and complement the efforts of IITs.

5 *We need to create a paradigm of sustained engagement between knowledge and research domain of NITs with livelihood domains in agriculture and MSME sectors in the neighbourhood.*

6 *NITs need to nurture comprehensive research programs that can feed into national decision making and planning.*

Chapter 1.3

7 All NITs should achieve recognition as providers of best UG engineering education in India, comparable to or perhaps better that IITs and certainly better than any other public / private institute.

8 In order to equip our engineers to be able to manage technology of tomorrow, teaching at undergraduate level should have adequate coverage of basic sciences with exposure particularly in areas of interface between new upcoming technologies and related science disciplines.

9 There should also be reasonable emphasis on undergraduate level research oriented to problem solving following a multidisciplinary approach and leading to practical products or field applicable solutions.

Chapter 2

10 *The Committee recommends a calibrated approach, where direct-to-student mode would supplement the teaching at NIT, rather than bypass it. NITs also need to develop and deliver e-course materials using various platforms like MOOCs etc.*

12 *Top faculty from premier institutes can deliver live lectures to students situated in different colleges and also use high quality multimedia resources to illustrate and consequently enhance the learning of a wider student community. Each class could have at least one course for which live lectures are delivered every semester for all the NITs simultaneously. Such programmes can commence within the next six months and can be scaled fairly soon.*

13 *Tools for publishing and creating interactive eBooks (Electronic Books) for courses have been developed in the last few years. While such interactive eBooks have been designed, efforts have to be taken to encourage teachers from premier institutions to create content using such tools and aid in the adoption of such interactive e-books by the students. This has to be done actively in the next few years.*

14 *Adopting ICT for conducting quizzes and evaluation would not only be more attractive for the students but will also aid instructors to test the actual understanding of the student in a more effective fashion. A rapid proliferation of these testing mechanisms will boost the quality of learning.*

15 *Analytics on the data captured can be provided in the form of reports to the student, teacher, parent and any other party involved. This way, educators will able to get a clear understanding of the strengths and weaknesses of students and also helps the teachers tailor lessons according to the needs and capabilities of the individual students.*

16 *Virtual groups can be formed to view a video (a recorded lecture), share a document, read a book, or any other resource in a synchronous fashion while being able to text, audio and video chat simultaneously. This results in synchronous learning and enables an ICT based collaborative learning/tutorial platform. Such tutorials compound the learning done by any student in a classroom.*

17 *Virtual laboratory is a tool that consists of several technologies such as simulations, animations, videos and remote triggered experiments which facilitate user interaction. Also, it allows for institutions to share costs and enables proliferation of quality labs. By setting up virtual labs across the country, students can complement learning by doing. As mentioned previously, it is one of those few technological options that enables cost effective and space saving opportunities for innovative learning and thinking. Some of NITs are already an integral part of virtual Labs initiative. This should spread across all NITs in a need based manner.*

18 *Open courses are online courses that aim at large scale interactive participation and open access via web. They are typically courses which are not credited and are available free of cost. In addition to conventional educational resources such as reading material, videos, problem sets etc., they also enable the creation of an interactive user forum of students, teachers and tutors. The initiative to use and support MOOC in NITs should be augmented.*

Chapter 2.1

19 *NITs should attempt to take a revolutionary step of promoting and evaluating group performance and add it to individual's score. This could be done as discussed in the report. (Each institution could evolve its own mechanism):*

Chapter 2.3

20 *NITs to hire only high quality faculty during fresh recruitment.*

Chapter 2.4

21 *NITs should introduce a "Trainee Teachers Scheme". The scheme will be financially supported and reviewed every year by MHRD and after 3 years by an external committee. The number of teachers recruited through trainee-teacher program could also be a factor towards tier-evaluation of the NIT.*

Chapter 2.4.1

22 *Even while new faculty of high quality is recruited, it is equally important to get existing faculty, especially the younger lot, to continuously improve and perform better. The senior/existing faculty should also be motivated towards excellence in teaching, technology development and research, to help institute reach better category as envisaged in section 3.1. Towards this, a teacher-training program could be evolved by NITs. The number of teachers at various level of certification could count towards tier-evaluation of the NIT.*

Chapter 2.4.2

23 *NITs have bright B. Tech students. But only a few of the top fifteen percent opt for research career in India. A program to enable such B. Tech students, at the end of 3rd year, to go for a direct PhD at IITs has been proposed. They would complete the fourth year credits at IITs (which would be transferred to NITs for award of their B.Tech degree) and move on to do their qualifying examination and pursue research. It is expected that such a scheme would be floated by IITs and the students of NITs could take advantage of this.*

Chapter 2.6

24 *To strengthen itself and to become the institutes with global recognition, NITs have to subject themselves to extensive review, evaluation and rating on a continuous basis. This would include Third Party Rating involving continuous survey of students, faculty and stake holders, yearly internal and external peer-review of faculty as well as departmental and institute level periodic evaluation.*

Chapter 2.7

25 In principle, the respective Board of Governors should decide roles, responsibilities and review or appraisal process for the faculty and the non-teaching staff of the NIT. However, considering legacy issues, broad non-prescriptive guidelines need to be formulated to minimize anomalies and major disparities or discrepancies amongst various institutions.

26 Boards of different NITs need to define an appraisal and recognition framework that motivates higher level performance in all areas as mentioned while at the same time individuals are able to develop themselves to be on par with their counterparts in the best institutions anywhere.

27 Review Committee for faculty appraisal would comprise the Head of the Department or Chair, senior faculty from the host Department and one other senior faculty from the allied Department. Critical comments, both positive and negative, should be communicated to the concerned faculty in writing. In case of senior faculty including Professors, Head of the Department and Deans, the review will be carried out by a committee comprising of

two members of the Board of Governors. Performance of the Director may be assessed by the Chairman Board of Governors and MHRD HE Secretary / Additional Secretary albeit with different set of parameters. If required the committee may seek to meet the concerned faculty in person for interaction, suggestions and guidance.

28 *The appraisals each year would be examined and commented upon by a departmental-level committee for young faculty and institute-level committee for senior faculty. Once in three years, the self-appraisal for the past three years (including comments of the above committee) would be sent for external peer-review.*

Chapter 2.7.1

29 *The external institute evaluation would be carried out at departmental level and institute level.*

The Departmental Visiting Committee will carry out comprehensive departmental audit every year. However in alternate year, the review will be minor (one to two days visit) and major (two-to three days visit). The objective of the Visiting committee would be to push quality in teaching, R&D, industrial collaboration and leadership and the evaluation is expected to enhance academic and research programs in the department. The committee would be appointed by the Governing Board of each NIT and would consist of two industry and two academic persons. Each person would have tenure of four years and half the team is expected to retire every alternate year.

Each NIT would have an External Institute Minor Review once in three years and a Comprehensive Review every six years. This review would be used in determining the tiered rating of the institute.

Chapter 2.7.2

30 *NIT Council should appoint a reputed agency to assess the quality of information submitted and rate the institutions using a common methodology. The established Indian rating agencies like CRISIL, ICRA and CARE, which have a credible history of*

assessment and rating and independent review of industry, could be asked to provide this service. These ratings would be in addition to accreditation to be carried out by NAAC/NBA and other such agencies.

Chapter 2.7.3

31 It is important for each NIT to strive such that the closing rank in entrance exam is not more than 1.5x of the total seats that they have.

Chapter 3

32 NITs should be graded to belong to one of the three tiers.

***Tier AC:** An institute with Excellence in Teaching and developing in technology development and in Research*
***Tier AB:** An Institute with Excellence in Teaching + Excellence in either technology development (industry interaction) OR Research and developing in the other*
***Tier AA:** An institute with Excellence in Teaching + technology development (industry interaction) and Research*

The tier-award will be done by a committee nominated by standing committee of NIT-Council. It will have members from academia as well as industry. Institute at different tiers could be given different levels of autonomy as well as incentive / support in terms of funding.

Chapter 3.1

33 NITs could turn their location into an advantage, if they can contribute significantly to industrial sector development in the state. In fact, the best NITs, over the years, would convert their location into a large industrial hub in the state. This does not mean that they would not work with industries outside their state – in fact; to begin with, it should lose no opportunity to work and interact with any industry anywhere. However the long-term goal would be to become a centre of industrial hub.

Chapter 3.2

34 Industry personnel and academia should start interacting in different ways (other than just for the purpose of hiring graduates). The following programs as detailed in the report are expected to help:

i. Involving industry personnel in teaching

ii. Having industry cells at NITs (along with the involvement of State Government)

iii. Sabbatical at industry

iv. Industry personnel as adjunct faculty

v. Innovation eco-system, entrepreneurship and incubation and Research Park

vi. Involving industry persons more proactively at senate and board level and in evaluation as well as rating

Chapters 3.2.3 – 3.2.8

35 Institutions like NITs have to undergo fair amount of transformation in order to realise the set objectives. Bold leadership, efficient governance and systematic management are required for the NITs to excel in the field of technical education. The policies and practices that direct each NIT must involve collective decision-making and joint responsibility. Every stage of the quality improvement process must be monitored by a system of checks and balances. These must be internalized as the best practices of the institute for serving the interests of all stakeholders.

Chapter 3.2.9

36 MHRD has started funding centres in frontier areas of technologies at various institutes in the country. It is recommended that at least some of these centres should be industry-oriented. Ideally these centres would have at least one IIT, at least one NIT and a medium / large scale industry, with the objective of taking research all the way to product commercialisation.

37 It is critical that the faculty who participate in industry action are rewarded. The committee recommends annual awards

at the level of NIT and the council for faculty who make significant contribution in the area of industry-related work. At the same time, NITs need to figure out a way to factor in faculty work with industry and contribution in technology-development for the purpose of promotion. Today the promotion process is based exclusively on academic research and is rather perfunctory in its method of faculty evaluation. The role of faculty contribution in technology development is given less weightage. Young faculty thereby get wrong signals. This urgently needs correction.

Chapter 3.2.10

38 *NITs and IITs constitute a sizeable number of centrally funded technical institutions. This implies that the two foremost engineering education systems in India are primarily responsible for engineering human capital for the country by bringing out high quality graduates who have good domain knowledge to produce pioneering research leading to the development of cutting-edge technology. It also means that these institutes must serve the national interest by adding engineers with skills and competencies that are required by the industry. Hence, maximising synergy between these two groups of institutions is very important. Several modes of interaction between NITs and IITs including recommendations for financial support for their implementation have been proposed in this report.*

Chapter 3.3.1

39 *With respect to engagement of NITs in North-East and J&K with regional development, an apex level SPV could be set up by MHRD with participation of DONER, NE Council and representative industry associations. The SPV could effectively link education and training in NITs in the region with development of the area. There should be a formal understanding between MHRD and industry in terms of development in North-East and participation of NITs in the process. The SPV would be governed by a Board of Management Chaired by the President of industry association with other Directors drawn from different stakeholders. The CEO/MD should be a professional appointed by the GoI in consultation with the Chairman of the Board.*

Government of India (MHRD, DONER and NE Council) could launch this SPV with adequate equity support and with

ownership involvement of all NITs in the region. {Suggest 20 crore by DONER, 10 crore by NEC and 10 crore each by each of NITs (MHRD)}.

Chapter 3.4

40 Chairman of BoG should be nominated by the Chairman of the NIT Council for a three year term on the recommendation of a nomination committee.

41 The top leadership positions (Chairman & members of BoG and Director) shall continue in their respective positions unless relieved by the competent authority upon completion of the term of their office.

42 Board meetings should be fixed sufficiently in advance taking convenience of members into account.

Chapter 4.1

43 The Director of the NIT is the most important position and determines the present and future of the institution. He / she should be an individual in the field respected by all for his/her capabilities and track record, but also must be an inspiring leader, capable manager and a passionate team person. The Search cum Selection process for the Director should enable identification of such a person with high degree of success. It therefore cannot be based just on an interview. Some detailed back-ground checking and evaluation of his / her past performance is essential. Search cum Selection Committee should consist of Chairman of the NIT Council as Chairman, eminent people from academia and industry, Chairman of standing committee of NIT Council, Chairman of BoG and Secretary MHRD as members. Council shall be empowered to approve the Directors nomination. The process of selection of Director must be started well in time to ensure an overlap between existing and incoming Director for at least one month.

44 Deputy Director should be appointed by the Director with approval from BoG in every NIT. Deputy Director will lead the institution in absence of the Director. In case it becomes

necessary, in-charge Director can be selected by BoG among five senior-most faculties.

Chapter 4.2

45 Horizontal interactions at multiple decision making and performance layers between IITs and NITs would have positive catalytic influence and should be promoted.

Chapter 4.3

46 A common program towards training in leadership development could be evolved. NITs could share management systems and SOPs amongst themselves.

Periodic Directors' Conference duly serviced by a core group (rotating membership with overlap) could be a good platform for sharing best practices and organizing orientation / training programs for faculty and staff at different levels covering various aspects of functioning of NITs.

Chapter 4.4

47 NITs should ensure a vertically integrated Administrative and Finance framework linked with different layers of the academic and research activities with the objective of playing a facilitating role at all layers.

48 The administrative leadership needs to have the ability to translate needs of Academic Leadership and envisioned Academic and Research programs into action through an efficient and rule bound system that facilitates objective oriented implementation

49 One may need to laterally induct professionals of high competence at leadership level in administration and finance at NITs. Getting consultants to set up efficient administration and finance systems and hiring people with specific competencies on contract could also be resorted to.

Chapter 4.5

50 NITs need to create yearly awards at Council level. The awardees could be chosen by committee appointed by the Council for this purpose every year for (i) Best in teaching, (ii) Best faculty in R&D, (iii) Best faculty in technology development and industrial interface and (iv) Best faculty in administrative role.

Chapter 4.6

51 Governance framework in NITs should be exclusively driven by passion for excellence and be conducive to the institutions becoming magnet to attract high quality teachers and researchers who could take the institutions to a much higher level of excellence. This would need a peer informed flexible approach to preferentially support creative ideas and an approach to pursue co-ordinated research in large groups to address some grand challenges. Apart from research to address important questions in the knowledge domain, NITs should also address challenges before industry and society with a holistic approach. This would require generating projects, seeking funding support and engaging in consultancy to solve problems of stake holder interest. Enhancing quality of human resource in education as well as industry domains through continuing education programs should be another key pursuit of the institution. The value system within the institution should encourage and motivate faculty in these directions with a high degree of excellence and impact. This needs a broad minded outlook with a liberal approach.

52 An optimum combination of Top-down and Bottom-up approach is required in the governance of NITs. This would prepare the junior faculty to take up higher responsibilities at appropriate time. On a residential campus, it is absolutely essential that everyone participate in institute building exercise. NITs should ensure that administrative acumen builds up quickly at all levels involving the entire faculty. Building up competencies, adopting best practices, networking with reputed institutes in neighbourhood such as IITs, IISc, IIMs etc. would be beneficial for NITs to progress rapidly.

53 The Act and Statutes broadly defines role and responsibilities for Director, Deputy Director, Deans, Registrar and the Head of the Department. These need to be relooked to modify as well as to provide additional details to bring clarity and

transparency. (Annexures VIII & IX provide the necessary suggestions)

Chapter 5

54 All NITs should develop their own procedures for academic activities, administration, purchases, functioning of hostel etc. which are consistent with the NIT act and statutes. A scalable solution be developed for systemic automation including procurement and academic work flows. This may be taken collectively for all the NITs through a consortium approach which can be adopted in an incremental fashion.

Chapter 5.1

55 All administrative support processes in an NIT should be subject to annual internal performance audit. Internal audit could be done by teams set up by the Director which could consist of representatives of users and domain experts outside the performing group.

Chapter 5.2

56 The non-teaching staff (NTS) are integral part of NIT system, be it teaching, research, administration, finance, sports, library, hostels, mess and other facilities management. Their contributions have a direct impact on the institution's performance and therefore it has to be given due importance. Some recommendations with respect to NTS may be seen in Chapter 5.3.

Chapter 5.3

57 An institute advisory committee in which alumni have a prominent presence should be set up to promote development of the Institute with active involvement of alumni. Chapter 6 brings out several aspects of alumni engagement for the benefit of the institute. They should be proactively pursued.

Chapter 6

References

i. W. Brian Arthur, The Nature of Technology: What it is and how it evolves, Free Press, 2009, pp. 117-118.

ii. Governance of Technical Education in India - Key Issues, Principles and Case Studies - Edited by Andreas Blom and Janette Cheong, World Bank Working Group Paper No. 190 (2010)

iii. Strategic Road Map for Academic Excellence of Future RECs - High Powered Review Committee Report on Regional Engineering Colleges - Chaired by Dr. R A Mashelkar (1998)

iv. Fostering Student Engagement Campus wide, Annual Report 2011, NSSE, Bloomington Indiana

v. National Knowledge Commission - Report of Working Group on Engineering Education -- Chaired by Prof. M. S. Ananth - (March 2008)

vi. Taking IITs to Excellence and Greater Relevance - Report of Dr. Anil Kakodkar Committee - (April 2011)

ACKNOWLEDGEMENTS:

The Committee would like to thank MHRD for this opportunity to participate in these important efforts. The Committee hopes that the recommendations being made, if implemented in letter and spirit, would make a significant positive difference in further development of NITs. The Committee wishes to acknowledge the generous help it has received from large number of peoples from NITs and IITs;

The Committee benefitted from discussion with Directors of NITs as also with the NIT Council during the course of its work. We gratefully acknowledge the valuable suggestions that were made in these sessions.

Dr I K Bhat, Dr Swapan Bhattacharya, Dr Sunil Sarangi and Dr N V Deshpande joined the committee during the final stages of its deliberations and made valuable contributions towards shaping its recommendations. Committee acknowledges the contribution of India Design Council, Dr Gaur, NIT Jaipur and several others for their inputs. Committee places on record untiring efforts of Dr R K Ingle, VNIT Nagpur, for his contributions, co-ordinating various inputs, making necessary arrangements for numerous meetings of the committee and preparation of this report. We also acknowledge support of Director VNIT in this regard.

The Committee would like to thank Directors of NIT Jaipur, NIT Calicut and NIT Silchar for their help and facilitating meetings with faculty, staff, students and Alumni of these NITs.

Committee would like to thanks all the Directors of NITs for their contribution and help in organising the online survey for students and furnishing required data for statistical analysis of their NITs.

Director and Registrar of IIT Delhi and IIT Bombay have made necessary facilities available for conduct of the meetings at the shortest notice.

Efforts of Shri Rajesh Singh and Shri Raju Srivasan, Director (NITs), MHRD, are duly acknowledged for various notifications, for providing annual reports of NITs as well as logistics support.

Annexure Ia Creation of Committee to Review the NIT System

No. F.23-12/2009-TS.III
Government of India
Ministry of Human Resource Development
Department of Higher Education

New Delhi, the 14th November, 2011

Subject : Constitution of a Committee to review the NIT system

In the 2nd Meeting of Council of NITs held under the Chairmanship of Hon'ble Human Resource Minister on 28th June, 2011. It was decided, inter-alia, that a Committee headed by Dr. Anil Kakodkar, Chairman, BOG, IIT Bombay be constituted to review the NIT System as was done recently for the Indian Institute of Technology system.

2. Accordingly, it has decided, in consultation with Dr. Anil Kakodkar to constitute a Committee under the Chairmanship of Dr. Anil Kakodkar, Chairman, BOG, IIT Bombay to review the NIT system with a view to suggesting a roadmap for the growth and development of NITs while ensuring their autonomy as institutions of national importance. The composition of the Committee will be as under –

1. Dr. Anil Kakodkar, Chairman
   Chairman, BOG, IIT Bombay

2. Prof. Ashok Jhunjhunwala Member
   Deptt. Of Electrical Engineering
   IIT, Madras, Chennai

3. Prof. Sandeep Sancheti Member
   Director, NIT, Suratkal

4. Prof. S.S. Gokhale Member
   Director, NIT, Nagpur

5. Sh. Gautam Thapar Member
   Chairman, Ballarpur Industries Limited,
   First India Place, Tower C, Mehrauli-Gurgaon Road
   Gurgaon, Haryana – 122002

6. Joint Secretary (NITs)/Incharge Bureau Head (TE) Member Secy.
   Ministry of HRD

R. The Terms of Reference of the Committee are as follows:

1. To review the overall NIT system as it exists today.
2. To suggest a roadmap for strengthening Financial, Administrative and Academic autonomy of the NITs.

3. To suggest ways and means to increase the capacity of institutions to argument their financial resources, including through increase in fees in the NITs (albeit in a gradual manner) as the issue of autonomy is closely linked with the ability of the institution to raise it our resources. While doing so interest of the weaker sections of the society should be taken care of.
4. To suggest a 'means-blind system' wherein scholarships are provided to the deserving and a system of education loans is dovetailed into it, particularly for such students who continue to research and take up teaching assignments as a career,
5. To suggest ways and means to retain/attract top B.Tech. students within the NIT system to Postgraduate and PhD programmes;
6. To consider the issue of faculty induction and development; measures to improve the strength of NIT faculty may also be suggested;
7. To suggest a self primed system within the NITs to achieve the optimal level of intake of students each year (UG and PG) with the possibility of funds being released to the institute on 'per student' basis to incentivise growth;
8. To suggest means to raise the resources/corpus of the NITs through research project, consultancy, donations etc. and to explore the possibility of matching grants from the Ministry;
9. To take stock of the present expansion programme [not only the number of NITs have increased from 20 to 30 but there have also been capacity increase in the older NITs on account of OBC reservation] and to suggest the future course of action in terms of inclusion, expansion and excellence;
10. To look into possible synergies that could be developed from not only interaction and collaboration amongst the NITs but also linking up with other National Institutes like IITs, IISERs, IISC, IIITs, IIMs, etc.

R. The secretarial and other logistic support to the Committee would be provided by secretariat of the NIT Council. The committee may devise its own process and methodology for its functioning and may submit its report within a period three months.

(R.D. Sahay)
Joint Secretary (TE)

Distribution:

1. Dr. Anil Kakodkar, Chairman, BOG, IIT Bombay
2. All members of the Committee
3. Director of all NITs

Copy to: PS to HRM/ PS to MoS/ PSO to Secretary (HE)/ Sr. PPS to Spl. Secretary

(R.D. Sahay)

Annexure Ib Co-opted members to Review the NIT System

No. F.23-12/2009-TS.III(Pt.)
Government of India
Ministry of Human Resource Development
Department of Higher Education

Shastri Bhawan, New Delhi,
Dated, the 24th October, 2013

Meeting Notice

Subject : Meeting of the Committee constituted to review the NIT System - regarding

In continuation of this Ministry's meeting notice of even number dated 24th October 2013, I am directed to inform that the next meeting of the Review Committee of NITs scheduled to be held at Indian Institute of Technology (IIT)- Delhi will now be held in the Chamber of Additional Secretary (TE), Department of Higher Education, Ministry of HRD, Room No 118, C-Wing, Shastri Bhawan, New Delhi on 5th November, 2013 (Tuesday) at 10.30 AM.

2. You are requested to kindly take note of the same and make it convenient to attend.

(Rajesh Singh)
Director (NITs)
Tel: 23073687

To

1. Dr Anil Kakodkar, Former Chairman & Secretary, Department of Atomic Energy, 7th Floor, Central Complex, Bhabha Atomic Research Centre, Bombay, Mumbai
2. Shri Gautam Thapar, Chairman & CEO, Avantha Group, Thapar House, 124, Janpath, New Delhi- 110 001
3. Prof S S Gokhale, Former Director, VNIT Nagpur
4. Prof Sandeep Sancheti, Former Director, NIT Delhi
5. Prof Ashok Jhunjhunwala, Professor (D/o EE), IIT Madras
6. Ms Amita Sharma, Additioanl Seceatory (TE), MHRD, Shastri Bhawan, New Delhi
7. Dr S K Sarangi, Director, NIT Rourkela
8. Dr I K Bhat, Director, MNIT Jaipur
9. Dr Swapan Bhattacharya, Director, NITK Surathkal
10. Dr N V Deshpande, Director, NIT Silchar

} "Special Invitees"

CC to:

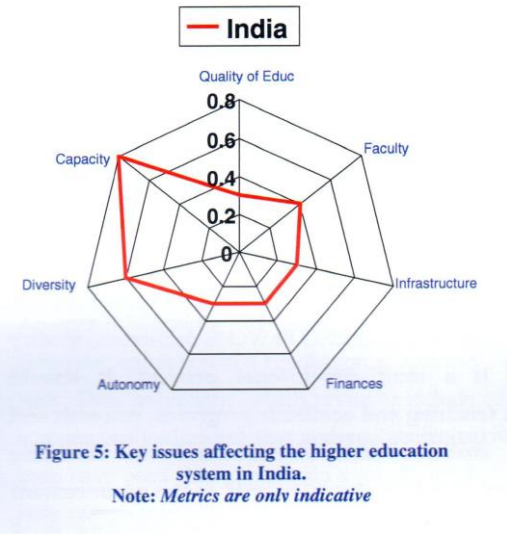
(i) The Director, IIT Delhi – with a request to kindly take a note of the same
(ii) The Director, VNIT Nagpur with a request to kindly depute Prof R K Ingle, Dean (FW), VNIT Nagpur to attend the aforesaid meeting and to make payments towards TA/DA and necessary arrangements, and also to keep close liaison with the NIT s Division of MHRD
(iii) Shri R Srinivasan, Director (TE), MHRD, New Delhi
(iv) PSO to Additional Secretary (TE), MHRD – with request to kindly make arrangements for the aforesaid meeting in the Chamber of AS (TE)

Annexure II Schedule of committee meetings

SN	Place	Date	Remark
1	IIT Mumbai	14th February 2012	Preliminary Meeting Terms & Conditions
2	IIT Delhi	21st March 2012	Meeting with Directors of NITS
3	MNIT Jaipur	13th April 2012	Visit to the NIT Jaipur
4	NIT Calicut	7th May 2012	Visit to the NIT Calicut
5	NIT Silchar	18th June 2012	Visit to the NIT Silchar
6	MHRD New Delhi	18th July 2012	Meeting with Industry representative
7	MHRD New Delhi	23rd August 2012	Meeting with Directors of NITS
8	IIT Mumbai	8th October 2012	Early PhD induction, Industry Institute Interface
9	IIT Mumbai	8th November 2012	Funding pattern, Trainee Teacher
10	IIT Guwahati	4th January 2013	Meeting with Directors from N-E & State Officials
11	IIT Mumbai	28th February 2013	Apex Selection Process, Review mechanisms, Fee
12	MHRD New Delhi	26th March 2013	Grouping of NITs, IIT-NIT Pairing
13	IIC New Delhi	20th June 2013	Towards excellence in UG Education
14	IIT New Delhi	20th July 2013	Discussion on final report preparation
15	IIT New Delhi	23rd August 2013	PPT Presentation for NIT Directors
16	IIT Bombay	10th September 2013	Meeting with Directors of NITS
17	MHRD New Delhi	5th November 2013	Discussion on feedback from NIT Council Meeting, 4 more
18	MHRD New Delhi	16th December 2013	Report finalization
19	IIT New Delhi	15th January 2014	Report finalization
20	IIT New Delhi	29th March 2014	Report finalization
21	IIT New Delhi	7th April 2014	Report finalization

Annexure III Excellence in Higher Education:

TCS in its document "Foundation for Excellence in Higher Education and Research in India", identified seven interdependent issues as illustrated in the diagram below.

Key indicators: a) Persistent downward spiral in quality of education from the point of view of stakeholders such as employee and students b) Decline in the number and quality of faculty c) Poor infrastructure support for teaching research and consultancy d) Shortage of financial resources e) Inadequate institutional autonomy f) Issues external to system- g) Continuous pressure to expand capacity Large diversity in student inputs (social and intellectual)	 **Figure 5: Key issues affecting the higher education system in India.** **Note:** ***Metrics are only indicative***

Two major changes in rapid succession in the first decade put NITs on the back-foot. The first one was 54% increase in the student intake on account of OBC reservation with inadequate infrastructure and the second one starting of ten new NITs in a single go without any infrastructure. Even though financing these projects was not a major issue, finding adequate human resources, preparing these campuses and putting administration in place in difficult geographic terrain was a major stumbling block. Recent newspaper article indicates that JEE-IIT is tilted towards CBSE and four major cities. North-East region is sadly missing it out. Even though JEE (advance) for IIT is of no consequence for NITs, the lack of opportunities to prepare for competitive examinations, awareness and preparedness for technology absorption in economic growth and absence of outreach of NITs in particular or technical education in general cannot be ignored. The problems faced as well as the requirements of N-E region are quite different from the rest

of the country. For inclusive growth of the NIT system it is necessary to give special attention to the North-East region.

"Working Group on Engineering Education" of the National Knowledge Commission presented the status report along with recommendations in 2008. Though, in parts, philosophical in nature it emphasized that engineering education consists of knowledge, knowhow and character. In tune with similar studies this report also stressed the need for academic freedom and autonomy, teaching as a unifying activity in which student joins in discovering knowledge, research - both routine and creative presented in journals and conferences and information dissemination for informing the public. The report also presented challenges such as meeting increased demand, knowledge explosion, governance, resource generation and retaining the perspective.

The same NKC report also expressed some reservations regarding undue emphasis on resource generation in an academic environment:

- The system is likely to be money-driven rather than scholarship driven
- Graduate students are likely to be trained as technicians in narrow areas in order to meet the unenlightened demands of the funding agency
- Emphasis of faculty can shift from teaching and knowledge creation to seeking funds through proposals
- Administration is likely to burdened by rules, regulations and litigations

On behalf of AICTE and CII, PwC conducted survey of technical institutes in the country in November 2012 which are at least 10 years old. The disciplines chosen were ECE, EE, ME, ChE, CE, CSE&IT. Certain weightage for various dimension were ascribed (Governance, Infrastructure, Entrepreneurship Development 10% each, Curriculum, Faculty 15% each, Services, Placement 20% each). Team of experts representing academia and industry visited few academic institutions. The average score indicated that most of the institutes performed poorly in faculty, services entrepreneurship development and governance. Placement and curriculum scored reasonably well.

http://www.aicte-india.org/downloads/AICTE CII%20Survey%20of%20Industry%20Linked%20Engineering%20Institutes%20Final.pdf

World Bank Working Paper No. 190 released in March 2010 deals with "Governance of Technical Education in India". Few salient highlights are as below:

Out of approximately 2400 technical/engineering institutions in the country across 30 states, less than 8% of public institutions are autonomous. Considering demand for tertiary education, private colleges that have sprung in the past 20 years are currently delivering 85% of all technical and engineering education. Considering this fact, effective, efficient governance and management to fulfil the needs of the industry and society cannot be overemphasized. Major higher education reforms require significant initiatives to increase autonomy and accountability in tertiary education sector. This aspect is essential for improving the quality of learning and teaching outputs and outcomes. Even though this working paper deals with whole of technical education for the country there are few takeaways for NITs as well. This paper outlines key suggestions / recommendations for the governing bodies:

- Act as custodian of values, mission and purpose
- Assert its autonomy and accountability
- Be unambiguously and collectively responsible for oversight
- Keep its effectiveness under objective review

Issues mentioned above are directly or indirectly connected to the future of NITs. Amongst all the odds, creating support structure amongst NITs including new ones and between NITs and IITs, acquiring and retaining high quality human resources, understanding nuances of governance, creating infrastructure to fulfil the aspirations of the young India, sensitizing the masses about impact of engineering and technology in nation's growth and adopting to the changing requirements would be the key issues that needs to be addressed.

Annexure IV Trainee-teacher scheme to bring in high-quality faculty

SALIENT FEATURES OF THE SCHEME

Sr. NO.	TOPIC	EXPLANATION
1	Nature of Programme	To appoint "TRAINEE TEACHERS" (TT) on contractual basis at National Institute of Technologies (NITs) subject to enrolment of the Candidates in Indian Institute of Technologies (IITs) for M Tech and PhD programme
2	Duration of M.Tech. & Ph D Programme Mode of Delivery	Maximum 8 years Format: Part-time & Virtual mode with one semester full time in particular IIT
3	Teaching Assignments for candidates at parent NIT	12-14 hrs per week Tutorial, laboratory, project work for initial 1-2 years, subsequently sharing and finally to teaching full course
4	Financial support / Salary	Tuition fee as charged by the concerned IIT and monthly consolidated salary paid to TT to be funded by MHRD under this scheme.
5	Specialization to be considered / offered	To be decided by the respective NIT and IIT
6	No. of seats	To be decided by NIT (typically 5 to 10 decided by BoG based on future and predictive faculty requirement). These would be maximum of 300 per year for 30 NITs to begin with.
7	Degree	To be awarded by IIT
8	Bonds/ Commitment for service	The Trainee teacher will receive his/her total contracted salary in two parts. One part will be paid to him /her on monthly basis .The second part of the salary will be put in RD in bank. This part is to be paid to TT after successful completion of their PhD and continuation in service at the host NIT for three years and paid in three annual instalments. In case

		TT fails to acquire PhD in the stipulated maximum period and also in case s/he discontinues from the service in parent NIT after successfully completion of his PhD, the balance amount will be forfeited. If TT fails to acquire PhD in the maximum stipulated time, s/he will be discontinued from this scheme.
9	Admissions	(i) This scheme is open to all graduating candidates who are in top 15% in the Centrally Funded Technical Institutes (CFTIs). All other candidates who are in top 15% from other AICTE/UGC approved institutions / universities (non-CFTIs) and having a valid GATE score would also be eligible. (ii) The concerned NITs would identify and implement initial screening criteria for the selection of potential candidates.
10	Employment	After successful completion of the PhD from IIT, the TT will be absorbed as an Assistant Professor in that NIT in regular scale with all the associated benefits and services rendered as trainee will be counted for various benefits admissible to employees of NITs.

Detailed Proposal

I Introduction

Currently there is critical faculty shortage in technical education in the country. The proposed scheme is expected to fill up gap between demand and availability of bright committed aspiring teaching professionals, for example in NITs, taking fresh UG graduates, nurturing them for teaching along with the M Tech degree and PhD research carried out at IITs. The top 15% of the engineering graduates can fulfill their aspirations to receive their degree from leading prestigious Institutes in the country. It is expected that the present faculty crunch could be partially solved by implementing the “Trainee Teachers” scheme.

II Objectives

To enhance teaching quality and to address the faculty shortage issue, some of the best engineering graduates (i.e. top 15% meritorious students from the IIT, NIT, IIIT, IISER, NISER and other AICTE/UGC approved

Institutions/Universities) could be attracted, motivated, and mentored. They would be engaged as Trainee Teachers at NITs. While initially they would assist in teaching, they would simultaneously go through part time M Tech and PhD programmes of IITs to acquire higher academic qualifications, which is a pre-requisite for faculty at NITs and IITs. Following are broad objectives of this scheme:

a. Create high quality teachers
b. To provide attractive teaching cum research carrier path to the UG student
c. Catch bright UG students to enable them to **Teach and Earn while you Learn** and providing top class training to become good academician / researcher.

III Key Aspects of the Scheme

Each NIT would work out a perspective faculty recruitment plan for next five years based on current vacancies, projected growth, faculty recruitment through other channels, retirements and expected resignations. The plan should be seen and approved by respective BoG to be consistent with MHRD approved projections and norms for the institute. The number of Trainee Teachers to be admitted in an year would be determined by distributing the admissions roughly equally over a period of five years. The perspective faculty recruitment plan could be reviewed periodically. Other channels of recruitment of faculty should also be pursued in parallel and should be factored in the perspective faculty recruitment plan.

Admission Methodology

i. NITs will advertise and shortlist required numbers of fresh bright B Tech students from the current or one year prior to the current academic year in appropriate branches. These prospective candidates will go through comprehensive fast track screening procedure that meets all requirements for the selection of entry level regular faculty. The selection process would be completed once the candidate is accepted by the concerned IIT for the M Tech and PhD program. These students must satisfy the criteria of being within top 15% ranks and above in institutions of higher standing such as IITs, NITs, IIITs, IISERs, NISER and other Centrally Funded Technical Institutions (CFTIs) or those who are in top 15% from other AICTE/UGC approved Institutions/Universities (non-CFTIs) and having a valid GATE score would also be eligible. The probable number of trainee and their specializations can be decided by the NITs such that the number shall be within a prospective faculty recruitment plan and with prior approval by BoG.

ii. These short-listed students will be asked for preference of minimum two IITs who offers such scheme. These students will be evaluated by corresponding IITs considering their eligibility criteria and their potential for teaching and performing research for M Tech and PhD program in the NKN enabled virtual learning mode. If the candidate is not selected by IIT for M Tech and PhD program by IITs, he/she will not be offered the trainee-teacher scheme.

iii. The IITs and NITs will collectively generate broad contours of e-courses to help the trainee to complete most of the credits while serving in the NITs. The trainee teacher will spend one semester in the entire duration of the programme in corresponding IIT for their M Tech and PhD work. Course work would include adequate coverage on teaching pedagogy in addition to covering courses relevant to M Tech & PhD programme.

Duration and Salary

i. The Trainee Teachers will mainly help the Institute for Laboratory and Tutorial classes, Research and progressively play bigger role in academics and research in the NITs.

ii. The status of Trainee Teachers will be like Contractual Employees with annually increasing consolidated salary on an equivalent scale (compensation higher than a regular PhD fellow but lower than an Assistant Professor) with regular leave, medical facilities, accommodation / HRA as applicable, transport allowance etc. Also all the fees and some professional expenses towards the M Tech and PhD programme will be reimbursed through this scheme. Part of the salary will be retained by the Institute, placed in Recurring Deposit (RD) and this would be returnable to the trainee in a phased manner, only after successful completion of PhD.

iii. It is necessary for the Trainee Teachers to complete M Tech and PhD within 5-8 years. If candidate fails to complete his PhD within eight years, his or her candidature to be in this scheme will be discontinued. The trainee teacher also can opt out of the scheme by giving sufficient notice to the administration and it should be effective only after completing academic requirements towards the end of current semester. In such a case the amount kept in RD will be forfeited.

Regularization of Candidate

After successful completion of the PhD, the trainee teacher will be absorbed as Assistant Professor at appropriate pay scale in the parent NIT and service rendered as trainee will be counted for various benefits admissible to employees of NITs.

Implementation Support

The scheme will be reviewed every year by MHRD and after 3 years by an external committee.

IV Financial Outlay

Financial outlay has been worked out as per unit cost given in Annexure-IVa.

Financial Requirements for eight years

While the actual numbers to be admitted as Trainee Teachers at a NIT would be based on approved perspective recruitment plan as indicated above, purely for the purpose of working out the budgetary requirements a representative number of 300 Trainee Teachers to be admitted every year for all NITs put together has been assumed. Actual annual budgetary requirements would need to be adjusted based on annual MHRD reviews of the scheme. Table I given below indicates the details of buildup of possible number of candidates in the scheme as a first step

Table – I: Indicative No. of "Trainee Teachers"

Financial Year	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21#**
Total for 30 NITs	300	600	900	1200	1500	1800	2100	2400

 # The numbers would stabilize hereafter

Number of Trainee Teachers at any time to be within projected vacancy position at the end of training period of the given NIT(s). In the old NITs, currently there are about 30 to 40% faculty vacancies. In the first eight years of this scheme, it is expected that the number of vacancies would be reduced substantially.

Table II provides the committed expenditure (Rs. in Lakhs) based on the eligible students admitted up to academic year 2020-21 based on **indicative numbers of 300 TT per year**.

Table II: Financial Requirement / Outlay during first eight years of scheme (Rs. in Lakhs)

Financial year	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**
Estimated Cost basis	Basic + DA(65%) + TA (3200/-) + HRA (20%) as on today							
Annual cost per TT	4.86	4.99	5.38	5.52	5.66	5.81	5.96	6.12
Total TTs	300	600= 300 New + 300 old	900= 300 New + 600 old	1200= 300 New + 900 old	1500= 300 New + 1200 old	1800= 300 New + 1500 old	2100= 300 New + 1800 old	2400= 300 New + 2100 old
Requirement of funds per year for new	1459	1497	1613	1655	1698	1743	1789	1836
Requirement of funds per year for old	-	1459	2956	4569	6224	7922	9665	11454
Coordination / Administrative Expenses (~2 Lac per yr including fees for IIT	600	1200	1800	2400	3000	3600	4200	4800
Total in lakhs	2059	4156	6368	8623	10921	13264	15653	18089
Revised total with approx. 10% increase rounded up	2059	4572	7005	9486	12013	14591	17219	19898

It is suggested that TT should get some funds for professional expenditure like membership of professional societies, attending conference, for which they should apply for, if their paper is accepted for presentation etc.

V Operational Details of the Scheme

For operational clarity, the scheme once approved should be implemented jointly by the IITs and NITs with their roles in the schemes as briefly outlined below.

1) **Role of IITs :**
   a. To select students jointly with NITs for “Trainee Teachers” programme
   b. If found suitable, enrol students for M. Tech and Ph. D programmes.

c. To deliver the programme in Virtual Mode such that the "Trainee Teachers" are available to the parent NIT for a maximum period to facilitate teaching-learning activities at NIT

d. To deliver contents related to pedagogy which are in addition to the conventional course / programme requirements

e. To arrange review of progress once in a year by concerned IIT faculty supervisor(s) and representative(s) from sponsoring NIT

f. Coordinate all activities in regard to its implementation of the scheme with NITs or a centralized body created for its implementation

g. To nominate one contact / nodal person from each IIT side (may be Dean (R&C) / (Acad.) or equivalent) for its effective implementation, monitoring and co-ordination of the scheme.

2) Role of NITs :

a. To plan and implement the scheme keeping in view the overall requirements of faculty in a given time frames

b. To identify, shortlist and recommend bright students for "Trainee Teachers" programme

c. To train TT as potential faculty and facilitate their interaction with IITs for M. Tech and Ph D programmes and also engage them suitably in teaching learning activities in their own institute

d. To disburse salary and other perks and benefits to "Trainee Teachers" in their respective institutions including fees to IITs.

e. To possibly join IIT faculty in review of the progress of the TT in Indian Institute of Technology.

f. To absorb them in regular faculty positions upon successful completion of the Ph D programmes.

VI Conclusion

The scheme should be launched from the next academic year 2013-14 itself after obtaining necessary approval from the MHRD and other concerned GoI bodies. Necessary budgetary provisions (for year 2013-14) should also be made for financing the scheme on long term basis. The concerned BoG of every NIT should make effective plans to make use of the scheme to mitigate the shortage of faculty on a long term basis. While doing so, they should adequately balance the recruitments from various channels including the "Trainee Teacher" Scheme. NIT council shall create a sub-committee to co-ordinate and monitor the scheme.

_____

Annex-IVa: Worksheet for Unit Cost Calculations (as on January 2013)

Proposed Pay to Trainee Teachers: 7 increments less than what an Assistant Professor will get, though on same scale) and what will he / she gets just at the time of finishing PhD (if PhD is completed in 7 years).

Assistant Professor: Minimum qualification: PhD

Rs 15600 Pay + 6000 AGP (Basic Pay = Rs 21600)
7 advance Inc on basic: (each increment of 3%) -- Rs 4550
DA (65% on Basic): Rs 16998
HRA (20% on Basic): Rs 5230
Transport Allowance: Rs 3200
DA on transport (65% of TA): Rs 2080
Total: Rs 53658/- pm

Trainee Teacher: Minimum qualification B. Tech.

Basic: Rs 21600 - 21% of Basic = Rs 17060
DA (65% of Basic): Rs 11090
HRA (20% of Basic): Rs 3410
Transport Allowance: Rs 3200 (fixed)
DA on TA (65%): Rs 2080
Total: Rs 36840/- pm Say Rs. 37,000/-

12 month cost	4,44,000/-
20% towards RD*	90,000/-
Additional 10% towards contingency/professional expenditure	45,000/-
Total yearly payment	**4,89,000/-**

(Yearly increment = 3% of basic ; and three increments (instead of one increment) after two years subject to completion of credit and other requirement for formal enrollment in Doctoral programme)

*(20% of consolidated salary to be deducted initially and put in recurring deposit (RD). At the end of 7/8 years, the deposit should be a substantial amount. This amount would be released in a phased manner on successful completion of the programme).
After absorption of the Teacher Trainee as regular faculty, he / she will start getting the regular salary as per the prevailing Assistant Professor scale.
The detail calculations up to **initial eight years** are given below.

Table A1: Details of Financial Requirement

	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year
Basic	17064	17576	19158	19732	20324	20934	21562	22209
DA	11092	11424	12453	12826	13211	13607	14015	14436
HRA	3413	3515	3832	3946	4065	4187	4312	4442
TA	3200	3200	3200	3200	3200	3200	3200	3200
DA on TA	2080	2080	2080	2080	2080	2080	2080	2080
Total / month	36848	37795	40722	41785	42880	44008	45170	46367
20% in RD	7370	7559	8144	8357	8576	8802	9034	9273
Net Salary	29479	30236	32577	33428	34304	35207	36136	37093
Additional 10% PDF	3685	3780	4072	4179	4288	4401	4517	4637
Total / year	486399	498900	537528	551563	566019	580909	596245	612042
Total/year in Lakhs	**4.86**	**4.99**	**5.38**	**5.52**	**5.66**	**5.81**	**5.96**	**6.12**
Net Salary / Year	353745	362836	390930	401137	411650	422479	433633	445121
Net Salary /year in Lakhs	3.54	3.63	3.91	4.01	4.12	4.22	4.34	4.45
Total RD/Year per TT	88436	90709	97732	100284	102913	105620	108408	111280
Total in RD for 300TTs in Lakhs	**265**	**272**	**293**	**301**	**309**	**317**	**325**	**334**
Coordination / Administrative Expenses in Lakhs /YR for 300 TT	**600**	**600**	**600**	**600**	**600**	**600**	**600**	**600**
Yearly Requirement for 300 TT in Lakhs	1459	1497	1613	1655	1698	1743	1789	1836
Cumulative requirement in Lakhs/year	**2059**	**4156**	**6368**	**8623**	**10921**	**13264**	**15653**	**18089**

Annexure V Design Spine for Undergraduate Engineering Students

(Informative - input from India Design Council)

We are proposing to build a "Design Spine" within the engineering curriculum. The Design Spine courses would be the major vehicle for developing a set of competencies to meet educational goals in areas such as creative thinking, problem solving, teamwork, and Design.

The purpose of the proposed program is to enable undergraduate engineering students to develop design knowledge and skills that will prepare them to be innovative and creators of new value.

A sequence of 6 courses will be delivered concurrently with the first six semesters at a rate of one course per semester. The sequence will arm students with sufficient knowledge of fundamental design principles and will encourage multidisciplinary and interdisciplinary design processes, challenging students to develop their intellectual competence and project management skills. Students will develop analytical skills, and creative potential.

The program would focus on innovative engineering design in a team-based, cross-disciplinary setting. "Innovative Design" implies both identifying and solving real – world problems for real people.

The program proposes to engage engineering students with a real problem, which has no given solution in an industrial / social context, develop social and collaborative skills, introduce new product development methods in a project environment.

The program will enable engineering students to develop products and services around those products that are innovative, useful, safe, aesthetically appropriate, ecologically sound and socially beneficial while serving the needs of society, consumers, manufacturers and the environment.

While reading this proposal there are two pertinent things to note.

1. The term design is used in the context of industrial design and design thinking and not expressed as engineering design and
2. The goal of this proposal is not make designers out of engineering students, but to augment their engineering education by adding the design component to their thinking and doing.

The Need

It is an uncontested fact that engineers need to broaden their outlooks to be relevant and successful. The education and general orientation of engineers have been directed inward toward the

profession, rather than outward toward the rest of society and the world. Engineering education should create a broader outlook and understanding in graduates and thereby engender newer capabilities to effectively face the challenges of the future world.

The complexity surrounding engineering projects is increasing every day. Natural resources are dwindling and the world population is increasing. The global infrastructure and economy are becoming more intertwined. In such a scenario, the creativity and innovation necessary to address the big issues facing civilization— maintaining the infrastructure; providing food, water, shelter, and power to the population; and growing sustainably and safely—will only increase in importance.

Exploring human creativity improves our understanding of the discovery and invention of new artifacts. It also contributes to an understanding of its role in productivity improvement and the enhancement of the quality of human life. The aim of infusing design into engineering education is to contribute to the understanding of human creativity.

Engineering curricula, with their focus on the disciplinary contributions to design, encourage a mindset in which students seek technical solutions often rooted in a specific engineering discipline with little regard for the context in which their product, system, or service may be deployed, the societal or business need it may fulfill or even its relations to all the other engineering, business or 'environmental' domains that can contribute to success.

Over 90% of new products introduced into the marketplace fail. A good portion of these failures are due to lack of understanding of end consumers and their needs. To develop truly successful new products, it's not enough just to ask people what they need or want.

Engineers need tools and techniques to get beyond what people can explicitly state and determine their implicit needs. The requirements extend beyond the traditional discipline specific technical knowledge to include product and system building knowledge and skills, personal and professional skills and interpersonal skills.

Design & Design Thinking

Steve Jobs, CEO of Apple Computer said "In most people's vocabularies, design means decoration. But to me, nothing could be further from the meaning of design"

Design is the creation process through which we employ tools and language to invent artifacts' and institutions. As society has evolved, so has our ability to design (Charles Owen, 1993).

Arnold Wasserman perceives design as “the integration of art and technology for the creation of products, communications and environments that serve human needs.

Design is explained by the UK Department of Trade and Industry (DTI) as: *‘Design is a structured creative process. Design is readily associated with industrial product design for manufactured products — specifically the ‘look’ of a product. However, the application of design is much broader, for example designing for function; for aesthetic appeal; for ease of manufacture; for sustainability; and designing for reliability or quality and business processes themselves. Service design affects how customers will experience the delivery of a service, such as a bank or a fast food restaurant. Elements of design, particularly graphic design, will form part of product, service and company branding and advertising strategy.’(DTI 2005)*

Design has evolved from being a vocation dealing with the form and function to a new approach of developing business models. Design has evolved over the past years from being a mere function of styling or aesthetics (where form and function are the focus) to design as a process (where design thinking is integrated into the development process). Today it is moving towards becoming a strategic element. (Heather Fraser, 2006).

Design Thinking transcends disciplinary boundaries and adopts a fluid process to address a wide range of problems and issues. While there is no single definition for it, a useful starting point is the description below:

“Design thinking can be described as a discipline that uses the designer’s sensibility and methods to match people’s needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity.” – Tim Brown CEO, IDEO

Harvard Business Review, 2008 defines Design Thinking, as a methodology that imbues the full spectrum of innovation activities with a human-centered design ethos. Innovation is powered by a thorough understanding, through direct observation, of what people want and need in their lives and what they like or dislike about the way particular products are made, packaged, marketed, sold and supported.”

Design thinking encompasses people (by observing them and gaining insights through their behavior patterns), ideating (brainstorming, looking at a problem from multiple perspective), prototyping (visually representing the thinking) and story narration (implementation by selling compelling narratives not "concepts").

Design Thinking has the potential to provide learning opportunities for engineering students to explore human desirability, technical feasibility and business viability. It means systems thinking,

breaking out of the normal confines, solving the fundamental issues, not the symptoms. Design thinking is a powerful approach to innovation and problem solving in the diverse contexts of engineering.

Why Design in Engineering Education?

Similar to design there are numerous definitions of engineering. Engineers "scope, generate, evaluate, and realize ideas" (Sheppard). This definition focuses on how engineers think and embrace the heart of the design process by highlighting the creation (i.e., scoping & generation), assessment, and selection (i.e., evaluation), making or bringing to life (i.e., realization) of ideas.

The National Academy of Engineering in the United States of America recognizes that engineering is, since its origin, a "profoundly creative process", and suggests a very provocative definition: "engineering is about design under constraint". This definition advances a significant connection in the practices of engineers and designers, which is possibly the core aspect of any education intended to correspond to the one proposed by the National Academy of Engineering: "the engineer designs devices, components, subsystems, and systems".

All educational theories that emphasize experiential learning are consistent with design activity. Design is the experiential activity central to the practice of engineering. It is through the experience of engaging in design that students are able to develop knowledge and skills necessary for professional practice. What is critical in contemporary world is that innovations are occurring at an astonishing pace, which are most apparent, and this has important implications for engineering practice and engineering education in the future. Thus design becomes an extremely important driver, which would enable actualization of ideas, making them concretely available in their diverse possibilities.

Lead in the creation and operation of new products and systems.

- Learn how to frame the design challenge properly
- Lead in the creation and operation of new product and systems
- Lead how to frame the design challenges properly
- Ideate, prototype, and iterate solutions
- Develop skills and attitudes such as experimentation, design thinking, teamwork, communication, societal context and business context
- Learn from the overall design process how to create value, prepare for their careers, and participate more fully in society

The Program

The proposed design spine coursework is optional for students those to choose to travel on this unique and innovative path. The

students will have the freedom to discover and follow their passion in design and to choose the challenges that they wish to undertake.

The program emphasizes the use of Project Based Learning where students participate in active and experiential learning through real product development situations. It will start with an open-ended situation of identifying a problem to solve and eventually end with a solution that can actually be implemented in the market. By the time they are graduating, they would have already become innovators and practitioners and might have a venture to take forward.

Year Content	**Opportunity Recognition**
Year 1	Students will identify new opportunities, areas to address, problems to solve. Students work on an engineering project, which provides a technological solution to an identified problem. One course per semester, i.e. Two courses in this year will be taught which would help the student to identify new opportunities. The year will end with a clearly defined problem with its boundaries and parameters. Opportunity recognition is an approach that puts people and their needs at the center of product development and business strategy creation. It is an approach for developing deep insights that provide strategic direction and open up new possibilities for product development. Students will gain a toolset from which to develop their own approaches to conducting researching for design: learning how to think about other people, about culture, and about new perspectives. They will also learn tactical skills: how to define research questions, how to conduct observations and interviews, how to interpret results, how to synthesize information to form a unique meaning, and how to communicate their findings in a way that is compelling and actionable. Students will move into a broad realm of unpredictable often incalculable time-constrained problem solving. They will explore a wide variety of problem definition, exploration and solving "tools," and a variety of surrounding "design thinking" topics
Year 2	**Ideation, Conceptualization** Vis-à-vis the identified opportunity, the students will ideate, generate ideas, move from divergence to convergence, and start the development of a concept. Again here two courses, one per semester will be taught in relation with the year objective. Students will first take a step back from what and how they are designing and ask the question of why they are designing it. They will understand stakeholder needs and translate those needs into their design. They will develop greater awareness of the personal, social, competitive and technological contexts that their products

	fit into, and to learn how to design for those contexts. They will learn several ideation techniques and visualization methods. The success of any creative work depends not only on the ability to find good ideas, but also on the skills for developing, managing and presenting those ideas to others. Here the students will explore different techniques for finding and developing ideas (such as brainstorming, improvisation games, and whiteboard techniques), and apply them in their chosen project and situations, such as pitching ideas to peers or superiors, and winning debates with others. Students will be equipped with a level of visual literacy that will enable them to analyze, evaluate and articulate visual information in a variety of forms. Students will learn how to translate complex information into simple visual solutions. Within the context of identified problem area students will be led through the process of investigating cultural, emotional, technological and business factors to develop new concepts, and iterative design. Principal focus will be placed on understanding the interaction of people and products / services.
Year 3	**Realization** Students will work to realize the concept they have worked on through the first two years. Here there will be course work i.e. two courses, per semester and in addition they will be paired with the design students studying in other design institutions. They will be provided tools and methods for creating new products, which will culminate in the creation of a prototype. One important means for involving users is through prototypes. Through prototypes, users can react to ideas and even take part in building and modifying them. Prototyping methods move from low to medium fidelity: paper sketches, storyboards, Pictive, scripted simulations and so on, each getting slightly more sophisticated. Early versions of prototypes should be very low cost (e.g., paper and pencil, postit notes, etc.), and its purpose should be to garner high-level reaction and input from the user. As the design progresses, prototypes should become more refined and the user's input should reflect smaller, but still important, design and usability decisions. The students will be introduced to a systematic “Differentiation by Design” strategy. Students will become aware the path from “concept to commercialization” and customer / product experience. The focus will be on design as a strategic offering from a product design and development perspective.

Teaching & Learning

Discipline Agnostic

The proposed program will be agnostic to engineering disciplines and will seek to combine depth in a discipline with cross-functional, multi-disciplinary design teams and projects. The idea is to bring students from different departments together to tackle interesting needs and innovations. These collaborations will enable us to mine deeper than individual disciplines can alone. Design thinking will be the glue that binds all these people together.

Learning by Doing

The emphasis will be on learning rather than teaching. Students will be encouraged to 'learn through the projects and subsequent discussions in a self-motivated manner. The idea is to create an exciting and charged environment, where cutting edge solutions are created.

Peer Group Learning

Throughout the program use will be made of peer group learning by which students develop an appreciation & understanding of different aspects of design, through formal & informal discussion with their peers.

Team Based Learning

Successful teamwork is essential in today's time. Teamwork requires a number of skills, especially those of inter-personal communication & role negotiation. The projects will be team-based projects. This will provide learning experiences, which extend the student's appreciation of team based operations, building on personal skills individually developed in other modules.

Independent Learning

The concept of independent learning is an important part of the design spine. It refers to the idea of student centered learning whereby the student takes primary responsibility for setting his or her own goals & creating his or her own program of studies within the framework of the course.

Written Work

The courses will involve a range of written assignments. These include: essays derived from questions generated by the content of the module, seminar papers and written reports as project outcomes.

Oral Presentation

Throughout the design spine program the student will be required to use the spoken word to support his / her work in both formal & informal situations. This would involve: seminar presentations; oral reports to support studio projects; contributions to seminars & group tutorials; individual presentations of findings.

Supervision

Good supervision is an important element of any program. We propose to train one faculty supervisor from the NIT to take the role of supervision and coordination for students opting for design spine.

Mentoring

The program design involves tapping the knowledge and expertise of leaders in the field. We will have a professional network of guest lecturers including thought leaders from around the world to speak with students over a distance mode and to guide them through their own experiences.

Online Learning

The final aim of design spine is to deliver the content through the Learning Management System over the Internet. Initially till the time the content is ready, a working framework is evolved, it is proposed that the content of the courses in the first year is delivered in person by faculty identified by us.

Student Pairing

Starting with beginning of third year, each team of engineering students will be paired with a design student. As much as there is a need for engineering students to learn and know about design, there is an equal and urgent need for design students to appreciate technology and engineering and its nuances. This will be an equal partnership between the students of engineering and design where the objective is that they learn from each other.

This kind of pairing will be full of vibrancy, continuous dialogue between engineering and design and full of new ideas. This collaboration will be facilitated through an online platform other than the other platforms the students may use within themselves. The design students will offer their design inputs right on aesthetics, form, user interface, human machine interaction ergonomics, usability, user convenience, etc. The engineering students will help the design students with technology aspects of the design students' project.

Execution

- We propose to implement the Design Spine from the beginning of academic year of 2014.
- We can start first with 5 NIT's and then scale things up with a complete online delivery to all other NIT's from 2015.
- In the year 2014 we can start with the delivery of course work to first year students and also we can start the pairing of 3'rd Year engineering students and design students.
- The experiences and learning will help us in our scaling-up from year 2015.
- The India Design Council will facilitate the online platform as well as the delivery of lectures in person as well as help with the design student pairing.

Industry – Institute Interaction

The design spine will seek to put students to work on real design problems submitted by individuals, non-profits, entrepreneurs, and industry members. The Industry – Institute Interaction will be facilitated in two ways:

Industry / Society Challenges

The Industry, local bodies, NGO's local Governments can put us open challenges where they are looking for technological solutions. These are not specific projects. These are open-ended challenges. All of these challenges will be up for being taken-up by the students during their opportunity identification phase. It will not be mandatory for students to work around these challenges; they can find their own challenges and work around with it.

Venture Studio

The projects identified by the students along with their conceptualization and realization will be put together in an online virtual fair. The industry / society will be invited to look at those and for areas which interest them they can start working with the students when they are in their fourth year.

Way Ahead …

- India Design Council is keen to start this program with the NIT's.
- The council will take full responsibility for the execution of the program as is proposed.
- Once after the program is agreed between the council and management of NIT's, the council will develop the finer program along with a detailed plan for execution.

- Once after the program is agreed between the council and management of NIT's will be submit a techno-commercial proposal for acceptance by NIT and further action.

About India Design Council

India Design Council is an autonomous body of Government of India established under the aegis of Department of Industrial Policy & Promotion, Ministry of Commerce & Industry. India Design Council is a strategic body for multi disciplinary design. It envisions to make Indian industry a design enabled industry. Mr. Anand Mahindra, Chairman and Managing Director of Mahindra and Mahindra is the President and Prof. Pradyumna Vyas, Director of National Institute of Design is the Member-Secretary of the India Design Council. Government of India nominates the members for a period of 3 years. The council comprises of eminent personalities from various walks of life.

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Annexure VI Proposed Multilayer Structure (Descriptive)

(Informative)

Body	Membership Composition	Main Objective	Remark
Admissions Committee	• Combination of senior and junior faculty representing all the departments as nominated by the Director • Chair & Vice Chair nominated by the Director	• Update the Director regarding fresh admission process • Liaise with CCB and MHRD • Providing admission/institute related information to the parents and students • Institute level Counselling leading to student admission	• Term of office for faculty two years with Vice Chairman becoming Chairman next year • Closer coordination with Academic & Finance Section
Warden's Council	• All the Wardens • Dean Student Affairs • Maintenance in-charge • Medical Officer • Chair: Chief Warden or equivalent as nominated by the Director	• Hostel seat allocation • Maintenance of Hostel rooms and functioning of dining halls/messes • Outsourced Service Contracts • Physical & Mental Health Discipline/Security • Anti-ragging mechanism • Advise Director regarding hostel fee structure	• Meets at least once a month • Wardens for a period of three years • Chief Warden for two years
Class Committee	• All Faculty teaching courses during the semester for a particular batch • Two student members • Chair: Faculty not teaching particular batch	• Teaching effectiveness • Stakeholder feedback • Improving T-L process • Reviewing/Modifying final Grades in subjects	• Should meet at least 3 times during the semester • Important findings to be placed before Senate

Body	Membership Composition	Main Objective	Remark
Departmental Consultative Committee	• Representative Faculty (at least two per various sections/laboratories and representing all cadres) • Chair: Head of the Department	• Timetable and Course allotment • Resource & Infrastructure allocation & planning • HR assessment & projections • Organizations issues • Budget preparation Board of Studies	• Meets at least one a month
Deans Committee	• All Deans, Deputy Director and Registrar • Chair: Director	• Deal with routine administrative matters • Address contentious issues needing detailed discussion • Plan for future academic and administrative activities	• Weekly Meeting preferably on a specific day of the week
HoDs/HoSs Meeting	• All Head of Departments and Sections (Chief Warden, Librarian, Workshop Superintendent, Medical Officer, DRs/ARs/Estate & Maintenance, Security…) • Deputy Director, Deans, Associate Deans, Registrar • Chair: Director	• Review and stats about of the past month • Critical issues and possible solutions • Plans for next month	• Monthly Meeting preferably on a specific day and same as Deans Committee meeting day
Building Works Committee	• As per Act and Statute • Suggestion: Representatives of State PWD or CPWD in Civil & Electrical each, Chief Architect/Town Planner and Faculty i/c Construction • Chair: Director	• Building & Construction activities – planning • Project monitoring & execution	• As per Act and Statues • Video participation where required should be permitted

Body	Membership Composition	Main Objective	Remark
Finance Committee	• As per Act and Statute • Suggestion: Representatives of AG Office/Faculty from IIM • Chair: Chairman BoG	• Financial planning, approval & re-appropriation • Budget preparation • Approving audited accounts	• As per Act and Statute • Video participation should be permitted
Senate	• As per Act and Statute • Suggestion: Two senior faculty from neighbouring IIT/IISc/ IIM, and one each from Industry & Alumni • Two student members to participate in non-policy matters • Chair: Director	• Supreme body for deciding all academic matters (timetable, examination, results, discipline). • Recommending body for new courses and programs for the BoG consideration	• As per Act and Statutes • Video participation should be permitted
Board of Governors	• As per Act and Statute • Suggestion: Representatives of CII/FICCI/ASSOCHAM & Alumni • Chair: Chairman BoG	• General governance and superintendence • Highest policy making body at Institute level	• As per Act and Statues • Video participation should be permitted
NIT Council	• As per Act and Statutes and discretion of MHRD		

Annexure VII Purchase Procedures

(Informative)

The following are few suggestions with respect to developing purchase procedures.

1. In general, the procedures should be simple keeping documented checks in such a way that execution becomes equally important as the procedures themselves.
2. Current procurement work flow processes of NIT Surathkal were found to be very useful for adoption across all NITs with certain modifications.
3. It was felt that all purchase orders of all the NITs should go to the proposed NIT portal. Extracted meta data for search and classifications may be provided which can be used for improved procurement judgment by all NITs.
4. List of vendors on the NIT portal with PO and list of orders may be regularly uploaded so that it may be extracted for similar procurement across to other NITs. A copy of POs may be provided to NITs on request. This will increase better awareness.
5. E-procurement process be adopted immediately for civil works initially and then extended to equipment and services in a time bound fashion. Since the e-procurement model has an inbuilt component of pre-audit, this shall be very useful for robust procurement and accounting evolution across all the NITs.
6. NIT tenders should be floated on some common portal as well in addition to the individual web sites for wider publicity.
7. For better utilization of assets and sharing of resources it is suggested to catalogue all important laboratory equipment costing Rs.5 lacs or above.
8. The payments for goods and services should be done through online transfers only.
9. For files and documentation NITs should adopt a robust and innovative file and document movement system. This can take care of internal movement within NITs as well as between NITs.
10. HoDs, Deans and Dy. Director may have defined administrative and financial powers for smooth operations of the procurement.

Annexure VIII Proposals for Amendments of the NIT Act

General suggestions:

1. 'Chairman' shall be replaced with 'Chairperson'.
2. 'His' shall be replaced with 'His / Her.'
3. The other suggestions along with minor corrections i.e. amendment or deletion or addition are given below.

S. N.	Act No.	Text (amendment/modification)
6.	**Powers of Institutes**	Amend h) as follows: h) to institute academic and other posts within the frame work of pre-approved policy of the Government and to make appointments thereto (except in the case of Director) ; Add: p) Creation of new infrastructure and upgradation of the existing laboratories, workshop facilities, IT infrastructure commensurate with the vision and objective of the institute approved by the Government.; r) To undertake external peer review and evaluation of the institution and individuals.
11.	**Board of Governors**	Amend e), f) and g) as follows: (e) two persons, at least one of whom shall be a woman and one preferably a past student of the institute, having special knowledge or practical experience in respect of education, engineering or science to be nominated by the Council; (f) Two Professors of the Institute to be nominated by the Senate (g) two Professors from IITs to be nominated by the respective Directors. Add: (h) Board is empowered to invite / co-opt other external member(s) from IIT, NIT, CFTIs, R & D organization, Industry etc.

14.	**Senate**	Delete “and” at the end of (d), add a new e) three faculty members from IITs from three different disciplines; and renumber existing (e) as (f)
24.	**Appointments**	Amend a) as follows: (a) the Board if the appointment is made on the academic staff in the post of Assistant Professor (regular / contract)/ trainee teachers) or above or if the appointment is made on the non-academic staff in group A or equivalent.
25.	**Statutes**	Add: (o) the constitution of Standing Committee for discharge of specific duties/ policy framing from time to time

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Annexure IX Proposals for Amendments of the Statutes

General suggestions:

1. 'Chairman' shall be replaced with 'Chairperson'.
2. 'His' shall be replaced with 'His / Her.'
3. The other suggestions along with minor corrections i.e. amendment or deletion or addition are given below.

S. N.	Statutes No.	Proposed Text showing either amendment or addition or deletion
1.	**DEFINITIONS**	Amend (a) as follow: (a) Act" means the National Institutes of Technology Act, 2007 and amended in 2012;
4	**BOARD OF GOVERNORS AND MEETING THEREOF**	Amend (14) as follow: (14) The minute book shall be kept open for inspection of the members of the Board and the Council at all times during office hours. Also the approved minutes, after confirmation by the Board, shall be placed on Institute web site. Add (18): (18) Under special circumstances, members, who cannot attend the meeting can contribute by sending suggestions / observation in writing or participate through video conferencing.
7	**SENATE**	Amend 10) as follow: (10) The minutes along with amendments, if any, suggested shall be placed for confirmation at the next meeting of the Senate and after the minutes are confirmed and signed by the Chairperson of the Senate, they shall be recorded in a minute book which shall be kept open for inspection of the members of the Senate, the Board and the Council at all times during office hours. Approved Senate minutes shall be posted on institute web site. Add (11) and (12): (11) In addition to the persons mentioned Section 14 of the ACT, the following shall be the invited members of the Senate, namely

		(a) Heads of Departments, Centres, Schools other than Professors (b) The Faculty Incharge other than Professor looking after library and/or Librarian of the Institute (c) The Faculty Incharge for Hostels other than Professor. In his absence, Warden by rotation in order of seniority in service as Warden, for a period of one year (d) Additional members having special expertise from IIT / NIT / CFTI / R&D organizations and Industry. 12) Members, who are not in station can contribute by sending suggestions / observation in writing or participate through video conferencing.
8	**POWERS OF THE SENATE**	Amend (xiii) as follow: (xiii) Make recommendations to the Board to disseminate knowledge through distance learning mode and ICT to various parts of the state or country or abroad; and
10	**FINANCE COMMITTEE**	Amend (6) as follow: (6) A copy of the minutes of every meeting of the Finance Committee shall be placed **before** the Board. The approved minutes shall be posted on institute web site Add (8): (8) Under certain circumstances, members, who cannot attend the meeting can contribute by sending suggestions / observation in writing or participate through video conferencing.
11	**Powers of the Finance Committee**	Amend (i) as follow: (i) examine and scrutinize the annual budget, annual accounts, internal and performance audit, outcome budget and audit report of the Institute, and make recommendations to the Board of Governors Add (iii): (iii) guide institute to become more financially self-sufficient / autonomous.

12	**Building & Works Committee**	Amend (1), (2) & (5) as follow: (1) There shall be a Building and Works Committee for each of the Institute, consisting of following members, namely:- **(i)** Director, ex-officio - Chairperson; (ii) One member nominated by the Board of Governors from amongst its external members- Member (iii) Dean (Planning and Development) or similar position - Member (iv) Registrar, ex-officio, - Member Secretary (v – vii) One expert each from Civil and Electrical Engineering wing of any organisations from amongst the Central PWD, State PWD or any Autonomous Body or PSU of repute and Chief Town Planner / Architect of state – Members (2) Four members shall form a quorum for a meeting of the Building and Works Committee. (5) A copy of the minutes of every meeting of the Building and Works Committee shall be placed before the Board. Also the approved minutes shall be placed on the institute web. Add(6): (6) Members, who cannot attend the can contribute by sending suggestions / observation in writing or participate through video conferencing
14	**POWERS OF THE CHAIRPERSON, BOARD OF GOVERNORS**	Amend (ii) & (iii) as follow: (ii) He shall have the powers to depute the director on official work or for attending conferences, outside India subject to such terms and conditions as may be laid down by the Board from time to time, limited to a period of 30 calendar days in an academic year. Longer visits by the director shall need approval of the Chairperson, NIT Council (iii) he shall execute the contract of service between the Institute and the Director on behalf of the Central Government. but he shall not be personally liable of anything under such contract: and

15	**TRAVELLING ALLOWANCES OF MEMBERS OF THE AUTHORITIES OF INSTITUTE**	Amend as follow: Members of the Board and other authorities of the Institute and members of the Committees constituted under the Act or these Statutes or appointed by the Board and other authorities shall be entitled to traveling allowance, daily allowance and sitting fee (only for external members) for attending the meetings of the authorities and their Committees as laid down by the Board from time to time.
17	**THE DIRECTOR AND HIS POWERS**	Amend (5), (8) and (13) as follow: (5) The Director shall have the power to write off irrecoverable losses / unserviceable items due to normal wear and tear / obsolete items having depreciated value up to a limit of one lakh rupees (current value) or as decided by Board subject to such stipulations as may be made by the Board from time to time. (8) The Director shall have the power to employ on contract basis (consolidated salary basis) the academic staff for period not exceeding two years and technical, administrative and other staff for not more than one year, on such compensation policy as may be decided by the Board from time to time. (13) The Director may, during his absence from headquarters, specifically authorize in writing the Deputy Director to discharge his routine duties. In absence of Deputy Director, one of the Deans or one of the Professors selected by BoG from among five senior most Professors may be authorized to discharge the routine duties. Add (17) and (18) : (17) Director with the approval of BoG shall undertake necessary steps to ensure efforts for continuous improvement of quality of all activities undertaken by the institutions ultimately leading to better outcomes, peer group assessment and rating (18) He/she shall have the power to send members of the faculty/ staff of the Institute for training, for a course of instruction, technical visits, collaboration, exchange program etc outside India subject to such terms and conditions as may be laid down by the Board from time to time.

18	**THE DEPUTY DIRECTOR**	Amend(1) and (2) as follow: (1) Deputy Director shall be appointed by the Director from among professors of the institute with approval of Board of Governors. (2) The tenure shall be for a period of three years initially which may be extended by two times for one year each on recommendation of the Director and approval of the Board. Delete (3): Add (6): (6) Subject to the budget provisions made for the specific purpose, the Deputy Director shall have the power to approve expenditure in accordance with the procedure as may be laid down in the ordinances defining the delegation of administrative and financial powers.
19	**DEANS**	Amend (4) as follow: (4) Only Professors or Associate Professors, preferably having requisite experience of heading department / section / centre, shall be eligible for becoming Deans. Add a new (5) as below and renumber existing (5) as (6): (5) Subject to the budget provisions made for the specific purpose, the Deans shall have the power to approve expenditure in accordance with the procedure as may be laid down in the ordinances defining the delegation of administrative and financial powers.
20	**HEAD OF THE DEPARTMENT OR CENTRE**	Add (8): (8) Subject to the budget provisions made for the specific purpose, the HOD shall have the power to approve expenditure in accordance with the procedure as may be laid down in the ordinances defining the delegation of administrative and financial powers.
21	**REGISTRAR**	Amend (2) as follow: (2) The Registrar shall act as Secretary of the Board of

		Governors, Senate, Finance Committee and Building & Works Committee and such other Committees as decided by the Board of Governors in accordance with the provisions of the Act and the Statutes. He/she shall prepare the agenda and minutes of these committee meetings in consultation with Director and concerned officials.
22	**CLASSIFICATION OF THE MEMBERS OF THE STAFF**	Amend (1) and (2) as follow: (1) Except in the case of employees paid from contingencies, the members of staff of the Institute shall be classified as under :- **i. Academic staff :-** Director, Professor, Associate Professor, Assistant Professor, Assistant Professor (on contract), Trainee Teacher and such other academic posts as may be decided by the Board from time to time; **ii. Technical Staff:** Group A: Librarian, Deputy Librarian, Assistant Librarian, Principal Students Activity & Sports Officer, Senior Students Activity & Sports Officer, (SAS) Officer, Principal Scientific/Technical Officer, Senior Scientific /Technical Officer, Scientific/ Technical Officer, Superintending Engineer, Executive Engineer, Engineer, Senior Medical Officer, Medical Officer, and such other technical posts as may be decided by the Board from time to time Group B: Technical Assistant/ Junior Engineer/SAS Assistant / Senior Pharmacist , Senior Technical Assistant/ Assistant Engineer/ Senior SAS Assistant / Pharmacist (Selection Grade – II) , Technical Assistant(Selection Grade – II)/ Assistant Executive Engineer/ SAS Assistant (Selection Grade – II), Technical Assistant (Selection Grade -I), Assistant Executive Engineer(Selection Grade -I), SAS Assistant (Selection Grade – I), Pharmacist (Selection Grade – I) and such other posts as may be decided by the Board from time to time Group C: Work Assistant, Technician, Laboratory Assistant ,Senior Work Assistant, Senior Technician, Senior Laboratory Assistant ,Work Assistant (Selection Grade-II), Technician (Selection Grade-II), Laboratory Assistant (Selection Grade-II), Work Assistant (Selection

		Grade-I), Technician(Selection Grade-I)/Laboratory Assistant (Selection Grade-I) and such other technical posts as may be decided by the Board from time to time; **iii. Administrative and Office Staff:** Group A: Registrar, Deputy Registrar, Assistant Registrar, Security Officer and such administrative and other posts as may be decided by the Board from time to time Group B: Accountant , Superintendent, Personal Assistant, Senior Accountant / Superintendent/Senior Personal Assistant, Accountant /Superintendent (Selection Grade – II), Personal Assistant (Selection Grade – II), Accountant /Superintendent /Personal Assistant (Selection Grade - I) Group C: Junior Assistant, Senior Assistant, Assistant (Selection Grade-II), Assistant (Selection Grade-I) ,Stenographer, Senior Stenographer, Stenographer (Selection Grade-II), Stenographer (Selection Grade-I) and such administrative and other posts as may be decided by the Board from time to time (2) Posts classified as **Academic staff** shall be vacation posts only except Director, Deputy Director, Faculty In charge for training and Placement and other academic positions as may be decided by the Board from time to time
23	**APPOINTMENTS**	Amend (1), (5) and ( ) as follows: (1) The posts at the Institute shall be filled by advertisement on all India basis: Provided that the ratio between the Direct Recruitment and Promotion posts for posts other than that of the Director shall be as per the recruitment rules (5) Selection committee for filling up of posts under the Institute (other than on contract basis) by advertisement shall be constituted in the following manner, namely: a). the Selection committee for recruitment of Academic Staff (excluding the Director), shall be as under: a1. Professors:

		(1) Director - Chairperson (2) Visitor's Nominee - Member (3) Two nominees of the Board out of the subject expert approved by the Board, but other than a member of the Board - Member (4) At least one expert nominated of Senate from, outside the institute - Member a2 Associate Professors, Assistant Professors, Trainee Teachers and Technical staff with GP more than or equal to Rs 6000/- of the 6th CPC or equivalent under future pay structures (1) Director - Chairperson (2) Two nominees of the Board out of the subject expert approved by the Board, but other than a member of the Board-Member. (3) At least one expert nominated of Senate from, outside the institute - Member (4) Head of Department concerned (only for the post below his rank) – Member (5) SC/ST and Minority community nominee for the posts where reservation is applicable b) The Selection Committee for other Technical posts shall be as follows: (1) Director or Deputy Director- Chairperson (2) One Expert from outside the Institute-member (3) Registrar or Dean from other NIT – Member (4) Concerned Head of Department or concerned Dean or Registrar-Member (5) SC/ST and Minority community nominee c). The Selection Committee for Group-A Administrative and other comparable posts shall be as under: (1) Director - Chairperson (2) Deputy Director - Member (3) One Expert from outside the Institute- Member (4) Registrar or concerned Dean from other NIT - Member (5) Nominee of Board - Member (6) Registrar or concerned Dean - Member (7) SC/ST and Minority community nominee for the

		posts where reservation is applicable d). The Selection Committee for Administrative and other Staff shall be as under: (1) Director or Deputy Director - Chairperson (2) One Expert from outside the Institute-Member (3) Registrar or Dean from other NIT-Member (4) Registrar, except for the post of Registrar- Member (5)SC/ST and Minority community nominee 8) In the case of all other posts, the Institute/ Director with approval from BoG Chairperson, may constitute such Adhoc Selection Committee, as circumstances of each case may require. (11) The regular posts to be filled by the institutions should be done through the process of advertisement specifying terms and conditions as per recruitment Rules of the Institution. (13) The recommendations of the Selection Committee shall remain valid for a period of one year from the date of approval by the competent authority or as prescribed by BoG. Delete (17) and (18) and then add (17) to (21) as follows: (17) All the posts shall be filled through direct recruitment following recruitment rules (RRs) approved by BoG. (18) In absence of the Director, any member of the staff of the Institute, who is appointed to perform the current duties of the Director, shall be the Chairperson of the Selection Committee in the place of the Director. (19) In the absence of the Deputy Director, the Director may nominate any member of the staff of the Institute to work on the Selection Committee in his place. (20) Candidates selected for interview for a post under the Institute may be paid such travelling allowance as may be determined by the Board from time to time (21) The director may appoint scrutiny committees out of the faculty and serving officers of the institute having

		ranks above those for which applications are being considered. The committee shall have the power to prepare a shorter list of candidates by considering the qualification and academic and non- academic records of the applicants, the institutes or universities from where they received their degrees, experience and relevance of their qualification and experience to the need of the institute.
24	**GENERAL TERMS AND CONDITIONS OF SERVICE OF PERMANENT EMPLOYEES**	Amend (v) and (vii) as follow; (v) The employees of the Institute shall be governed by the Central Civil Services (Conduct) Rules, 1964 unless separate specific rules have been framed by BoG/Institute. (vii) The applications of the employees of the Institute shall be forwarded for employment outside the Institute only three times in a year in accordance with the procedure specified in Schedule – D. The Director may, however, permit additional applications to be forwarded at his/her discretion. delete (ix) and Add (ix) to (xvi) as follow: ix. Every appointment shall be subject to the conditions that the appointee is certified as being in sound health and physically fit for service in India by a medical authority nominated by the Board. Provided that the Board may for sufficient reasons relax the medical examination in any case or class of cases, subject to such conditions, if any, as may be laid down by the Board x. An employee of the Institute shall devote his whole time to the service of the Institute and shall not engage directly or indirectly in any trade or business or any other work which may interfere with the proper discharge of his duties, but the prohibition herein contained shall not apply to academic work and consultative practice undertaken with the prior permission of the Director, which may be given subject to such conditions as regards acceptance of remuneration as may be laid down by the Board. xi. The appointing authority shall have the power to terminate the services of any member of the staff without notice and without any cause assigned during the period of probation.

		xii.The appointing authority shall have the power to terminate the services of any member of the staff by giving 3 months' notice or on payment of 3 months' salary in lieu thereof, if on medical grounds, certified by a medical authority nominated by the Board, his retention in service is considered undesirable by such appointing authority xiii.The Board shall have the power to terminate the services of any member of the staff on grounds of retrenchment or economy by giving to the persons concerned six months notice in writing or on payment of six months salary in lieu of thereof. xiv. If an employee is unable to discharge his legitimate duties assigned to him, due to permanent unfit condition (physical and or mental) and certified by the medical board, the competent authority may transfer him to some other position (equivalent or lower) where his services can be utilized or give him compulsory retirement. xv. Employee shall submit the self appraisal forms every year as approved by BoG.
29	**PROVIDENT FUND AND PENSION SCHEMES**	Amend as Follow: Employees of the Institute appointed prior to 1.1 2004 will be governed by Central Civil Services (Pension) Rules, 1972 or Contributory Provident Fund rule (India) of 1962 and the Employees appointed on or after 1 1.2004 will be governed by New Pension Scheme of Central Government. Employees appointed in any NIT governed by old GPF cum Pension scheme shall continue to be governed by aforesaid scheme subject to receipt of capital value of the pension from their former employer.
30	**RESIGNATION**	Amend (i) as follow: (i) if he is a permanent employee only after giving three months notice in writing to his/her appointing authority, or by paying three months salary in lieu thereof or provided that the appointing authority may for sufficient reasons either reduce this period or call upon the employee concerned to continue till the end of the academic session in which the notice is received.

31	**RETIREMENT**	Amend (2) as follow: (2) The appointing authority has the right to retire the employee before superannuation as premature retirement in accordance with the provision of contained in FR56(j) read with rule 48 and appendix 5 of CCS (pension) rules 1972.
38	**STUDENTS' HOSTELS AND HALLS**	Amend (3) and (4) as follow: (3) For each hostel or hall of residence there shall be a Warden and such number of Associate and Assistant Wardens and other staff as may be determined by the Institute from time to time. (4) The members of the faculty / staff shall be appointed by the Director as Warden, Associate and Assistant Warden.
40	**Schedule 'A' [ref. Statute No.17(2)]**	Amend: Item No.[2] The appointee shall be on the service under the agreement for a period of five years with effect from date of joining the post. Provided that if the appointee on conclusion of the period of service mentioned above is below seventy years of age, his/her service shall continue till the 30th June of the academic year in which the appointee concludes the said period or till he attains the age of seventy, whichever is earlier.
41	**Schedule 'B'**	**Delete existing Schedule B and renumber remaining schedules accordingly.**

SCHEDULE 'B'

DEANSHIP

The institute may have not more than six deanships. There may be following Deanships in National Institute of Technology with the approval of the Board of Governors:

Dean Academic Affairs
Dean Planning and Development
Dean Student Affairs
Dean Faculty Affairs
Dean Sponsored Research, Consultancy and Continuing Education

In addition, the Board may create a 6th deanship with a designation and job function appropriate to the institute and its programmes.

Deanship is a functional position and not administrative one and as such must be discharged in its right spirit. The primary duty of a dean shall be to assist and advise the director in policy matters and to discharge management functions on behalf of the director within financial limits and administrative jurisdiction set by him. Director may also appoint Associated Deans / Faculty in-charge (FIC) / Professor In-charge (PIC) from among the faculty members who will reports to the respective dean and assisting him in discharge of his assigned duties. The deans will also be assisted by officers of the registry, estate and other services as appropriate in handling all the mundane support services. Deans must be nominated by the Director only from amongst the Professors/Associate Professors, but should not be Heads of the Departments. The Tenure of Deanship shall ordinarily be two years extendable by one more year; but Director with the approval of the Chairperson, Board of Governors may relieve any or all Deans before such period.

<u>DUTIES AND RESPONSIBILITIES OF DEANS</u>

The following duties and responsibilities may be entrusted to the Deans by the Director. The list of responsibilities is only illustrative and not exhaustive. The responsibilities assigned can be reshuffled by the director as per need of the institute with the approval of Chairman, Board of Governors.

1. **Dean (Academic Affairs)**

He/she will assist and advise the Director in matters of:-

a) Admission and enrolment of students
b) Finalisation of academic calendar, time-tables, registration of students for course work and examinations, class room arrangements and all other requirements for proper conduct of class work;

c) Conduct of class tests and co-coordinating the finalization of session's evaluations and for ensuring the timely declaration of results.
d) Supervision of the maintenance of up-to-date academic records of all categories of students;
e) Publication and distribution of the syllabi
f) Organizing meeting of all the Institute level academic bodies;
g) Arranging the issue of all academic certificates, medals and prizes to the students;
h) Arranging or conducting of those examinations which are to be conducted by the Institute as stipulated in the Institute regulations.
i) To formulate policies for the conduct of research and steps to maintain suitable standard by implementing the Board of Governors/Senate decision.
j) To execute the policy of the Senate in the conduct of P.G., Ph.D. and other research programmes including the examination of the thesis.
k) To co-ordinate for the conduct of Convocation.
l) To modify the teaching programmes or any other academic activity that will be considered by appropriate Senate sub-committee committee for which Dean (Academic) is the Chairperson and it will be sent to the Senate for consideration.
m) To admit sponsored, Early Faculty Induction Programme and Quality Improvement Programme candidates in accordance with the policies lay down by Senate.
n) To suggest the Director to take suitable steps from time to time to strive for the high academic standards.
o) Formulating proposal for new courses and in organizing meetings of faculty members and external experts for this purpose in this regard;

2. <u>Dean (Planning and Development)</u>

He/she will assist and advice the Director in the following:

a) Planning the expansion and diversification of institutional activities and preparation of all developmental proposals, to the extent up to submission of plan & estimates related to Civil, Electrical Works, Sanitary, Network System, etc.
b) Supervision of the construction and the maintenance work of buildings, roads, water supply, sanitation, lawns and gardens, communication networks, IT infrastructure, transport, water coolers, air conditioners, telephones, etc.
c) Maintenance of all necessary statistical data regarding plan & projects required for compilation of various reports periodically required to be sent to Ministry of Human Resource Development and other agencies.
d) Monitoring the physical targets and utilization of funds in respect of plan Projects and in the preparation of relevant papers for submission of progress reports.
e) To arrange for the agenda and organization of the meeting for procurement of equipment related to projects.
f) Providing necessary data for the budget and new estimates & plans to

the Building & Works Committee.

g) Preparing and maintaining detailed Institute map showing both over ground and underground resources;

3. <u>Dean (Students Affairs)</u>

a) He/she will advice the Director in organising the students counselling.
b) He/she will be responsible for the publication of students' Magazine, News Bulletins, News letters etc.
c) He/she will advice the Director in matters related to students discipline and welfare.
d) He/she will assist the Director in matters related to the Students bodies such as student Gymkhana, Student Activity center etc.
e) He/She will co-ordinate the NCC, NSS, Games, Swimming Pool, Sports, Cultural and Co-curricular and Extra-curricular activities of the students.
f) He/she will correspond with Parents/Guardians of Students about their progress and individual problems / welfare.
g) Coordinate co-curricular activities (technical festivals, quizzes etc.) for the students.
h) He/She will help Director in maintaining Sports facilities, auditoriums and other resources used by students;
i) He/she will conduct the enquiries of students indulged in indiscipline.
j) He/She will keep a record of Alumni and correspond with them.

4. <u>Dean (Faculty Affairs)</u>

He/she will assist and advise the Director in matters related to:

a) Deputation of faculty to various institutions under Quality Improvement Programme / Sponsored / Exchange for higher education
b) He/she will advice the Director for deputation of the faculty members to various conferences, seminars, short-term courses, training programmes, foreign teaching / training assignments etc.
c) He/she will chair the committee meetings of the evaluation of papers submitted or to be submitted to the conferences / seminar by the faculty members.
d) He/she will assist the Director in organizing training programmes for faculty.
e) He/she will assist the Director in maintaining the discipline and work ethos among the various departments and between the faculty members.
f) He/she will assist the Director in maintaining the high academic standards and achieving academic excellence in the institution.

g) Supervision over faculty discipline, integrity and commitment.

5. <u>Dean (Sponsored Research , Consultancy and continuing education)</u>

He/she will assist and advise the Director in matters related to:

a) Frame rules for industrial sponsored research and consultancy.
b) Monitoring the physical targets and utilization of funds in respect of Sponsored Projects & Consultancy and in the preparation of relevant papers for submission of progress reports.
c) To expand and monitor the activities of consultancy, testing and sponsored research of Institute
d) To co-ordinate the formulation and conduct of non-formal* and continuing education and extension programmes.
e) Create and maintain database regarding faculty expertise.
f) To promote Institute Industry Interaction and Communicating with industry for liaison with the Institute on joint R & D and for seeking financial support;
g) To protect Institutes IPR
h) Facilitate through his/her office faculty in procuring equipment necessary to conduct research/consultancy work, recruitment of project staff.
i) Provide guidance for submitting proposals to funding agencies such as Department of Science and Technology (DST), Bhabha Atomic Research Centre (BARC), Board of Research in Nuclear Sciences (BRNS), Indian Space Research Organisation (ISRO), Defense Research and Development Organisation (DRDO), Aeronautics Research and Development Board (AR&DB), Ministry of Information Technology, etc.

*Non- formal education shall cover all teaching activities normally not leading to a degree by itself, such as short term courses for industry and academia, summer internship for students of other institutes and colleges, distance education, courseware delivered using e learning methods etc.

The following and other activities (illustrative and not exhaustive) may be entrusted to a separate deanship or added to an existing deanship (or may be assigned to Deputy Director) by the director with the approval of Chairman, Board of Governors.

a) Maintaining data base of alumni of the Institute and Assisting alumni in meeting their own requirements in relations to the Institute
b) Communicating with alumni through publications or individually on Institute matters;
c) Engage Alumni in respect of promotion of infrastructural development,

creation and support for endowment funds, training and placement, Industrial connect etc.

d) Communicating with alumni for generating resources for the Institute;
e) Organizing alumni congregations on campus or outside;
f) Participating in Pan-NIT Alumni organisations.
g) Creating and maintaining academic relations with international organisations
h) Maintaining off campus extension activities.
i) Working out long term vision, planning and strategy,
j) Managing distance education programs of the Institute;
k) Preparing and distributing e-learning material based on faculty expertise.
l) Managing support services such as security, guest house, transport services, medical, school etc
m) Creating and maintaining Institute's web site and publicity material, Public Relations etc.
n) Assisting / Advising to Director in matters of Recruitment of Non-teaching officers and staff
o) Training to Non-teaching officers and staff
p) etc.

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