

8. Innovations and Emerging needs

8. Introduction

The National Institutes of Technology (NITs) were established with the mandate to impart higher technical education and also to carry out research work at par with the standards adopted by international universities. In pursuance of achieving excellence at par and meeting the basic objectives of establishing the NITs, this Institute has initiated various innovative measures not known to be in operation as such elsewhere. These innovations are meant to do things differently rather than to do different things. It is pertinent to mention here that the ten new NITs are in addition to the existing twenty older NITs in the country. The older NITs have required huge experience and have become matured with the passage of time. The ten new NITs are young enough and need to be innovative from the very beginning for achieving excellence. NIT-Arunachal Pradesh has started with a perfect tune and innovative ideas wherever and whenever possible within the existing frameworks of the NIT Act and Statues.

The following paragraphs portray a summary of things initiated in NIT-Arunachal Pradesh for stepping in the hall of fame. The motive of doing so is to invite constructive review opinions and suggestions for possible addition to, deletion from and modifications of current actions of the Institute for steering the wheel in the right direction for perfect achievements while ensuring an inclusive growth.

8.1 Academic Innovations

The Vision and Mission of NIT-Arunachal Pradesh stand on the four pillars viz. EDUCATION, RESEARCH, SERVICE TO SOCIETY and ETHICS. In pursuit of this, several noble approaches are made in framing syllabi, selecting judicious new disciplines for UG & PG studies, introducing Ph. D. programmes, undertaking social services and adopting country-specific programmes. The following are the details in this regard:

Education in a frame of productive & forward looking syllabi in producing right and prospective engineers for the country

The UG syllabi are chalked out with unique & distinct compulsory credit courses for all the disciplines and those are: NCC/NSS to make the students mentally & physically competent; Historiography in Science & Technology to make future engineers to know about the philosophy & struggle of

their great predecessors to establish scientific & technological temper in the societal cause; Values & Ethics to produce future engineers with ethical mind and value-oriented human beings; Design Contest as an attempt to produce Technical Engineers rather than only Academic Engineers within the current framework of the fixed four-year programme; Research Paper Communication to ignite young minds in thinking process and research viability; and Environmental Engineering & Disaster Management to provide time-relevant courses to meet emerging needs.

To make the students globally employable and competitive, several excellent courses are offered. These are basically communication skill development papers on English, French, German, Japanese and Chinese. All Electives are made open to students of any & all branches. Now-a-days, employability of students of CSE & IT (for that purpose all other disciplines too) is based on sometimes how much they know about Java, PH P, Ruby rather than that of core subjects. Hence in order to enhance the employability, which is one of the responsibilities of any Institute of National Importance, add-on courses (non-credit) are offered to the students during vacation/holidays, preferably by the Industrial Houses.

Fabulous measures in examination process

Several bold measures have been introduced or are in process of implanting in revamping the examination system in NIT-Arunachal Pradesh. The measures so undertaken are believed to examine as to how far the students know rather than what they do not know. Besides, engineers should be made to take up design on given problem with available formula and imaginative orientation rather than memorizing of dates, data and quotations. A few noteworthy initiatives taken up are: setting question paper of more marks (say 150 marks rather than the conventional 100 marks) and asking students to write whatever they can with a maximum given score (for example 100 marks), open book examination in selective mathematics and design oriented papers, and on-line examination in papers of objective type.

Catering Industrial Flavours in imparting Education

Since the days of recommendation of Kothari Commission for Institute-Industry interaction, various steps are in operation in different universities through many different ways to realize the concept. However, NIT-Arunachal Pradesh promises to do the interaction through an approach reportedly never seen hitherto. The big ideas in operation in the Institute are I-course and compulsory industrial training for members of faculty.

One paper in each semester of all branches is marked as I-course meaning that at least 50% of the course content of the paper will be taught by an Industrial Expert. In order to meet the challenges of not getting industrial experts for delivering lecture, other way around approach has been adopted up in NIT-Arunachal Pradesh. During summer vacation, teachers on rotation are sent to industry for training at least for a month at full cost of the Institute to allow them to acquire Industrial experience gradually.

Inspiring changes through judicious selection of new UG & PG courses

Several research works on technical education systems in India categorically pointed about the spurt of growth of institutes/universities owing to LPG-(Liberalization, Privatization & Globalization) adopted in India after 1990s. But the emphatic spurt has resulted in creating several imbalances in the technical education in India primarily due to Private Investment Policy of low investment and high return clubbed with the profit-only motive in most of the cases. The disciplines, popularity in respect which are increasing in leaps and bounds, are low investment and service-oriented courses like Computer Science & Engineering, Information Technology and Electronics & Communication Engineering. Mother Core Sector engineering and high investment disciplines of Mechanical Engineering, Civil Engineering and Electrical Engineering are pathetically ignored. Any '*Institute of National Importance*' must act to correct this imbalance and, therefore, NIT-Arunachal Pradesh has resolved to start B Tech programme in Mechanical Engineering and Civil Engineering in 2013-14. At the same time, the Institute does not like to ignore the emergent areas for taking a giant leap forward. It has aspired to start M Tech in Mobile Computing & Communication Engg., being one of the most promising emergent fields, in 2013-14.

NIT-Arunachal Pradesh has taken a bold decision to introduce M Tech programme on Appropriate Technology & Entrepreneurship Practice in 2013-14 as a sole course in collaboration with the National Institute of Rural Development, Hyderabad. Several studies and statistics predict that the unemployment of engineering graduates in India will be a social crux and may be highly dismissive for engineering education in India to flourish and progress. As of today, around 40% engineering graduates are either jobless or in job with under-paid monthly emoluments. Most of the employed engineers suffer from frustration due to lack of job-satisfaction and lack of innovative strategies of the employers. In the age of LPG (Liberalization, Privatization and Globalization), it was predicted that the BRIC countries (i.e. Brazil, Russia, India and China) will be the

power-centres to reckon with. The fact is that except in respect of China, it is difficult to believe that the prediction has been true. China has progressed based on several innovative measures one of which is the revolution in entrepreneurship in manufacturing sectors with global market. India has not progressed much in entrepreneurship in manufacturing industries, though it has some impacts only in service sectors, that too in basically IT sectors. Therefore, it will be a wise approach either to introduce noble new M Tech programme in India to tackle the gaps mentioned above. Today in India, there is a need to produce engineers who will create jobs rather than running after jobs. At the same time, in India, one important unattended sector is appropriate technology relevant to rural, cultural and environmental development. A little attention has so far been given to bamboo technology, low cost & local made farming technology, rural home-made food processing technology, bio-gas technology, renewable energy resources, and environment and sustainable development. In order to address both the issues mentioned above, an innovative M Tech programme on Appropriate Technology & Entrepreneurship Practice (AT & EP) has been started for 2013-14 as mentioned above. The "Think Tank" of the Institute is also seized of the need of other aspects of inclusive growth in the present-day scenario.

Forward thinking research activities

NIT-Arunachal Pradesh has taken up challenges to create potential and productive research culture in the Institute in the process of which notable exercises are introduction of Ph. D. programmes in Computer Science & Engineering, Electronics & Communication Engineering, Physics, Chemistry and Mathematics; regular organization of research conferences including the North-eastern Regional Science Congress in the centenary year of Indian Science Congress Association (proposals have been sent for organization of a full Indian Science Congress in 2015, Indian Engineering Congress in 2015 and Annual Convention of Indian Society for Technical education in 2016); publication of regular bi-annual journal called Int'l Journal on Current Science & Technology; encouraging and sponsoring members of faculty to enrol as members of scientific & professional societies like IEEE, IETE, IE(I), ISTE and ISCA leading to creating sections/chapters in short future. Lots of accolades are achieved in research productivity in NIT-Arunachal Pradesh [e.g. in 2011, two Professors / Assistant Professor visited USA, Italy and Jordan to present research papers & chair technical session; in 2012, two Professors / Assistant Professor to visit USA for the same function in 2013-14, four faculty members visited USA and to attend International Conferences; and many Professors have published research papers in leading national & international journals].

Developing resourceful laboratories & libraries

NIT-Arunachal Pradesh has left no stone unturned in installing world class laboratories and those are: English Communication Laboratory, Computing & Network Laboratory, Campus Wi-Fi connectivity, Video Conferencing & other ten laboratories in last one year with M Tech class rooms with a computer with NET facilities to each student. The library is immensely resourceful as is evident from the following table of comparison based on data available in different websites.

Table: Books per student available in libraries of leading Universities/ Institutions

Sl. No.	Name of the Institute/University	Total number of students	Total number of books in library	Book collection per student
i	Stanford University, California	19,945	13,10,000	65.12
ii	IIT-Khargpur	6,450	3,00,000	46.51
iii	MANIT-Bhopal	4,000	1,40,719	44.26
iv	NIT-Arunachal Pradesh	372	16,433	44.17
v	IIT-Bombay	5,700	2,28,077	40.18
vi	MNNIT-Allahabad	3,179	1,04,382	32.83
vii	IIT-Guwahati Pradesh	3,900	1,17,000	30.00
viii	NIT-Agartala	2,200	34,000	15.45

Fast Track students' activities

The Institute has provided enough encouragement to its students with partial financial support to make them enrolled as IEEE student member following which petition has been submitted for opening students' branch at NIT-Arunachal Pradesh. On every year on Technology Day on 9th May, the Institute has decided to organize National Students' Essay Contest with best essays awarded with cash prizes and with publication of the proceedings containing the selected essays. As a matter of bringing togetherness and to bring respect for seniors as well as confidence in juniors, senior students are encouraged to teach juniors on some selected

course papers. The approach is believed to decrease/minimize conflicts between seniors and juniors often common in universities particularly on egoistic issues. NSS/NCC chapter has been opened in the Institute under the banner of which students took part in plantation and beautification programmes in Yupia. Students have since organized two blood donation camps.

Regular symposium of Visiting Professors

In each semester, a conclave of eminent professors from leading universities is initiated to supplement the regular teaching process and also to have interaction by teachers for research direction. A few distinguished professors invited for such conclave are: Prof S C Dutta Roy, IIT- Delhi; Prof S L Maskara, IIT- Kharagpur; Prof Ajit Pal, IIT- Kharagpur; Prof P K Basu, University of Calcutta; Prof Atal Chowdhuri, Jadavpur University; and Prof Karmeshu, JNU, among others.

8.3. Administrative Innovations

Administrative reforms & innovations in NIT-Arunachal Pradesh go in tandem with those of academics so as to achieve maximum benefits. Administrative philosophy adopted by the Institute is binary : "0" for love, affection and humanitarian attitude with zero action while activities are performed to meet the defined objective in the framework of prevailing rules & regulations; and "1" while action is stringent when given function has failed to meet the targeted goal with non-acceptable pretext. The Institute categorically rejects the common excuse of not doing things on the pretext of having no time as its philosophy of time management is that "Busy men always get time to execute; but it is the idle men only who do not get time." Accordingly, innovative practices introduced in NIT-Arunachal Pradesh are brought out hereunder.

Six days a week

NIT-Arunachal Pradesh is in the practice of 'six days a week' in first three/ four weeks of a month, followed by holiday of the last week clubbed with cumulative 3 or 4 days' compensatory leave for working on Saturdays/ Sundays/Holidays of the previous weeks. The process has got multiple benefits of providing a substantial period of holiday at a stretch at least once in a month to the employees and students from distant places to enable them to go home for family togetherness without disturbing the effective continuity of teaching & learning process with a small gap for avoiding monotony and providing a short break in studies.

Practice of E-office

NIT-Arunachal Pradesh is in the process of being transformed into a paperless office. Most of the communications are made by and through e-mails. ERP solutions are to be installed for complete automation of the offices in short future.

Greenovations

Plenty of initiatives are implanted to make NIT-Arunachal Pradesh a zero-tolerance zone so far as the noise and pollution are concerned with the facilities of in-built waste disposal and energy conservation in place. The present temporary campus has an installed captive solar power plant of 100 kw serving all purposes of energy requirement. This is reported to be the first of its kind in the entire North-eastern region. Necessary plan has been sanctioned to make the permanent campus (at Jote) a fully solar powered, earth-quake resistant, in-built waste disposal system with possible bio-gas plant and water recycling plant. Cost escalation for such a planned noble campus is of course a matter of concern. The permanent campus is proposed to have a tram line communication with conventional vehicles deployed at the entrance only. The proposal is meant to make the campus less noisy and pollution-free.

Attitudinal U-turn

NIT-Arunachal Pradesh believes to see half a glass of water as half-full rather than half-empty. Institute's authorities have since given verbal directions to all concerned to review and analyze all & every proposal with positive attitude as far as practicable. It has been categorically instructed all in the administration and academics to behave like Teachers rather than as Officers; but that does not mean any deviation from the existing rules & regulations. It envisages that if the reply in response to anything is "NO", the same is to expressed as "*NOT BEING POSSIBLE, PLEASE.*"

Continuous encouragement

NIT-Arunachal Pradesh is in the practice of yearly award of best teacher, best student and best employee on performance matrix. The practice is to reward for good works. The Institute believes in rectification and, therefore, there is only "Reward" scheme and no "Punishment" scheme. The punishment scheme is rectification and providing suitable counselling and further renewed opportunities to excel.

8.4 Conclusions

It is the goodness and hard work of the members of faculty, officers, members of staff and students that NIT-Arunachal Pradesh is in continuous practice of doing innovations in chain to become second to none. Their art of converting difficulties into opportunities and the attitude of "never say no" have made the Institute to do such splendid works in a short span of four (4) years logically and practically during a period of one and half a years. To NIT-Arunachal Pradesh, "Yesterday is Memory, Today is Gift and Tomorrow is Hope". To fulfill the cherished hopes and aspirations, the Institute pledges support, review decision and constructive criticism from readers towards redefining the practices for greater societal benefits and to reach the sky which is the only limit to NIT-Arunachal Pradesh.
