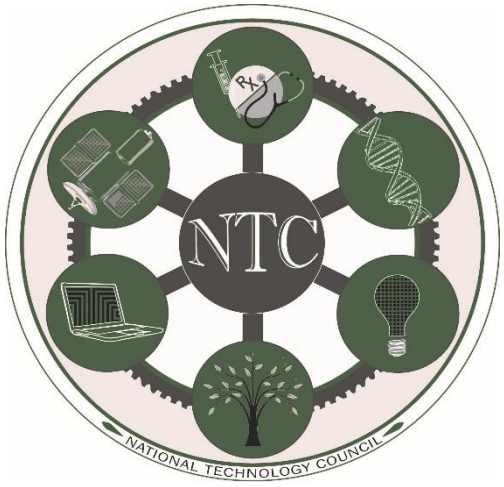
Program Accreditation Policy

And

Procedures Manual

(Engineering Technologies)



NATIONAL TECHNOLOGY COUNCIL OF PAKISTAN

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Foreword

The National Technology Council has been established by Higher Education Commission of Pakistan (HEC) as a statutory autonomous body to regulate the Quality and Conduct of Engineering Technology Education Programs in Pakistan, ensure competence of Graduate Engineering Technologists and help socio-economic uplift of the country. The strategic focus of National Technology Council is to improve Quality of Engineering Technology Education Programs based on Outcome Based Education (OBE) & Outcome Based Assessment (OBA) system through a comprehensive Policy & Processes of Accreditation and Certification, adopting international best practices both in public and private Higher Education Institutions / universities imparting Engineering Technology Education in the country. NTC has set up Technology Accreditation Board (TAB) to monitor the growth and quality of Engineering Technology Education in Pakistan. NTC's TAB has a mandate to evolve procedures, articulate the criterion, define parameters, and establish appropriate benchmarks. Accordingly NTC has designed Accreditation & Evaluation processes and Accreditation Manual, First Edition -2017, incorporating all aspects of OBE and OBA applicable to Engineering Technology Education Programs being run in the country. It is expected to serve as guidelines to the Higher Education Institutions (HEIs) and all stakeholders to meet Quality Assurance Standards. Consequently, Degree Awarding Institutions (DAIs) are expected to produce competent Engineering Technologists to meet stakeholders' requirements and contribute their best for the National development.

NTC acknowledges the support and efforts of Engineers, Engineering Technologists and Academicians who contributed directly or indirectly in preparation of this Manual. Special thanks are due to Pakistan Engineering Council, Dr. Abdul Aziz Mazhar, Dr. Mohsin Tiwana and Mr. Aftab Iqbal for their indescribable cooperation and contribution in preparing this Manual.

Chairperson NTC
May 2017

Preamble

NATIONAL TECHNOLOGY COUNCIL (NTC), is established by HEC under sub-section (e) of section 10, of the ordinance No LIII of 2002,dated 11th September 2002 and HEC No.19-3 /HEC/HRM/2015/9721 dated 7th September 2015 ,published in the gazette of Pakistan October 2,2015, as statutory autonomous body, also to assume the status of independent self-accounting unit. NTC has a mandate to carry out "Accreditation and Certification" of all 4 year programs at Bachelor level leading to technology degrees over a span of 16 years of academic learning. The Accreditation is to be used to ensure that quality Engineering Technology education programs are run in all the Degree Awarding Institutions (DAIs) in the country. The Engineering Technology programs and respective Higher Education Institutions (HEIs) meet certain defined and comparable to international standards i.e. Sydney Accord. The Engineering Technology education curriculum is aligned with guidelines of HEC/ NTC and ensures Continual Quality Improvement culture, in the spirit of Outcome Based Education system.

This manual includes concepts of quality assurance in Engineering Technology Education adopted by developed countries, based on *OBE&OBA system*. It is expected that this will provide guidelines to (HEIs/DAIs) and other stakeholders to meet the required quality assurance standards for the accreditation of their existing engineering technology programs or newer programs being proposed. The Manual emphasizes on elements of program learning outcomes required in the technology curriculum and to adopt Continual Quality Improvement (CQI) procedures covering Outcome-Based Education (OBE) and Assessment concept.

Vision

Transform Pakistan through technology by ensuring high quality teaching and training, to develop Technologists for the benefit of society

Mission

To accredit higher education programs for graduate technologists, stimulate quality, innovation in teaching and training self-evaluation and accountability in higher education. Help Higher Education Institutions (HEIs) to realize their academic objectives to produce high quality professional technologists for the benefit of society and maintain National Register of Technologists.

Objectives

The main objective is to ensure that the accredited Engineering Technology Degree Programs of 4 years at Bachelor level satisfy quality academic requirements comparable to international standards and the Graduate Technologists meets the registration requirements of NTC. To meet these "Objectives" NTC will:-

- **i.** Periodically conduct evaluation of Engineering Technology degree programs and Higher Education Institutions (HEIs) offering the programs on the basis of guidelines, norms and Standards as specified by it. Accreditation shall be a mandatory process for all relevant academic programs, in keeping with NTC's Scope of Engineering Technology Programs as offered by public and private sector institutions. The incentive for obtaining such accreditation shall be enhanced recognition in the technology community, prospective students, all the stake holders and the society at large.
- **ii.** To help evolve system that ensure Continual Quality Improvement (CQI) is being practiced by the Higher Educational Institutions (HEIs), provide feedback for the improvement and development of technological educational programs in NTC's specified Technological fields and applied sciences, that can better meet the qualitative needs of the dynamic industry.
- **iii.** To build a technical education system, as facilitator of human resource, that will match the national goals of growth by competence, contribution to economy through competitiveness and compatibility with societal development and international standards.
- **iv.** To provide the quality benchmarks targeted at Global and National Stockpile of human Capital in all fields of technical education.
- **v.** The qualified Graduate Engineering Technologists through accredited technology programs satisfy the minimum academic requirements for registration as "Professional Engineering Technologists".

Acknowledgment

National Technology Council Pakistan gratefully acknowledges the information contents received from the following organizations, academicians and professionals in development of this manual:-

-Pakistan Engineering Council
-National Computing Education Accreditation Council (NCEAC)
-Board of Engineers, Malaysia
-Dr. Abdul Aziz Mazhar
-Dr. Mohsin Tiwana
-Mr. Aftab Iqbal

The Accreditation Criteria and the Accreditation Policy and Procedures Manual may change from one accreditation cycle to the next.

Note: NTC's accreditation criteria are prescribed by means of "general criteria" that apply to all Engineering Technologies disciplines and "programs criteria" that are established and apply to each specific disciplines of Engineering Technology.

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Abbreviations/ Acronyms

Sr. No	Acronyms	Representation
01	AIC	Accreditation Inspection Committee
02	ARC	Appeal Review Committee
03	CLOs	Course Learning Outcomes
04	CQI	Continuous/Continual Quality Improvement
05	CPD	Continual Professional Development
06	DAE	Diploma Associate Engineering
07	DAI	Degree Awarding Institutions
08	FTDF	Full Time Dedicated Faculty
09	GAs	Graduate Assistants
10	HEC	Higher Education Commission
11	HEIs	Higher Education Institutions
12	HOD	Head of Department
13	ICS	Intermediate Computer Sciences
14	IBCC	Inter Board Chairmen Committee
15	IEA	International Engineering Alliance
16	KPI	Key Performance Indicator
17	MFS	Minimum Faculty Strength
18	NCRC	National Curriculum Review Committee
19	NRT	National Register of Technologist
20	NTC	National Technology Council
21	OBA	Outcome Based Assessment
22	OBE	Outcome Based Education
23	PEs	Program Evaluators
24	PEOs	Program Education Objectives
25	PhD	Doctor of Philosophy
26	PHOs	Practical Handouts
27	PLOs	Program Learning Outcomes
28	QEC	Quality Enhancement Cell
29	QIC	Quality Improvement Committee/Cell

Sr. No	Acronyms	Representation
30	RAs	Research Assistants
31	R&D	Research and Development
32	SA	Sydney Accord
33	SAR	Self-Assessment Report
34	SFT	Supervised Field Training
35	SIT	Supervised Industrial Training
36	SKP	Student Knowledge Profile
37	TAs	Teaching Assistants
38	TAB	Technology Accreditation Board
39	TSK	Technology Specific Knowledge

NATIONAL TECHNOLOGY COUNCIL PAKISTAN

PROGRAM ACCREDITATION POLICY AND PROCEDURES MANUAL (ENGINEERING TECHNOLOGIES)

1.1. Introduction

NTC has a mandate to carry out "Accreditation and Certification" of all 4 year programs at Bachelor level leading to Engineering Technology degrees over a span of 16 years of academic learning. The Accreditation is to be used to ensure that quality engineering technology education programs are run in all the Degree Awarding Institutions (DAIs) in the Country. The Engineering Technology programs and respective Higher Education Institutions (HEIs) have to conform to the Outcome Based Education (OBE) System in keeping with Sydney Accord. The Engineering Technology education curriculum is aligned with guidelines of HEC / NTC and ensures Continual Quality Improvement culture, in the spirit of Outcome Based Education system.

1.2. Importance of Accreditation

Accreditation is a type of quality assurance process to ensure that the Higher Education Institutions (HEIs) offer high quality Engineering Technology Education programs. In this context, services, operations and resources of an Educational Institution or Program/Curriculum are examined and evaluated by an external body to determine their compliance with a set of standards, best international practices and updated in keeping with dynamic needs of the technological fields and modern industry. The Accreditation process gives the Institute an opportunity to conduct in-depth analysis of its strengths and weaknesses in its internal and external environments and protects and promotes the interest of all stakeholders

1.3. Scope:

The following 4 years Degree Programs of Engineering Technologies but not limited to, shall fall in the purview of Accreditation and Registration :-

i. BSc Aeronautical Engineering Technology
ii. BSc Agro Industrial Engineering Technology
iii. BSc Air Conditioning Engineering Technology
iv. BSc Aircraft Maintenance Engineering Technology
v. BSc Architectural Engineering Technology

vi. BSc Automotive Engineering Technology
vii. BSc Aviation Engineering Technology
viii. BSc Bioengineering Technology
ix. BSc Biomedical Engineering Technology
x. BSc Chemical, Process, Plant Engineering Technology
xi. BSc Civil Engineering Technology
xii. BSc Coal Engineering Technology
xiii. BSc Computer Engineering Technology
xiv. BSc Construction Engineering Technology
xv. BSc Cyber Security Engineering Technology
xvi. BSc Drafting/Design Engineering Technology (Mechanical)
xvii. BSc Electrical Engineering Technology
xviii. BSc Electronic(s) Engineering Technology
xix. BSc Electromechanical Engineering Technology
xx. BSc Energy Engineering Technology
xxi. BSc Environmental Engineering Technology
xxii. BSc Fashion Design and Engineering Technology
xxiii. BSc Fire Protection Engineering Technology
xxiv. BSc Garment Engineering Technology
xxv. BSc Industrial Engineering Technology
xxvi. BSc Information Engineering Technology
xxvii. BSc Instrumentation and Control Systems Engineering Technology
xxviii. BSc Manufacturing Engineering Technology
xxix. BSc Marine Engineering Technology
xxx. BSc Materials Engineering Technology
xxxi. BSc Mechanical Engineering Technology
xxxii. BSc Mechatronics Engineering Technology
xxxiii. BSc Metallurgical Engineering Technology
xxxiv. BSc Mining Engineering Technology

xxxv. BSc Nuclear Engineering Technology
xxxvi. BSc Petroleum Engineering Technology
xxxvii. BSc Space Science Engineering Technology
xxxviii. BSc Surveying / Geomatics Materials Engineering Technology
xxxix. BSc Telecommunications Engineering Technology
xl. BSc Textile Engineering Technology

Additional emerging disciplines and degree programs pertaining to the Engineering Technology shall be added to the list in future with formal recommendation of the Council and approval of the Controlling Authority.

1.4 NTC's Technology Accreditation Board (TAB)

The Technology Accreditation Board (TAB) comprises of Eight Members i.e. Chairperson NTC, Secretary and Convener from each subcommittee. The Chairperson NTC will head the TAB and in the absence of the Chairperson, the Secretary of the Council will perform the duties. The Chairperson may co-opt additional members from academia and industry in order to make it broad based with balanced representation.

The TAB Guides and monitors the accreditation process, sanctions the approvals for the visitation schedules and composition of teams, resolves any conflicts between the visitation reports and rejoinders of the institutions regarding the accreditation of the programs. The TAB shall meet at such time and place and at such frequency as decided by the Chairperson; however, it shall meet at least two times in a calendar year.

The major functions of TAB are appended hereunder: -

I. To implement NTC accreditation policy
II. To formulate guidelines and procedures for launching of new Engineering Technology Program and subsequent Program Accreditation
III. To evaluate the programs at regular intervals not exceeding four years with the third-year being the preparatory period for the next accreditation preferably before the end of sixth semester and for a new program, minimum 6 months before the start of the program.
IV. To appoint Accreditation Inspection Committee (AIC) to accredit each Engineering Technology Program
V. To receive and review evaluation reports by the AIC and to communicate its findings to the institutions concerned for their rejoinder, if any
VI. To decide on whether accreditation should be granted or not, as well as the conditions to be imposed, if there is such a need

VII. To respond to complaints and appeals regarding the accreditation process / decisions

VIII. In case of dispute, an appeal against the recommendation of AIC will be submitted by the HEI within 30 days of such decision with a report to substantiate the request. The Technology Accreditation Board (TAB) will take 30 working days to arrive at final decision against the appeal along with reasons for the decision or a revisit on behest of HEI

IX. To publish online directory of all accredited programs (First Schedule) periodically

X. To represent NTC in mutual recognition agreements on academic qualifications with other countries and international forums

XI. To report its work periodically to NTC's Controlling Authority

XII. To prepare and maintain a registry of program evaluators to carry out accreditation of HEI's Engineering Technology Programs

XIII. To select and appoint program evaluators from the maintained registry to constitute AICs for carrying out engineering technology programs accreditation. The number of program evaluators shall be specified by TAB as it may deemed appropriate for smooth accreditation process and to adhere with specified timeline.

XIV. To Register as "Student Engineering Technologist", "Graduate Engineering Technologist" and "Professional Engineering Technologist" in the field of Engineering Technologies.

XV. Revision of Accreditation and Registration policies in keeping with dynamic industrial needs

TAB ensures that Higher Education Institutions (HEIs) continue to maintain the standards to satisfy the laid down criteria on which accreditation has been given to a program.

1.5 Launching of New Engineering Technology Program

1.5.1 Zero Visit

Higher Education Institutions (HEIs) desirous of starting a new Engineering Technology Program should apply for zero visit before launching of a new program by providing detailed information through prescribed forms (NTC/ZV - 001) along with fee deposit in favor of NTC. Zero visit is mandatory to seek "go ahead signal" from NTC for launching a newer Engineering Technology Program. The HEI must not advertise for a new Program unless permitted by the NTC.

1.5.2 Interim Visit

The newer Engineering Technology Program(s) launching "Go Ahead Signal" given by NTC's Technology Accreditation Board (TAB) through zero visit to HEIs, are required to apply for an interim visit along with prescribed fee in favor of NTC at the end of first year of each new program.

This is essential to ascertain HEIs preparedness for the next phases of the Program. The HEI has to provide detailed documentation as per NTC / INV- 001 Form for critical analysis along with the progress on the zero visit report / observations. The details / deadlines to submit the application for the interim visit are as per the prevailing NTC policy.

1.6 Change-of-Scope Visit

An accredited program would be required to apply for a Change-of-Scope visit under the following circumstances:

i. An increase in the student enrollment
ii. A change in the scope of the program objective / curriculum / nomenclature
    (NTC May allow plus 10% upward revision of core subjects and minus 10% downward revision in related subjects. Any best compromise be reached between 80:20 and 70:30. The restriction has been in view as not to increase allied subjects more than 30%. The revision must be through academic council of the HEI without effecting credit hours and under intimation to NTC).
iii. Addition of new stream/specialization in the program's scheme of study

The application for this visit must be submitted at-least 6-months before the date of effective implementation of the proposed change

1.7 Qualifying Requirements

The qualifying requirements are meant to screen out Programs that do not meet the core requirements of the assessment criteria. Failure to meet any one of the qualifying requirements may disqualify the Program from further assessment / process. There are seven (7) components of the qualifying requirements and each Program is expected to have all the components, as follows:-

i. Applicant HEI must satisfy the legal status/requirement of the relevant bodies, specifying the particular legal arrangements as a Charter / Degree Awarding Institution (DAI), Constituent or Affiliated institution, or any other type, etc.

ii. Engineering Technology Program course of 4 years duration shall be made up of normally 130 - 140 credit hours as follows**:-**
    a. Core Technology Subjects: 70% credit hours
    b. Related Subjects: 30% credit hours
iii. Last two semesters 7th and 8th consists of Supervised Industrial / Field Training (minimum 32 credit hours, 8 hrs a day 5 days a week)
iv. The Supervised Industrial / Field Training may be conducted on the basis of time sharing formula of 60% : 40% i.e. 60% time on hands on training and 40% time will be spent on theoretical aspects of practicals to be conducted. HEI's must have MOUs with industry and Field organizations for the supervised Training during 7th and 8th semester.
v. Full-time Core Technology faculty, minimum of 06 (01 Professor, 01 Associate Professor, 02 Assistant Professors and 02 Lecturers) per program, and matching student-faculty ratio of 20:1 or better
vi. Progress / Compliance Report on the last AIC visit observations / TAB decision
vii. Summary of initiatives to adopt Outcome Based Education (Program Learning Objectives and Outcomes)
viii. Duly completed and signed Self-Assessment Report (SAR) as per prescribed format in chapter 4 of this manual

In case of the first accreditation of a new program, the institute should also provide the compliance reports on the Zero / Interim visit. If the Program has met all the qualifying requirements, a detailed assessment of the Program based on the accreditation criteria as explained in the relevant sections will be carried out.

1.8 Provision for Withdrawal

The Higher Education Institutions (HEI) has the option to withdraw an "Engineering Technology Program(s) Accreditation" during the Accreditation Inspection Committee (AIC) visit through written request to the AIC Team Leader after being informed of its strengths and weaknesses, but before the AIC holds formal discussion among its members for finalizing the Report. However, the accreditation visit fee will not be refunded.

The purpose of this provision is to enable the institutions to improve the program quality in keeping with qualifying requirements mentioned in section 1.7 above after making the necessary investments and corrections to overcome the indicated weaknesses, rather than be assigned a 'Not Accredited' status. The institution can apply again for the accreditation of program(s) being withdrawn together with the prescribed fees.

1.9 Registration requirements for Graduate and Professional Engineering Technologists

The registration will be carried out in respect of the 4 years accredited degree programs normally consisting of 130-140 credit hours and 16 years of academic learning through F.Sc Pre Engineering or equivalent, A-level, ICS, DAE. The registration against nominal fee will be open to the Engineering Technology Degree Programs i.e. B.Sc. mentioned in Scope, Section 1.3 of this manual.

Engineering Technology graduates prior to 2017, belonging to HEC recognized Universities / Institutions and permeating through 4 years Technology Degree will also be considered for registration in following categories:-

i. Registration as 'Graduate Engineering Technologists' on payment of Rs. 5,000/- for life time registration. The Graduates holding BSc Engineering Technology / B. Tech (Hons) / B. Tech / BS Technology / BE Technology / BSc Technology Degrees will be registered on production of photocopy of HEC's attested Degree and Transcript. However, the cut out date for their registration would be 31st December 2021, after which only the Graduates permeating through NTC's accredited programs would be eligible for registration by NTC.
ii. Registration as 'Professional Engineering Technologist' after acquiring 5 years of post-degree experience in the relevant Technology Discipline and on production of photocopy of HEC's attested Degree and Transcript along with experience certificates issued by the competent authority of the concerned organizations/departments. The Registration fee would be Rs. 10,000/- for life time registration.
iii. The foreign degree holders will also be required to produce HEC's equivalence certificate.

Note: The prescribed Registration fee mentioned above may change subject to approval of the Council

2 Accreditation Process

2.1 Introduction

This chapter highlights the process and procedures pertaining to the program accreditation by NTC. The accreditation process, whether for a first accreditation or re-accreditation, involves a comprehensive assessment which starts with a review of the information submitted by HEI in Self-Assessment Report (SAR) as contained in chapter 4 of this manual, followed by the Accreditation Inspection Committee (AIC) visit and subsequent preparation of the accreditation report based on findings and recommendations of AIC team to the NTC's Technology Accreditation Board (TAB).

2.2 Accreditation Process and Parameters

Generally, the steps involved in the accreditation process are as follows:

i. The Higher Educational Institution will make an application for accreditation by submitting the prescribe Fee and according to Self-Assessment Report SAR as given in chapter 4 of this manual. If a new program is to be started or already accredited program is to be re-accredited, the application will be submitted at least 6 months before start of a new program or before sixth semester of the already accredited program.
ii. NTC will form Accreditation Inspection Committee (AIC) to evaluate the submitted information. The Committee will be headed by a Team Leader, and the number of members and their field of expertise on the Accreditation Committee will depend on the program to be accredited. NTC will adopt the following guidelines in determining the composition of the (AIC)
    a. An academic (or formerly an academic) member, preferably trained in line with Outcome Based Education (OBE) system conforming to Sydney Accord requirements, shall be included in the Team
    b. Expert Representatives from respective key stakeholders from Engineering Technologies shall be included in the committee
    c. The AIC Leader should not be a current academic in an educational institution in the region of the country where Accreditation will be in process
iii. The (AIC) may, before visit evaluate the submitted information, request HEI through Secretary NTC for additional information, where necessary.
iv. If the information provided is sufficient, the (AIC) Leader will request the Secretary of the NTC/Program Coordinator to liaise with the Educational Institution to develop a schedule or program for an on-site visit and subsequent Evaluation

v. If observers are to be included in the on-site visit, the Secretary of the NTC/ Program Coordinator will seek prior written consent from the Educational Institution, as its expenses will be charged to the HEI in addition to the normal Fee
vi. The AIC will carry out the on-site visit, which could take between two to three days
vii. The AIC will meet, prepare and submit its summary report to NTC within 4 days after the on-site visit; and formal report within 30 days after the visit
viii. On the basis of the report by the AIC and its recommendations, a decision on accreditation will be made by Technology Accreditation Board (TAB). Accordingly the Higher Educational Institution (HEI) will be informed of the decision by NTC
ix. An appeal, if deemed necessary, against the decision of NTC will have to be submitted in writing within 30 days of the date of NTC decision report
x. The duration of accreditation will depend upon the recommendation of AIC and the subsequent approval by the Technology Accreditation Board (TAB).

Accreditation of Four (4) years Technology Degree Program will be carried out under the umbrella of HEC; considering the following aspects:

a) Overall scope and structure of the program
b) Curricula/syllabi
c) The requisite infrastructure
d) The faculty
e) Level of compatibility with international standards and trends.
f) Level of skill development by the program
g) Level of integration of science and technology
h) The student support
i) The laboratory facilities
j) Facilities for student activities and other amenities
k) Financial aid/assistance and endowment Fund Facility
l) Level of job placement of technology graduates

2.3 Accreditation Inspection Committee (AIC)

The visiting team referred to as Accreditation Inspection Committee (AIC) consists of 3 to 4 members, the Convener, two Experts/Evaluators of the respective field under consideration and NTC Representative. The experts/evaluators should have earned preferably Doctorate or at least Master's degree related to program(s) under accreditation and having at least 10 years of teaching-cum-industrial and practical experience. The AIC will include participants who have no conflict of interest with the Degree Awarding Institution (DAI) / Higher Education Institution (HEI) to be visited and who are selected on the basis of their high standing in the profession, ability to assess curricula, competence in appraisal based on overall objectives and performance towards the achievement of set goal.

2.3.1 The Convener

The Convener of the Accreditation Inspection Committee (AIC) has the overall responsibility for the accreditation visit. The convener assigns duties to each team member keeping in view the overall perspective. He should be familiar with the accreditation process and gather in advance the earlier reports, if any. He has the responsibility for the preparation of consolidated team report and its timely submission for the consideration of the TAB. If convener is unable to undertake the visit due to unforeseen circumstances, one of the senior members of the team will be appointed by Chairperson/Secretary NTC to fulfill the role of Convener.

2.3.2 The NTC Representative

The member is responsible to provide all secretarial facilities, coordinate between Accreditation Inspection Committee (AIC) and the institute, availability of relevant information and to ensure compliance. NTC representative shall give detailed briefing about the visit, institutional data and previous accreditation visit report(s) to the convener. NTC representative will also ensure compilation of visit report on the last day of visit for submission to the TAB. He/she will also help to provide necessary policy level updates to the AIC when and where required.

2.3.3 The Program Evaluators

The Program Evaluators (PEs) are responsible for the evaluation of an individual program. Usually there are two evaluators, preferably one from industry or having industrial experience for each program. The member from an industry or user organization can be included only in the final visit during 3rd or 4th year of the program. The latter can sometimes serve as an expert for more than one program depending on his

competence and abilities. However, in case two programs with substantial similarity in course contents are being offered within a Department, a single set of two/three PEs may be chosen for both the programs. For programs in emerging or inter-disciplinary areas, more PEs can be included in the team depending on the need.

The duties of the Program Evaluators include evaluation with reference to the criteria given earlier, through physical verification of infrastructure / facilities, records, interviews with administrators, faculty, alumni, students / stakeholders and other activities, which they find necessary for the total performance appraisal. The PEs are also required to mention strengths and weaknesses against each criterion in the worksheet.

The Program Evaluators deputed for accreditation purposes should be senior professionals having enough requisite teaching / research experience. Availability of these PEs may be sought well in advance and the candidate institution will be informed about the composition of AIC. The candidate institution may object to the assignment of a PEs provided it submits proof of any verifiable conflict of interest with the assigned PEs. In case a PE is unable to undertake the visit due to circumstances beyond his/ her control, the Convener of the team will nominate another PE in consultation with TAB (NTC), keeping in view the guidelines for selection of PEs.

2.4 Types of Accreditation Visits

In relation to "Accreditation of Engineering Technology Programs" following are various types of visits conducted by NTC:

2.4.1 Accreditation / Reaccreditation Visit

An institution applying for accreditation visit is expected to fulfill all the requirements pertaining to faculty, curriculum, laboratories, library, infrastructure, finances and other allied facilities as per the accreditation guidelines. Program seeking accreditation for the first time is required to ensure submission of relevant form to NTC at-least six months before the commencement of Program. The programs seeking renewal of accreditation status (Re-Accreditation) should apply before sixth semester.

2.4.2 Confirmatory Visit

This visit is necessitated only if required by the TAB as a result of any deferred / pended accreditation decisions due to deficiencies that can be removed within 6 months.

2.5 Activities in AIC Visit

Normally, the Accreditation Inspection Committee (AIC) requires two days to complete the evaluation of a program. However, for multiple programs, the visit may be scheduled for more days. In this case the visit will be planned to hold respective presentations in a combined session followed by visit to common facilities during the first day. All relevant documents and information should be made available and displayed in the exhibit room for scrutiny and analysis. Qualitative facts such as professional attitude, commitment to academics and R&D activities, conduciveness of environment, and morale of the faculty and students should also be taken into consideration while evaluating the program.

Following activities are expected to be completed during the visit:

a. Meeting with senior administration of the institution
b. Discussion with full time and shared program faculty to assess strengths and weaknesses of the program and its conduct
c. Interaction meetings with students, alumni and other stakeholders for obtaining their feedback
d. Meeting with management officials of the higher education institute in connection with provision of support regarding Finance, Infrastructure, Examination, Admission & Registration etc.
e. Review and analysis of all the documents furnished by the department / institution
f. Visits to laboratories, library, computing facilities, auditorium, sports facilities, hostels, faculty offices, classrooms, career placement office, medical, safety & security infrastructure and such other facilities on site
g. A concluding meeting with senior management of the program and institution to share observations of the visiting team

2.6 Schedule of Accreditation Inspection Committee (AIC)

Pre-visit Meeting, Afternoon / Evening before Day of Visit

- Team introduction and briefing of panelists
- Private plenary meeting of all members participating in the accreditation visit, chaired by AIC Team Leader. (Observers are invited to attend, if any)

Day one of Visit

- Introduction with Dean / principal
- Presentation / Briefing by HEI
- Briefing in keeping with Self-Assessment Report (SAR) i.e. Curriculum, Faculty, Students, Labs, Library, Infrastructure and Alumni
- Improvements since last visit or against previous observations

1. Program Objectives and Outcomes

- Mission and Program Objectives
- Program Outcomes and Teaching Processes
- Assessment system, exam papers, marked scripts, final year projects, effectiveness of teaching and learning, internal curriculum development, curriculum Mapping, quality assurance, student feedback mechanism, and other records

2. Classroom Visit

- Two to three class rooms (size: 12 – 15 sq.ft per student, teaching aids, furniture etc.)
- Students interview (Admissions, Course Outline, Subjects, Examination, Extra-curricular activities, scholarships etc.)
- Demonstration of student outcomes / attributes in accordance with Sydney Accord (Student Knowledge Profile)
- Students assessment
- Students perception
- Students feedback

3. Infrastructure Visit

- Faculty offices
- Laboratory Audit (desirable Lab/Workshop Size 35 – 45 sq. ft. per student):
- Library Audit (minimum 1000 books of 250 Titles and 3 journals/magazines of international repute per program):
- Auditorium and examination hall (size desirable 12 – 15 sq. ft. per person), sports facilities and other allied facilities
- Safety and Security Audit (safety and security measures and disaster plan)

Day Two of the visit

1. Faculty Meeting
2. Course File Audit / Teacher's Folder
3. Examine faculty Research projects and publications: View selected facilities to assess Research and Development work being undertaken by the faculty i.e. Research work & papers, books written, participation in conferences & seminars
4. Meeting with School Dean to review issues raised, Finances and Governance
5. Exit meeting with Dean / Principal
6. Compilation of reports and forms by AIC with recommendations

2.7 Accreditation Decisions

The TAB in its Accreditation Decision Meeting (ADM) may decide about the accreditation status of an individual program in one of following ways:-

i **Accredited for FULL Four years:** Programs meeting or exceeding all accreditation criteria, though with some concerns or minor weaknesses (W category)

ii **Accredited for Two years:** Programs meeting all the accreditation criteria, but no severe deficiency though may have some major weaknesses / serious concerns (X Category)

iii Deferred / Pended up to one year to ensure removal of deficiencies:
In case program has a few severe deficiencies which can be removed within a specified period of time. Re-consideration would require an evidence based compliance report or a confirmatory-visit once the deficiencies are removed (Y Category)

iv **Not Accredited:** Programs not ready for accreditation due to non-conformance to one or more criteria or serious deficiencies in major attributes (Z Category)

Note: The duration of accreditation will depend upon the recommendation of AIC and the subsequent approval by the Technology Accreditation Board (TAB).

2.8 Accreditation Fees

Fee for various types of accreditation visit i.e. Accreditation, Re-Accreditation, Confirmatory/Compliance, Zero, Interim, Change of Scope, and Appeal cases are as follows :-

- Zero visit
- Interim visit
- Change of Scope visit
- Accreditation / Re-accreditation

Rs150,000/- per visit

- Appeal against AIC decision — Rs100,000/- per case

Note: Please refer to NTC Secretariat for the current fee structure / policy for various types of assessment visits. The Accreditation fee may change from one accreditation cycle to the next subject to approval of the Council.

2.9 Appeals

In case an institution wishes to appeal for a review of the action on accreditation taken by the AIC, a written application along with the prescribed fee should be sent to the Secretariat NTC, Technology Accreditation Board within 30 days of the date of notification of the judgment. The appeal should be accompanied by a report to substantiate the request. On receipt of such an application, and being satisfied about its prima facie case, the Technology Accreditation Board (TAB) / Chairperson NTC may appoint a special Committee, **Appeal Review Committee (ARC)**, consisting of a minimum of three members including Vice Chairperson/Secretary NTC as Chairperson and two subject specialists who were not initially involved in the visitation, to conduct the appeal review. A meeting of the committee will be convened, wherein the Higher Education Institution (HEI) and the Convener / Team leader of AIC may be invited to present their case. The committee may also visit the institution, if necessary. The recommendations of this committee will be considered by the Chairperson NTC for making final decision. The Chairperson will consider the findings of the Appeal Review Committee and arrive at a final decision within 30 working days after receipt of the appeal at secretariat NTC.

Chapter 3: Criteria for Accreditation

3.1 Introduction

An Engineering Technology program shall be assessed by AIC to enable graduates of the program to be registered as Graduate Engineering Technologists with the NTC. The evaluation process is based on a set of broad-based criteria developed through collective intellect concerned with Engineering Technology Education all over Pakistan and is compatible with international standards. The corner stone of Accreditation policy is based on Outcome Based Education (OBE) System to be followed by Higher Education Institutes i.e. **No OBE = No Accreditation.** This has to be established through mapping process of Program Education Objectives (PEOs) v/s Program Learning Outcomes (PLOs). Reference Annexure # 2

OBE is an educational process that focuses on what students can do or the qualities they should develop after they are taught. OBE involves the restructuring of curriculum, assessment and reporting practices in education to reflect the achievement of high order learning and mastery rather than accumulation of course credits. It requires that the students demonstrate that they have learnt the required skills and contents. Each criterion serves to assess a principal feature of the institutional activities and program's effectiveness as per its educational objectives. Hence, each of them is described in terms of quality attributes, amenable to a substantially objective and qualitative assessment. NTC encourages the institutions to continually strive for the attainment of excellence. The AIC evaluation processes are designed to facilitate identification of strengths and weaknesses of the programs. Institutions seeking accreditation of their programs are expected to satisfy each criterion. They are required to adhere to these criteria during the validity period of accreditation granted. The HEIs are also encouraged to periodically review the strengths and weaknesses of their programs and strive for their continuous improvement.

3.2 Accreditation Criteria

The accreditation assessment however, involves a review of qualifying requirements (Sec. 1.7) and evaluation of an Engineering Technology program's conformance to the following criteria.

Criterion 1 - Program Educational Objectives (PEOs)
Criterion 2 - Program Learning Outcomes (PLOs)
Criterion 3 - Curriculum and Learning Process
Criterion 4 - Students
Criterion 5 - Faculty and Support Staff
Criterion 6 - Facilities and Infrastructure
Criterion 7 - Institutional Support and Financial Resources
Criterion 8 - Continuous Quality Improvement
Criterion 9 – Industrial Linkages

3.2.1 Criterion 1 – Program Educational Objectives (PEOs)

The Higher Education Institution (HEI) applying for accreditation should have Vision & Mission statements and a set of goals. The program offered by the HEI should also have well defined objectives. Program Educational Objectives (PEOs) are broad statements that describe what graduates are expected to achieve a few years after graduation. Documents pertaining to each program (e.g. Prospectus, Schedule of studies etc.) that clearly and publicly articulate its mission, objectives, commitment and desired outcomes. *It should be ensured that the program objectives are aligned with the Program Mission, Institute's Vision and Mission.* Program mission and objectives should be articulated and made known to everyone in the institution through institutional publications and websites.
The successful pursuit and realization of the mission and objectives, and the means adopted to accomplish them, bring out the quality of the institution and its programs. Program Educational Objectives are based on the needs of the program's constituents that are linked to the student learning and outcome assessment process.

The objectives should be clear, concise, realistic and measurable within the context of the committed resources. Few examples of Program Educational Objectives (PEOs) are as follows:

PEO 1: Will have demonstrated knowledge of Mechanical Engineering Technology appropriate for career pursuits and workplace needs.
PEO 2: Will have the ability to understand, diagnose, communicate and provide solutions to technical problems/situations for the benefit of the society
PEO 3: Will demonstrate the intellectual curiosity to actively pursue the acquisition of new knowledge and skills necessary to refine and improve his/her abilities to contribute to the Technology domain
PEO 4: Ethical commitment that allows them to deal successfully with social, technical and professional situations in their lives and work.

A process should be developed to assess the level of attainment of the program objectives to evaluate effectiveness of the academic programs. It should include feedback from faculty, employers, alumni and other stakeholders. The evaluation results should be utilized for redefining/improving the program objectives.

The program seeking accreditation must demonstrate that following are in place:

a) Well-defined and published Program Vision & Mission
b) Program's Educational Objectives defined and consistent with the Vision & Mission
c) Mapping of Mission & Vision with PEOs (Annexure 1)
d) Program's Educational Objectives based on the stakeholders needs and inputs
e) A process in place to evaluate the attainment of educational objectives (Annexure 2)
f) Evaluation results used for continual improvement of the program

3.2.2 Criterion 2 - Program Learning Outcomes (PLOs)

Program outcomes are the narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills and attitude that the students acquire while progressing through the program. The program must demonstrate that the students have attained a certain set of knowledge, skills and behavioral traits, at least to some acceptable minimum level. Specifically, it is to be demonstrated that the students have acquired the following graduate attributes but not limited to:

(i) **Engineering Technology Knowledge (SA1):** An ability to apply knowledge of mathematics, natural science, Engineering Technology fundamentals and Engineering Technology specialization to defined and applied Engineering Technology procedures, processes, systems or methodologies.

(ii) **Problem Analysis (SA2):** An ability to Identify, formulate, research literature and analyze broadly-defined Engineering Technology problems reaching substantiated conclusions using analytical tools appropriate to the discipline or area of specialization.

(iii) **Design/Development of Solutions (SA3):** An ability to design solutions for broadly- defined Engineering Technology problems and contribute to the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

(iv) **Investigation (SA4):** An ability to conduct investigations of broadly-defined problems; locate, search and select relevant data from codes, data bases and literature, design and conduct experiments to provide valid conclusions.

(v) **Modern Tool Usage (SA5):** An ability to Select and apply appropriate techniques, resources, and modern technology and IT tools, including prediction and modelling, to broadly-defined Engineering Technology problems, with an understanding of the limitations.

(vi) **The Engineering Technologist and Society (SA6):** An ability to demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to Engineering Technology practice and solutions to broadly defined Engineering Technology problems.

(vii) **Environment and Sustainability (SA7):** An ability to understand and evaluate the sustainability and impact of Engineering Technology work in the solution of broadly defined Engineering Technology problems in societal and environmental contexts.

(viii) **Ethics (SA8):** Understand and commit to professional ethics and responsibilities and norms of Engineering Technology practice

(ix) **Individual and Team Work (SA9):** An ability to Function effectively as an individual, and as a member or leader in diverse teams.

(x) **Communication (SA10):** An ability to communicate effectively on broadly defined Engineering Technology activities with the Engineering Technologist community and with society at large, by being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

(xi) **Project Management (SA11):** An ability to demonstrate knowledge and understanding of Engineering Technology management principles and apply these to one's own work, as a member or leader in a team and to manage projects in multidisciplinary environments.

(xii) **Lifelong Learning (SA12):** An ability to recognize the need for, and have the ability to engage in independent and life-long learning in specialist Engineering Technologies.

In addition to incorporating the graduate attributes (i) to (xii) listed above as the program learning outcomes, the Higher Education Institutions may also include any additional outcomes if adopted. In particular, the program must demonstrate the following:

a) Well-defined and published Program Education Objectives (PEOs)
b) Program Education Objectives (PEOs) linked to the Program Learning Outcomes (PLOs) (Annexure 3)
c) Mapping of Program Learning Outcomes to Course Learning Outcomes (CLOs) (Annexure 4)
d) Teaching-learning and assessment methods appropriate and supportive to the attainment of Course Learning Outcomes
e) Quality of assessment mechanism to evaluate achievement levels for all the Program Learning Outcomes by each student
f) Process in place by which assessment results are applied to further refine the assessment mechanism and/or redefine the program / course outcomes, thus leading to continuous improvement of the program.

3.2.3 Criterion 3 – Curriculum and Learning Process

The academic curriculum of the program should be designed to facilitate / ensure the achievement of program outcomes by all students. This is achieved by offering a balanced combination of technical and non-technical contents coupled with appropriate assessment and evaluation methods. It should have a well-defined core of essential subjects which should be supported by requisite compulsory as well as elective courses. It should also invoke awareness and comprehension of societal problems amongst the students and should motivate them to seek solutions for improving the quality of life. The theory content of the curriculum has to be supplemented with appropriate experimentation in laboratories.

The institution should ensure incorporating the inputs from all stakeholders, especially from the industry, in developing curriculum contents so as to keep the curriculum aligned with the program objectives and outcomes. The program structure should cover the essential fundamental principles at the initial stages, leading to integrated studies in the final year of the program in consonance with the approach and levels defined in Bloom's taxonomy. Bloom's taxonomy is a set of three hierarchical models used to classify educational learning objectives into levels of complexity and specificity. The three hierarchical models cover the learning objectives in Cognitive, Affective and Sensory domains.

Comprehensive pursuance of a curriculum necessitates that all of its related activities should be allocated time intervals as per a well-defined reference. In semester system of education, this reference is "Credit-Hour". One credit hour is defined as: one hour of lecture per week for a minimum of 14 weeks in a semester (not including examination or mid-term break). One credit hour equivalent is awarded for 3 hours of laboratory or workshop for a minimum of 14 weeks in a semester (not including examination or mid-semester break). One credit hour equivalent is awarded to 2 hours of supervised and compulsory tutorial session for a minimum of 14 weeks in a semester (not including examination or mid semester break) subject to a maximum of one credit hour for each subject in that semester. The program should be offered as a 4-years or 8-semesters program. One credit hour is awarded to one week, of 5 working days, Supervised Industrial Training @ 8 hours per day.

The minimum total number of credit hours for an Engineering Technology degree program of 4 years; stretched over 8 semesters, with entry Qualification of F.Sc. or equivalent or DAE/A-level/ICS, are normally **130**- **140** credit hours.
The 130 -140 credit hours shall be made up as follows: -

- **A.** Core technology subjects: **: 70 % credit hours**
- **B.** Related subjects **: 30% credit hours**

General studies, Safety and Health, Ethics, Management, Industrial Psychology, Engineering Economics, Islamic & Pakistan studies etc. NTC May allow plus 10% upward revision of core subjects and minus 10% downward revision in related subjects. Any best compromise be reached between 80:20 instead of 70:30. The restriction has been in view as not to increase allied subjects more than 30%. The revision must be through academic council of the HEI without effecting credit hours and under intimation to NTC.

- **i.** Credit hours for remedial classes in basic sciences and basic mathematics shall not be included.
- **ii.** Final year project work to complement Engineering Technology studies shall be considered Engineering Technology subject to a minimum of 6 credit hours and a maximum of 12 credit hours.
- **iii.** Laboratory work to complement the Engineering Technology theory shall be considered as part of the Engineering Technology subjects.
  - **a.** Industrial Training, in reputable industry, shall be for a minimum of 32 weeks during 7^{th} and 8^{th} semester.
  - **b.** Credit hours: 16 / semester @ 8 hours /day/ week of 5 days OR total 32 credit hours for 7^{th} & 8^{th} semesters
  - **c.** The HEI / university awarding the degree will be considered responsible for ensuring the capabilities of all training staff involved. The Accreditation Inspection Committee (AIC) will require established evidence (i.e. industrial training program, industrial involvement & trainee assessment system) as to how the training objective is being achieved. In this regard a comprehensive Training Log Book will also have to be maintained

The hallmark of a curriculum is to infuse original thinking and hands on training, resourcefulness and entrepreneurial spirits among students. Each program should embody foundation courses as well as the general and specialized professional content of adequate breadth and depth, and should also include appropriate Humanities and Science components. The core of the program should concentrate on acquisition of knowledge and skills in the specific discipline and also ensure exposure to inter-disciplinary areas. There should also be an effective relationship between the curricular content and practice in the field of specialization. In addition, the graduates should demonstrate competence in oral communication, scientific & quantitative reasoning, critical analysis, system design, logical thinking, creativity and capacity for life-long learning. The general framework pertaining to the knowledge profile for all Engineering Technology programs are defined, periodically reviewed and publicized by National Curriculum Review Committees (NCRC) of Higher Education Commission (HEC). The contents of each constituent course of the curriculum should be updated to absorb recent technological and knowledge developments. Evidence to this effect should be presented at the time of accreditation.

The delivery of subject matter and the assessment process employed should enable the students to develop intellectual and practical skills effectively, as deemed essential in program outcomes. Mapping of program outcomes i.e. Engineering Technology knowledge, problem

analysis, development of solution, modern tool usage, the Engineering Technologist and society, communication, environment, ethics and lifelong learning etc. to curriculum or associated program activities, course syllabi that indicate the desired program learning outcomes that are covered in the course. Assessment of various learning outcomes should be carried out by employing direct / indirect methods appropriate for that outcome. Complex outcomes which are not easily quantifiable, e.g. communication skills (oral / written), critical thinking, etc. often require rubrics for their assessment. The assessment methods employed should be well understood by the students and the teaching / learning process should motivate them to develop a quest for life-long learning.

The academic calendar, number of instructional days, quality of faculty, contact hours per week, design and delivery of syllabi, student evaluation and feedback are the important aspects in reviewing the effectiveness of teaching-learning processes.

In addition to regular teaching / learning activities such as classroom interaction, lab experimentation and faculty consultation, other aspects of student learning such as tutorial system, research / design projects, seminar / workshops and exposure to industrial practice should form an integral part of curriculum. Internal reviews of quality assurance procedures should be carried out periodically.

An Engineering Technology program should also demonstrate the following essentials:

3.2.3.1 Assessment Procedures of Program of Study

The regulations for assessment procedures of program of study must be made available and maintained by the faculty. The HEI / University should be able to demonstrate its management system for assessment, which should include:

(a) Examination regulations;
(b) System of assessment and criteria for pass / fail;
(c) Preparation procedures for examination papers;
(d) Level of examination papers; and
(e) Assessment procedures for final year project and industrial training
(f) Student Portal as part of HEI's website
(g) Teachers Files

The HEI may have an external examiner for each program to independently review the overall academic standard. The external examiner should be a person of good standing in the academic and Engineering / Engineering Technology profession. The external examiner is expected to carry out the overall assessment of the program including staff as well as all subjects and laboratory work undertaken by the students. Assessment is to be made yearly, at the end of each academic session. The external examiner's report in line with Self-Assessment Report (SAR) shall be included in the application for accreditation.

3.2.3.2 Assessment of Learning Outcomes

The program must ensure that each student has achieved all Program Learning Outcomes (PLOs) to acceptable level through assessment of Course Learning Outcomes (CLOs). The appropriateness of the assessment methods along with the level of achievement against the targeted outcomes must be evaluated. Mapping of program outcomes to individual courses, nature of assessment tools (direct/ indirect/rubrics) and the process of evaluation to determine the attainment of PLOs should be demonstrated through reasonably convincing evidences.

Processes for securing feedback and comments from students, graduates, employers and representatives of the wider community, and evidence of their systematic application to the review and continuing improvement of program objectives, curriculum and content, and the quality of teaching and learning. Post-program processes should include graduate employment data, alumni surveys documenting achievement and employers' surveys of longer-term performance and development.

3.2.3.3 Supervised Professional Industrial / Field Training

The program should facilitate and promote cooperative learning through supervised industrial / field training program of continuous 32 weeks duration (7^{th} and 8^{th} Semesters) in an Engineering Technology practicing environment /organization. The training program should have been planned and agreed to between the institution and the host organization. The training organization / institution should have on job trainer and maintain student's training log book in possession of the students essentially required for later assessment / evaluation of students learning through training.

Familiarity with all common Engineering Technology processes is essential and exposure at a practical level to a wide variety of processes is required at a level appropriate to the young technologists. Whilst it is clearly desirable for students to get a feel for the skills involved, the central aim is to achieve appreciation, not to acquire craft skills. Clearly, many of the latest processes and large scale or costly operations can

only be the subject of observation or demonstration, and visits to Technology practicing works may be helpful in many such cases. Exposure to Engineering Technology practice shall be integrated throughout the curriculum. In addition, exposure to professional Engineering Technology practice may also be obtained through a combination of the following:

- **i.** Use of guest lecturers;
- **ii.** Use of staff with industrial experience;
- **iii.** Courses on professional ethics and conduct;
- **iv.** Industrial visits.
- **v.** Industry-based final year project;
- **vi.** Regular use of a logbook in which experiences are recorded, as part of trainee assessment as well.< **3.2.3(iii)c** >

It is considered that there is no real substitute for first-hand experience in Engineering Technology practice environment, outside the University. The National Technology Council (NTC) advocates that all Technology Teaching and Training Academic staff must acquire exposure to such experience, in addition to the other elements suggested, and make efforts to assist all students gain placements of suitable quality.

3.2.3.4 Lab Work

The teaching / learning in each core engineering technology subject must be supported with sufficient practical work in the labs. For this purpose, "Lab Manual" containing Practical Handouts (PHOs) of all experiments for each course must be maintained. The labs should be well-equipped with the requisite up to date Technology Software and equipment/machines such as basic components, modules, measuring instruments, etc. The students should be encouraged to develop practical skills. Students should work in groups, preferably not more than 5 in a group. Throughout the program, there should be adequate provision for laboratory or similar investigative work, which will develop in the prospective Engineering Technologists the confidence to deal with new and unusual Engineering Technology problems in the field of their specific Technology.

3.2.3.5 Design Projects

In order to hone the practical skills and giving spark to their imagination, the students of an engineering technology program must be encouraged to undertake design projects as an integral part of every core subject. Such design projects should inculcate intuitiveness,

resourcefulness and the spirit to compete. The students should also be motivated to participate in competitions which assign a theme and require the participants to use their ingenuity, creativity and innovation.

3.2.3.6 Final Year Project

The final year project could be a part of Supervised Industrial Training during 7th and 8th semester. The project can provide one of the best means of introducing a real professional approach to engineering technology studies. For this reason, the use of projects as a vehicle for teaching and integration of theory and practice in subject areas is strongly encouraged throughout the program. It is a requirement for the program to include a significant project(s) in the later stages. Whilst group projects, e.g. in design exercises, may be entirely appropriate for work in earlier years, the final year / 7th & 8th semester project is required to demand individual analysis and capable of being assessed independently from the work of others. The student is expected to develop techniques in literature review and information prospecting. Where practicable, it is recommended that final year project(s) should also provide opportunities to utilize appropriate modern technology in some aspect of the work, emphasizing the need for Engineering Technologists to make use of computers and multimedia technology in everyday practice.

Design projects shall include complex Specific Engineering Technology problems and design systems, components or processes integrating core areas and meeting specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. A project of this nature should invariably lead to an integration of the knowledge and practical skills as mandated in the program outcomes.

3.2.3.7 Tutorials

Tutorials should be part and parcel of the program so as to complement the lectures. A tutorial session should preferably not exceed twenty five (25) students at any time.

3.2.4 Criterion 4 – Students

The quality of students admitted and their academic progression are important considerations in evaluating the success of a program in achieving its set objectives and outcomes. The Higher Education Institution (HEI) must frame and enforce policies for admitting fresh as well as transfer students into the program.

The (HEI) should devise mechanisms to guide students regarding academic and career matters. Policies should be made and implemented to maintain a manageable teaching load in all semesters. The institute must provide conducive teaching-learning environment, and also monitor / evaluate students' progression towards achieving program outcomes and objectives. The monitoring / evaluation processes should be adequate to ensure fulfillment of program requirements up to the required level of quality and standard by all the graduating students.

3.2.4.1 Admission Criteria

The need blind admission policy based on merit only and open to all candidates regardless of religion, race, creed and financial resources. The entry requirement to the program shall be assessed to ensure that the students accepted are at the minimum qualifications required for training and education as an Engineering Technologist. It is to be ascertained whether the students being admitted in the program qualify the minimum eligibility criteria prescribed by NTC for various programs and whether the merit is strictly being followed.

NTC has set the following minimum requirements for admission into any Engineering Technology program:-

For all Engineering Technologies:

- 50% marks in F.Sc. (Pre-Engineering) or Equivalent Qualification A-level / ICS / DAE / B.Sc. (Excluding sports and Hafiz-e-Quran)
- Qualifying the Entry Test

Institutions are expected to have well laid-out and transparent procedure to compute overall merit for admission into a Engineering Technology Program. The HEI may work out weighted for admission in respect of students who meets minimum requirements for admission as follows:

Induction Weightage: 70% weightage to F. Sc. Or Equivalent / ICS / DAE / B.Sc.
30% to Entry Test

The student should have at least 50% overall adjusted admission marks computed from above ratios.
Equivalence of the Examination passed by the candidate shall be determined by Inter Board Chairmen Committee (IBCC) and eligibility by the concerned HEI.

3.2.4.2 Annual Intake

This aspect pertains to the number of students admitted considering the capacity of the program and its allied facilities through an assessment process. The program intake at HEI level should be in-line with the maximum intake allowed by NTC.

3.2.4.3 Admission Response

This aspect pertains to the number of applicants applying for admission into the program, and the ratio of the number of applicants offered admission and the number of students who finally joined the program.

3.2.4.4 Transfer of Students

The Higher Education Institution (HEI) shall develop a clear, documented and well publicized policy on transfer of students from other institutions. The policy shall take into account evaluation of credit equivalence for the subjects studied in an accredited program of an institution and should be based on justifiable grounds. Not more than a maximum of 50% of the total credit hours required for the specific Technology degree program should be transferred. All such cases of student transfer should be intimated to NTC for information and record at the time of acceptance by the institution. The institution may not entertain transfer students beyond their NTC approved class size.

3.2.4.5 Class Size (Theory)

This aspect pertains to the number of students for the theory classes. For Technology subjects, average class size should be limited to 45-50 students per program maintaining student teacher ratio of 20:1 and requisite infrastructure. Where the main subject instructor is an experienced PhD faculty, and is being duly assisted by appropriate number of GAs/TAs/RAs for conducting scheduled Tutorials/Help-Sessions and/or with advertised office-hours for off-class guidance of the students. The classroom size must have provision of space as 12 – 15 sq ft per student.

3.2.4.6 Class Size (Practical)

For laboratory sessions, the number of students conducting experiments in the laboratory at one time should be such as to ensure sufficient practical exposure and proper guidance / supervision by the Graduate Lab Instructor in specific Technology. For hands-on type experiments, the number of students per workstation should be limited to 2-3 - (5 max) per workstation; whereas for labs which are demonstrative in nature, relatively larger number of students per workstation may be considered reasonable. Adequate number of Graduate Lab Instructor and associated staff should be available for effective guidance and help to students during their practical sessions.

3.2.4.7 Semester Academic Load

This aspect pertains to the number of credit-hours taken by students in each semester, and the appropriateness of each subject's workload in consideration of its credit-hours. Students should not be over-burdened with workload that may be beyond their ability to cope with, or may hamper their assimilation of the subject matter and optimal performance. As prescribed by HEC, Academic load in a semester should preferably be in the range of 12 - 18 Cr Hrs per week / student.

3.2.4.8 Completion of Courses and Student Feedback

This aspect pertains to the completion of subject contents / curriculum as published in the official program catalog/prospectus and/or website. All the subject topics as well as the practical experiments meant to be covered for the particular course must be completed during the prescribed time. The information should be gathered from the official record, e.g. course-file as well as through feedback and interaction with students.

3.2.4.9 Student Knowledge Profile

The program that builds this type of knowledge and develops the attributes is typically achieved in 4 years of study depending on the level of student at entry. A program should be able to provide:

a. A systematic, theory based understanding of the natural sciences applicable to the sub-discipline
b. Conceptually – based mathematics, numerical analysis, statistics and aspect of computer and information science to support analysis and use of models applicable to the sub-discipline

c. A systematic, theory-based formulation of Engineering Technology fundamentals required in an accepted sub-discipline
d. Engineering Technology specialist knowledge that provides theoretical framework and bodies of knowledge for an accepted sub-discipline
e. Knowledge that supports Engineering Technology design using the technologies of a practice area
f. Knowledge of technologies applicable in the sub-discipline
g. Comprehension of the role of technology in society and identified issues in applying technology: ethics and impact: economic, social, environmental and sustainability
h. Engagement with the technological literature of the discipline

3.2.4.10 Student Performance Evaluation

This aspect pertains to the various mechanisms being used for evaluating students' performance in the program courses, and their suitability and affectivity for assessment of the level of achievement of Course Learning Outcomes (CLOs). This may include a review of various class assignments, quizzes, research reports, examinations as well as lab projects, Lab note books and viva-voce. The number and variety of such assessment tools and their coverage of subject topics in a manner which ensures a reasonably accurate assessment of students' level of achievement against various learning outcomes is the key to monitor students' progress in a direct manner. It is expected that the program should demonstrate a minimum number of such class assignments, quizzes and examinations for assessment of PLOs.

3.2.4.11 Academic Counseling

This aspect pertains to the guidance available to students from teachers through dedicated office-hours beyond scheduled time-table. The office hours must be publicized by the instructors by posting them on the office doors/notice-boards. Tutorials, problem-solving and/or help sessions, when planned, should be scheduled and made a part of the time-table. Research Assistants (RAs) and Teaching Assistants (TAs) / Graduate Assistants (GAs) engaged to provide extra coaching and/or subject assistance, especially when assisting the main instructor with a larger class-size, should also maintain specific designated hours for off-class assistance/counseling. Individual student's academic progress should be monitored and corrective measures taken on regular basis through well-defined mechanism.

3.2.4.12 Career and Student Wellness Counseling

In addition to the course specific guidance, the institute should have designated student counselors who would advise and counsel students regarding academic as well as career matters. A formal orientation session for the newly admitted students to apprise them about the salient requirements and policies/procedures of the program is highly desired. The student wellness counselor(s) should also provide assistance to students in managing their health, financial, stress, emotional and spiritual problems.

3.2.4.13 Financial Support to Students

The Higher Education Institution may also provide or arrange for various financial benefits to its students like scholarships and interest-free loans. HEI must maintain special fund, as a continuous financial support to the students throughout the program. Preferably at least 10% of student population in any particular program be given scholarships.

3.2.4.14 Student extra and co-curricular activities

In order to inculcate ethical practices and inter-personal skills in program graduates, the institute should provide ample opportunities / facilities for extra- and co-curricular activities. Provision of in-door and out-door sports facilities for physical fitness and mental endurance should be ensured. The necessary administrative and financial support should be provided for establishing student clubs, societies, and chapters for various co-curricular activities. These activities are meant to transform the students / graduates into proficient Engineering Technologists

3.2.4.15 Participation in Competitions

Students' participation in national / international specific technology exhibitions and / or competitions not only provides an opportunity to display their projects, exchange ideas and compete with teams from other institutions. It helps to broaden their horizon and provides a platform to the program faculty and administrators to benchmark their program. Winning positions / prizes in such competitions serves to highlight the strong area of the program and builds confidence in the students. Thus, the program should encourage and facilitate participation in such competitions / exhibitions.

3.2.4.16 Alumni satisfaction

This aspect pertains to the opinion of former graduates regarding the quality and adequacy of their education, and that of fresh graduates of the same institution and in the same discipline. The Higher Education Institutions are encouraged to develop a database of outgoing graduates to receive their feedback through the placement bureau and from alumni's associations.

3.2.5 Criterion 5 – Faculty and Support Staff

The faculty strength, qualifications, level of competencies, commitment and attitude play a vital role in the accomplishment of program objectives and outcomes. This in turn, depends upon the recruitment process, incentives, faculty development programs and workload of the faculty. The program must have sufficient number of dedicated full-time faculty members to ensure adequate level of student-teacher interaction, and to provide necessary counseling to students. A viable Engineering Technology program is expected to comply with NTC's / HEC criteria for the minimum number of dedicated program faculty members i.e. 6 (01 Professor, 01 Associate Professor, 02 Assistant Professors and 02 Lecturers) to ensure student teacher ratio 20:1 as also given in (Sec. 1.7). Each technology program should strive for establishing itself independently; for this reason, faculty sharing with other departments should be practiced essentially for the required inter-disciplinary courses. For the same reason, visiting faculty from other academic institutions and/or industry should only be engaged occasionally and that too for teaching specialized / advanced courses. However, the number of such visiting faculty members should be kept to a minimum.

The program faculty must have appropriate qualifications and competencies to cover all areas of the curriculum. The qualifications of the faculty are generally gauged by the advanced degrees held by them, practical experiences and their scholarship and research. It is expected that all teaching faculty shall have at-least postgraduate qualifications, as per the criteria of eligibility set in HEC. A teaching staff with BS level education but having vast industrial experience and proven specialized expertise may be considered as an exception and respected.

The faculty is expected to act not only as instructors and researchers but also as student advisors, faculty mentors, academic planners, curriculum developers, internal auditors; and also occasionally assist in institutional administration. The faculty must demonstrate complete familiarity with Outcome-Based Educational (OBE) approach. They are expected to have the ability/authority required to ensure proper conduct of the program, and to develop/implement processes for evaluation, assessment and Continuous Quality Improvement (CQI) of the program. Their familiarity with the program objectives and outcomes, understanding of the outcome-based assessment cycle, and enthusiasm for developing more effective programs are the key elements to ensure attainment of program objectives.

Employment and retention of qualified faculty and supporting staff is an indication of managements' commitment and seriousness towards institute's mission and program objective. Adequate employment security coupled with salaries and benefits commensurate with position, and periodic evaluation for vertical mobility should be ensured and made known. The institute should implement an effective mechanism for mentoring and academic/professional development of the faculty to ensure their continuity and retention. In addition, some sort of performance appraisal mechanism should also be in place to monitor the continued effectiveness of the faculty and their adherence to program's objective and outcomes. In this regard students documented feedback and teachers' course files could be referred.

The institute should encourage faculty for establishing linkages with industry for bringing in sponsored research projects and securing research grants from sponsoring agencies. Faculty workload should be such that it should not hinder their effective performance in both teaching and research. Besides being adequate in number and qualifications, the faculty members should possess hands-on experience, communication skills, attitude and commitment to program's objectives. There shall also be sufficient, qualified and experienced technical and administrative staff to provide support to meet the program objectives.

3.2.5.1 Academic Structure

The number of faculty members on various professional ranks (i.e. Professors, Associate Professors, Assistant Professors, Lecturers and eminent Educationist & Researcher) within the program should be clearly defined. The institutions are encouraged to determine the number of faculty members on various ranks without a bar on the ratio among different ranks to encourage promotion to deserving candidates. The faculty pyramid provided by HEC should be treated as a guideline specifying the bare minimum number of higher rank positions. The adherence to this bare minimum, however, must be ensured on the least. While observing the mentioned pyramid, the program head of a technology program should possess a PhD degree in relevant discipline coupled with required experience to lead an Engineering Technology program.

3.2.5.2 Full – Time Faculty

This aspect pertains to the full-time program faculty members teaching core Engineering Technology subjects. The absolute minimum number of such faculty members for a program is given in Sec 1.7; however, the actual minimum number of faculty strength (MFS) required for the program is based on the number of sections (considering 45-50 students/section) admitted per year in the program, and is estimated as follows**:-**

For each section admitted per year, there should be at-least 6 faculty members (01 Professor, 01 Associate Professor, 02 Assistant Professors and 02 Lecturers) teaching core subjects. Active engagement in the program requires that the faculty member must be engaged in delivering the program curriculum (not being shared with other disciplines/department) and must have taught at-least 2 course-sections per year to the program's degree students. The request for evaluation / accreditation of the program would not be entertained by NTC unless the program fulfills this minimum faculty requirement. This minimum faculty requirement sets the bare minimum; however, the management should ensure that actual Full-Time Dedicated Faculty (FTDF) members be sufficient in number to ensure adequate level of student-teacher interaction, and to provide necessary student advising/counseling. To achieve this objective, the prescribed student-teacher ratio is 20:1 or better.

For this purpose, faculty members having PhD in the relevant disciplines may also be employed to a maximum of 20% of MFS. Such faculty members should; however, be engaged to teach only those subjects which are relevant to their areas of research and specialization.

In addition to the core teaching faculty, which must hold post-graduate qualifications, the institute/program is encouraged to employ Full-Time academic support staff, in the form of Teaching Assistants (TAs), Graduate Assistants (GAs), and/or Research Associates (RAs) to provide academic support/facilitation to students in the form of extra coaching for theory as well as Research/Lab projects, and holding subject tutorials and/or problem-solving sessions. These TAs/GAs/RAs must be graduates at least. For the purpose of computing student-teacher ratio, these TAs/GAs/RAs would be counted as being equivalent to One-Half, up-to a maximum of 20% of FTDF.

Giving due consideration to the natural mobility of faculty members for various reasons, such as pursuing higher qualifications, availing Post-Doctoral research opportunities and/or seeking better career options, a faculty member who has contributed to teaching for more than a semester and whose timely replacement is made in the relevant field should also be considered in counting towards student-teacher ratio, up-to a maximum of 20% of FTDF. Program faculty which is being shared with other disciplines/departments would be counted as One-Half while computing student-teacher ratio.

3.2.5.3 Shared Faculty

Faculty members who are serving in the same institution as a full-time faculty dedicated to some other programs and are being used to teach subjects related to their disciplines in the under-review program. This would include faculty from other Technology disciplines as well as faculty from departments of Mathematics, Humanities, and Physical and Management Sciences, etc. Shared faculty members engaged for the program

must have post-graduate qualifications. For the purpose of computing student-teacher ratio, shared faculty members would be computed as One-Half, up-to a maximum of 25% of FTDF.

3.2.5.4 Visiting Faculty

A program may occasionally invite qualified and experienced professionals from industry as well as other academic institutions to impart state-of-the-art knowledge and applied skills/techniques to the program students. However, each technology program should strive for establishing itself independently; for this reason, the number of such visiting faculty members should be kept to a minimum and that too for teaching only specialized/advanced-level courses. This number should not exceed 20% of FTDF, further, these visiting faculty members are not counted towards computation of student-teacher ratio.

3.2.5.5 Faculty Qualifications

This aspect pertains to the HEC recognized degrees held by the program faculty. The program faculty must have appropriate qualifications and competencies to cover all areas of the curriculum. The qualifications of the faculty are generally gauged by the advanced degrees held by them, practical experiences and their scholarship and research. It is expected that all teaching faculty must have postgraduate qualifications. A teaching staff with accredited degree and having vast industrial/field experience and proven specialized expertise may be considered as an exception.

3.2.5.6 Student Teacher Ratio

Student-teacher ratio (20:1) generally prescribed as the best practice for the undergraduate programs. The actual number of required faculty will be worked out on this basis. For computing student-teacher ratio, total number of students will be taken as 4-times the number of admission seats per year. In addition to FTDF, TAs/RAs/GAs and shared faculty from other departments/disciplines would be counted as half.

3.2.5.7 Faculty Training and Mentoring

The training and mentoring of the faculty members is important factor for making them more effective in their role as instructors, student advisors, academic planners, and curriculum developers. Senior faculty is expected to undertake the responsibility to guide and help in

providing mentoring support on regular basis. Not only there should be a systematic plan of activities for the training of newly inducted/young faculty members, the institute/program should also devise a strategy to conduct workshops/seminars as a refresher for the existing program faculty.

The faculty must be trained with Outcome-Based Education (OBE) system. Their familiarity with the program objectives and outcomes, understanding of the Outcome-Based Assessment (OBA) cycle, enthusiasm for developing more effective program, and the ability to become an active player in this regard are the keys to ensure the attainment of program objectives. They are expected to have the ability to ensure proper implementation of the program, and to develop processes for evaluation, assessment and CQI.

Following are some of the key points that should be covered during various phases of training.

- Teacher's training program
- Program objectives and outcomes
- Outcome-Based Assessment cycle and its implementation
- General aspects of lectures delivery
- Modes and means of effective student-teacher interaction
- Using quizzes/assignments/exams/projects/viva as effective assessment tools
- Evaluation of assessment results to gauge level of attainment of Course Learning Outcomes (CLOs)
- Preparing and maintaining course files that must cover: course outline, weekly course plan, lecture wise course topics covered, aggregate award list, best, average and worst (quizzes, assignments, mid semester/by annual papers, end semester/annual papers, class attendance), class time table and course completion certificate dully signed by HOD.

3.2.5.8 Faculty Retention, Development and Career Planning

Employment and retention of qualified faculty is an indication of managements' commitment and seriousness towards institute's mission and program objectives. Faculty strength, qualifications, level of competencies, commitment and attitude play a vital role in the accomplishment of program objectives and outcomes. To inculcate a sense of professional satisfaction and commitment to the program among faculty members, adequate employment security coupled with salaries and benefits commensurate with position, and periodic evaluation for vertical mobility should be ensured and made known to the faculty.

The institute should implement an effective planning for academic/professional development of the faculty to ensure their continuity and retention; in addition, Faculty performance appraisal mechanism should be in place to monitor the continued effectiveness of the faculty and their adherence to program's objective and outcomes. Institute should have adequate provisions for scholarships leading to PhD, training and sabbatical leave for Post-doc research to promote professional growth and development. Workload for young faculty enrolled in postgraduate programs should be reduced to compensate their pursuits in their research program.

3.2.5.9 Faculty Workload

This aspect pertains to the extent and nature of workload assigned to faculty members. Faculty workload should be such that it should not hinder in their effective performance in teaching and research. The faculty workload should be an average not to exceed 12-18 hours per week.

3.2.5.10 Faculty Research and Publications

The institute should foster research activities among its faculty members, by supporting participation in national/international conferences, workshops, etc. Faculty members, especially those holding PhDs degrees, should contribute actively in research, and are expected to publish 1-2 research papers each year in reputed national and international journals and conferences. The institute should make provisions in the budget for allocations to participate and organize workshops, conferences, colloquia, etc. Policies for sabbatical leaves and short/summer leaves for the faculty to take-up post-doctoral research assignments at other national / international institutions /organizations should also be made.

The institute should encourage faculty members for establishing linkages with industry to provide consultancy, design services and to provide solutions to their developmental issues. Interaction with industry and sponsoring national/international agencies to attract R&D funding is one of the important factors indicating the dynamism of the program as well as its faculty members. The efforts of faculty members, who secure R&D funds from industry/donors, should be acknowledged in the form of reduced workload and/or financial incentives.

3.2.6 Criterion 6 - Facilities and Infrastructure

The Higher Education Institution shall ensure availability of needed infrastructure i.e. availability of land, buildings, equipment, library, laboratories, workshops, computing facilities, seminar hall, auditorium, playgrounds, hostels, recreational and healthcare facilities, etc. (see annexure 19). In addition, cafeteria, transport, consulting and career placement services should be provided as per requirement for the program. The intention is to make the institution fully aware of present and future needs of the program. An evidence of strong financial commitment and availability of the needed finances for the project has to be ensured.

Similarly the classrooms, offices, laboratories, and associated equipment must be adequate to provide conducive atmosphere to attain Program Learning Outcomes (PLOs). Modern tools, equipment, computing resources, and laboratories appropriate to the program must be available and accessible to faculty and students, and should be systematically maintained and upgraded. Laboratories and workshops should be adequately equipped for experiments and "hands on experience" in the area of the core subjects. Appropriate experimental facilities must be available for students to gain substantial experience in understanding and operating laboratory equipment and conducting experiments. The equipment must be reasonably representative of modern technology practice in-vogue. Where practical work is undertaken at another university, or in industry, arrangements must be such as to provide reasonable accessibility and opportunity for learning and proven evidence of conducting experiments by the students.

Higher Education Institution must also provide safe and secure learning environment to its students and staff members. Strict and extensive safety and security measures must be put in place to avoid any unwanted incident. A well laid disaster plan should be in place in line with government instructions.

Following documentary evidences should be furnished with clear description in self-assessment report by candidate institution for the accreditation / re-accreditation of technology program(s).

i. The adequacy of teaching and learning facilities such as classrooms, learning-support facilities, study areas, information resources (library), computing and information-technology systems, laboratories, workshops, and associated equipment to cater for multi-delivery modes.
ii. Describe the adequacy of support facilities such as hostels, sports and recreational centers, health care centers, student centers, and transport in facilitating students' life on campus and enhancing character building.

The information required vide (i.) and (ii.) above should be provided in the supporting documents but is not limited to the minimum following requirements:

- Master plan of physical facilities
- A summary, in tabulated form, of the lecture hall facilities (give number, capacity, and audio video facilities available) and auditorium
- Details of the Program Laboratories and equipment
- Details of Library, books, journals and access to national and international database
- A summary of recreational, sports facilities and other amenities
- A summary of information on recent / continuous improvements and planned improvements in these facilities
- A summary of Safety and Security measures of all Facilities with disaster plan

3.2.7 Criterion 7 – Institutional Support and Financial Resources

This criterion deals with the financial resources and commitment to support an Engineering Technology program. The Higher Education Institution (HEI) and its Programs operates with integrity to ensure the fulfillment of its mission through transparent management structures including administrative leadership, Faculty, Staff and Students to collaborate, plan, monitor and promote quality offering. Effective planning structure of a program, its committees and policies are widely known and communicated to all stakeholders. Essential governance and management setups like syndicate, senate, academic councils, board of studies, Deans, Chairmen/HoDs, Registrar, Treasurer, controller of examination, director sports and health services etc. should be in place.

Management and administrative structure promote effective leadership and support collaborative planning and participation of faculty in decision making. The program should uphold and protect its integrity through transparent merit based admissions, objective evaluation and quality of curriculum and instruction through regular updating of syllabi and continued professional development of its faculty.

The main objective is to glean and assess the adequacy of these resources in sustaining the program, with a view to its up-gradation and future enhancements. Hiring and retaining qualified faculty members in sufficient numbers is a pre-requisite for a vibrant program. Obviously, this needs continued financial commitment in addition to creating conducive environment. The availability of infrastructure in terms of classrooms, well-equipped labs and well stocked library are also essential requirements. In addition to teaching and learning, the program must demonstrate avenues of R&D pursuits to enable students and faculty transform their innovative and original thinking into practice. The Higher

Education Institutions can also invest various funds available with the institution such as G.P. Fund, Pension, C.P. Fund, Benevolent Fund, income from self-finance, with guaranteed profit scheme and surplus funds available after appropriations etc. The institution may consider initiating the loan scheme to facilitate deserving students. All these activities demand availability of sufficient financial resources and proficient management. (See Annexure 19)

Needless to say, a sound Engineering Technology program must be economically viable to ensure its sustainability and future enhancements. Therefore, it is essential that an institution requesting accreditation of a technology program should provide the requisite information and data to the NTC for evaluating its fiscal details. The clarity and accuracy of the information will facilitate an objective assessment of adherence to this criterion.

The required information comprises income and expenditure details which can be extracted from the approved budgets for the current as well as two previous, but consecutive, financial years. In case of new program, only one or two budgetary figures will suffice i.e. current and future allocation. Institution is required to provide copies of the approved budgets and last-year audited accounts.

3.2.8 Criterion 8 – Continuous Quality Improvement (CQI)

The HEIs / universities / constituent colleges must demonstrate that they regards Quality Technology Education as a significant and long-term component of its activity. This would most commonly be reflected from HEI's Mission Statement and strategic plans. It must have adequate arrangements for planning, development, delivery, review of Engineering Technology programs and staff, and academic and professional development. As stated in earlier paragraphs, the concept of accreditation of an Engineering Technology program is the demonstration of adherence to the laid down criteria of NTC. The weaknesses and non-conformance observed during the last accreditation and evaluation visit must be addressed to remove the deficiencies. Obviously, the subsequent compliance report from the institution should be based on verifiable remedial measures. Prior to its submission to NTC, it is desired that the internal Quality Improvement Committee/Cell (QIC) of the institution should have already confirmed the veracity of the actions taken for CQI.

Continuous improvements are assured only if a proficient closed-loop system is in place. The institution should have well defined process for quality improvement. This aspect deals with the steps taken for improvement of program quality and in particular steps taken in the light of the observations of last accreditation visit. The institution should also provide details of the procedure of internal assessment which is part of the internal quality assessment as part of QEC program. The institutions should demonstrate and provide information and reports that are

prepared for Continuous Quality Improvement related to different Accreditation Criteria described in this manual. For best outcomes, the HEI must involve all stakeholders into the improvement process.

The institution should also provide following documents:-

i. Self-assessment reports on CQI based on Surveys and feedback from the stakeholders
ii. Report of implementation plan based on the observations of last accreditation visit and the remedial actions taken by the institute.

3.2.9 Criterion 9 – Industrial Linkages

This aspect relates to industrial collaboration and linkages of the institution in order to provide opportunity to students for Supervised Industrial / Field Training, consultancy, R&D and exposure to professional practices. A corporate office in the institution for linkage with industry and other organizations is desirable and fruitful. This linkage may also involve sponsored research, initiating joint research projects, conducting short courses, organizing conference, sharing R&D facilities and facilitating student Supervised Industrial Trainings and placement of students after graduation etc. Through a proper Industry Linkage office and marketing strategy, the institution should find the potential beneficiaries of its R&D undertakings to commercialize the scientific know-how for mutual benefits of the user organization (client) as well as the institution itself.

Faculty and Students are expected to undertake assignments through Industrial Liaison office to provide solutions to Complex Engineering Technology Problems. Students and faculty should be encouraged to establish collaboration for R&D and product development related projects, with due regard to environmental and societal impact. Feedback from the industry and employers is crucial and an essential part of curriculum review process used to evaluate attainment of the program objectives.

Chapter 4: Guidelines for Self-Assessment Report

4. Introduction

The Higher Education Institution (HEI) applying for accreditation must submit documents that provide accurate information and sufficient evidence for the purpose of evaluation. For each program to be accredited, unless otherwise stated, the institution shall submit the following documents in hardcopy and in digital form:

i. Self-Assessment Report (SAR)(as per the format described below)
ii. Duly filled Annexures 1 to 18 provided in the Manual.
iii. Supporting Material / Documents

4.1 Self-Assessment Report Format

A Self-Assessment Report is an account of the institution's plan, implementation, assessment and evaluation of the program conducted. It reflects the processes with results obtained, used in continual quality improvement at all levels of the program's activities. This appropriately bound document, with all pages numbered and a table of contents, shall provide the information and description about the program to enable the Evaluation Panel to objectively assess the program for the purpose of accreditation. The emphasis shall be on qualitative description of each aspect and criterion, and how these meet the standards and expectation as set out in this Manual. In other words, this summary document is a form of Self-Assessment of the institution's program.

The general structure of the Self-Assessment Report (SAR) shall conform to the following sections. The institution is advised to provide accurate information hard and soft copy, as detailed and in line with Chapter 3 of this Accreditation Manual.

- Provide general information on the institution and the program specific information
- Provide detailed information on program history of accreditation (year of accreditation, conditions imposed and actions taken)
- Describe any self-initiated improvements made in the program and the year the changes were introduced

4.1.1 Program Educational Objectives

4.1.1.1 State the vision and mission of the institution and/or faculty.
4.1.1.2 Describe the PEOs and state where they are published.
4.1.1.3 Describe how the PEOs are consistent with the vision and mission of the institution and/or faculty and stakeholders' requirements. (as per template Mapping of Vision & Mission with PEOs given in Annexure 1)
4.1.1.4 Describe the processes used to evaluate the achievement of PEOs. (Annexure 2)
4.1.1.5 Describe how the results obtained from evaluation are being used to improve the effectiveness of the program.

4.1.2 Program Learning Outcomes

4.1.2.1 List the PLOs and state where they are published.
4.1.2.2 Describe how the PLOs relate to PEOs (as per template PEOs to PLOs Mapping given in Annex 3).
4.1.2.3 Describe how the PLOs encompass the requirements of Section 3.2.3 of this Manual.
4.1.2.4 Describe the processes used to establish and review the PLOs, and the extent to which the program's various stakeholders are involved in these processes.
4.1.2.5 Describe the mapping of courses with PLOs (as per template Courses to PLOs Mapping given in Annex 4).
4.1.2.6 Describe the data gathered and the results of the assessment of PLOs.
4.1.2.7 Explain how the assessment results are applied to further develop and improve the program.
4.1.2.8 Describe the materials, including student work and other evidence, that demonstrate achievement of the PLOs.

4.1.3 Curriculum and Learning Process

4.1.3.1 Discuss the program structure and course contents to show how they are appropriate to, consistent with, and support the development of the range of intellectual and practical skills and attainment or achievement of the PLOs.
4.1.3.2 Discuss the program delivery and assessment methods and how these are appropriate to, consistent with, and support the development of the range of intellectual and practical skills and attainment or achievement of the PLOs.

The information required in Sec 4.1.3.1 -- 4.1.3.2 should include but is not limited to the following (should include relevant templates given in Annex 2 to 8, where applicable.

- A matrix linking courses to PLOs to identify and track the contribution of each course to the PLOs (as per template Courses to PLOs Mapping given in Annex-4)
- Details of system of instruction, examination and grading system (as per template System of instructions and grading system given in Annex 5 & 6)
- Distribution of the Technology courses according to areas specific to each program (as per template Curriculum Design given in Annex-8)
- Distribution of the related non-engineering (general education) courses
- Distribution of the courses offered according to semester (as per template Course Offerings given in Annex-9)
- Details of Laboratory equipment / workstations and experiments conducted (as per template Lab and Lab Work given in Annex-7)
- Details of Supervised Industrial / Field Training Program and formal method of feedback from employer

4.1.4 Students

4.1.4.1 Discuss the requirement and process for admission of students to the program, response and annual intake (as per template students Admission and enrolment given in Annex-10).

4.1.4.2 Discuss the policies and processes for credit transfer/exemption.

4.1.4.3 Discuss mechanism for providing guidance to students on academic, career and aspects pertaining to wellness.

4.1.4.4 Discuss students' workload, class sizes for theory as well as laboratory sessions and completion of courses.

4.1.4.5 Discuss students' activities and involvement in student organizations that provide experience in management and governance, representation in education and related matters and social activities.

4.1.4.6 Discuss Key Performance Indicators (KPIs) to demonstrate students' performance in relation to PLOs.

4.1.5 Faculty and Support Staff

The information required in Sec. 4.1.5.1 – 4.1.5.4 should include relevant templates, faculty strength, faculty summary and faculty loading given in annexures 11 to 15, where applicable.

4.1.5.1 Discuss the strength and competencies of the academic staff in covering all areas of the program, and in implementing the outcome-based approach to education.

4.1.5.2 Discuss how the overall staff workload enables effective teaching (including student-teacher ratio), student-staff interaction, student advising and counseling, institutional service and research activities, professional development and interaction with industry.

4.1.5.3 Discuss processes for faculty development, training and retention.

4.1.5.4 Discuss the sufficiency and competency of technical and administrative staff in providing adequate support to the educational program.

4.1.6 Facilities and Infrastructure

4.1.6.1 Discuss the adequacy of teaching and learning facilities such as classrooms, learning-support facilities, study areas, information resources (library), computing and information-technology systems, laboratories and workshops, and associated equipment to cater for multi-delivery modes.

4.1.6.2 Describe the adequacy of support facilities such as hostels, sport and recreational centers, health centers & hospital linkages, student centers, and transport in facilitating students' life on campus and enhancing character building.

The information required in Sec 4.1.6.1 -- 4.1.6.2 should include but is not limited to the following:

- A summary of the lecture facilities (give number, capacity, and audio video facilities available)
- A summary of the laboratories (list down the details of workstation available in each laboratory)
- A summary of the workshops (list down the equipment/machinery available in each workshop)
- A summary of the computer laboratories (list down the hardware and software available)
- A summary of recreational facilities
- A summary of the Library resources (list down number of relevant books, journals, magazines, subscription to online portals)
- A summary of arrangements made/measures taken to ensure workplace safety (list safety and security measures, disaster plan)
- A summary of information on recent improvements and planned improvements in these facilities

4.1.7 Institutional Support and Financial Resources

4.1.7.1 Describe the organizational structure of the HEI

This aspect pertains to essential governance and management structure like senate, councils, committees, board, chairman/principal/deans/HoDs, registrar, controller of examination, treasurer, Director Sports and health etc. (Organogram)

4.1.7.2 Administrative and academic powers given to essential organs above

4.1.7.3 Discuss institution's financial commitment and support to sustain and enhance the quality of program. Also summarize the salient features in a tabular form (as per the templates, University income generation, operational budget and development budget given in Annex-16 to 18).

4.1.8 Continuous Quality Improvement (CQI)

4.1.8.1 Discuss the mechanism for the following: program planning; curriculum development; curriculum and content review; responding to feedback and inputs from stakeholders including industry advisors, students and alumni; tracking the contribution of individual courses to PLOs; tracking outcomes of performance through assessment, including rubrics; reviewing of PEOs and PLOs; and Continual Quality Improvement.

4.1.8.2 Discuss the implementation plan based on the observations of the last accreditation visit and the remedial actions taken.

The information required in Sec 4.1.8.1 -- 4.1.8.2 should include but is not limited to the following:

- Evidence on the participation of faculty members and support staff as well as students in the continual quality improvement process
- Evidence on the development of academic staff through opportunities in further education, industrial exposure, as well as research and development
- Policies, internal processes and practices that are in place at all levels within the institution relating to the accreditation criteria as stated in Chapter 3 of this Manual.

4.1.9 Industrial Linkages

4.1.9.1 Discuss the involvement of industry in discussions and forums, professional practice exposure, and collaborative projects / research for the solutions to Technology problems, curriculum development and its contents review.

- Existence of active industrial advisory board / committee / industrial liaison office
- Formal mechanism of industrial linkage and development program

Mapping of Vision & Mission with PEOs

Annexure 1

Vision & Mission	PEO 1	PEO 2	PEO 3	PEO 4	-
University Vision: **Improving lives**[2,4] through **learning**[1,3]	√	√	√	√	-
University Mission: Promotes excellence in **lifelong learning**[3,4], **focuses on student success**[1] and **community needs**[2]	√	√	√	√	-
Program Mission: The program creates **solid base of Mechanical Engineering Technology knowledge**[1], prepares students to **perform well in industry**[2,4] and creates interest to **excel in life**[3]**.**	√	√	√	√	-

PEO 1	Will have demonstrated knowledge of Mechanical Engineering Technology appropriate for career pursuits and workplace needs.
PEO 2	Will have the ability to understand, diagnose , communicate and provide solutions to technical problems/situations for the benefit of the society
PEO 3	Will demonstrate the intellectual curiosity to actively pursue the acquisition of new knowledge and skills necessary to refine and improve his/her abilities to contribute to the Technology domain
PEO 4	Ethical commitment that allows them to deal successfully with social, technical and professional situations in their lives and work.

NOTE: **The above mentioned mapping of PEO to Vision and Mission of University is given as example. However, the HEI must align its own Vision, Mission and Program Education Objectives (PEOs), and map them accordingly**
HEI must ensure that Program Objectives are align with Program Mission and Institutes Vision and Mission (Ref 3.2.2)

Annexure 2

Program Education Objectives Assessment

Program Education Objectives (PEOs)	Strategy	Key Performance Indicators (KPI)	When Measured
PEO 1	Employment data (Gov/NGOs)	Government data shows 65 % employed (career pursuits and have attained subject knowledge)	Data updated once/twice a year
	Employers survey	Employer feedback about PEO 1 is 60 %	Feedback collected each year
	Alumni data	Alumni data (portal/meeting) about PEO 1 is 75%	Data updated every 6 months
	Alumni survey	Alumni survey about PEO 1 is 70 %	Feedback collected each year
PEO 2	**-**	**-**	**-**
PEO 3	**-**	**-**	**-**
PEO 4	**-**	**-**	**-**
-			

Note: Data for PEO 1 is given as example and HEI must use its own strategies to measure KPIs

Program Education Objectives (PEOs) to Program Learning Outcomes (PLOs) Mapping

Annexure 3

Program Learning Outcomes (PLOs)/ Graduate Attributes	**Program Education Objectives (PEOs)**					
	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	-
PLO 1						
PLO 2						
PLO 3						
PLO 4						
PLO 5						
PLO 6						
PLO 7						
PLO 8						
PLO 9						
PLO 10						
PLO 11						
PLO 12						

***For detail explanation regarding Program Education Objectives (PEOs) and Program Learning Objectives (PLOs) please refer to chapter 3.2.2 and 3.2.3 of this manual**

****Rating level: No Emphasis = 0, Very little Emphasis = 1, Moderate Emphasis = 2, Strong Emphasis = 3**

Annexure 4

Courses to Program Learning Outcomes (PLOs)

Sem. No	Course Code	Course Title	Level of Emphasis of (PLOs) (0:No to 3:Strong**)											
			PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
1														
2														
3														
4														

Annexure 4

Courses to Program Learning Outcomes (PLOs)

Sem. No	Course Code	Course Title	Level of Emphasis of (PLOs) (0:No to 3:Strong**)											
			PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
5														
6														
7														
8														

***For Program Learning Outcomes (PLOs) details, please refer to 3.2.3 of this Manual**

****Rating level: No Emphasis = 0, Very little Emphasis = 1, Moderate Emphasis = 2, Strong Emphasis = 3**

Annexure 5

Sr. No	System of Instructions and Examinations				
1	Nature of Academic Sessions	a) Annual	b) Term	c) Semester	d) Quarter
2	No of sessions in the program				
3	Duration of a session (in weeks)	Teaching:		Total:	
4	Total no of courses in the program				
5	No of courses in session	Min:		Max:	
6	Total contact hours for a theory course per session				
7	Total contact hours for a practical course per session				
8	Weekly contact hours for a theory class				
9	Weekly contact hours for a Practical class				
10	Attach academic calendars (for current and previous year)				
11	Attach classes schedule/ Time Table				
12	Attach grade sheet for last One year (All batches)				

Annexure 6

Grade sheet

Intake Batch _____

Session (term/Semester/Year) _____

			No. of Students Securing Grades (or %age Ranges, i.e. >90, 80-90, 70-80, 60-70, 50-60, 40-50, <40)								
Sr. No	**Course Name**	**Total**	**A+**	**A**	**B+**	**B**	**C+**	**C**	**D+**	**D**	**F**

*** HEI can provide information regarding grading system based on its grade categories i.e. 5, 7 or 9 grade categories**

Annexure 7

Laboratories & Lab Work

Number of Total Engineering Technology + Computing Courses _____

Number of Lab Courses _____

Number of Laboratories _____

Attach Lab Commitment Charts for each Lab (for current & the previous Semester/Term)

Attach list of Experiments and name of Instructor(s) for each Lab course (for current and previous Semester/Term)

Sr. No	Name of Laboratory	Staff Name with Qualifications	Lab(s) of Course(s) Conducted in the Lab	Type(s) of Workstations (No of each type)	Nature of experiments Demo/Hands-on	No of students/ workstation

Curriculum Design

Annexure 8

Domain	Knowledge Area	HEC Recommended		Institute's Program Breakup	
		Total Credit	Overall %	Total Credit	Overall %
Related Subjects			30%		
	Sub Total				
Core Technology Subjects			70%		
	Sub Total				
	Total	130 - 140	100%		

Course Offerings

Annexure 9

Year/Semester/Term/Quarter (Provide data for all sessions)

Year/ Sem. No	Sr. No	Course Code	Course Title	Credit Hours	Knowledge Area	Pre – Requisite Courses (if any)

Course Offerings

Annexure 9

List of Electives (separate for each Area of Specialization offered)

Year/ Sem. No	Sr. No	Course Code	Course Title	Credit Hours	Knowledge Area	Pre – Requisite Courses (if any)

Annexure 10

Students Admissions and Enrolment

Sr. No	Intake Batch	Total Applicants	Total Admissions Offered	Total Student Admitted	Present Strength	No of Section (s)
1	Fall 2017					
2	Fall 2016					
3	Fall 2015					
4	Fall 2014					
	Total					

Annexure 11

Faculty Strength
List of Full Time Departmental Teaching Faculty (Sorted by Designation)

Sr. No	Name	Professional Registration	Designation	Joining Date	Details of qualifications			Specialization	Experience Teaching/ (Total) years	Dedicated / shared	Cr. hours taught in the current and last semesters	
					Degree	Year	Institute				MS	BS
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							

Annexure 12

Faculty Strength

List of Part Time/ Visiting Teaching Faculty from other Departments/organizations

Sr. No	Name	Professional Registration	Designation	Joining Date	Details of qualifications			Specialization	Experience (Teaching/ Total) years	Dedicated / shared	Cr. hours taught in the current and last semesters	
					degree	Year	Institute				MS	BS
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							

Annexure 13

Faculty Strength

List of Full Time Lab. Technologists and Teaching Assistants

Sr. No	Name	Professional Registration	Designation	Joining Date	Details of qualifications			Specialization	Experience (Teaching/ Total) years	Dedicated / shared	Lab Conducted (Contact Hours)	
					degree	Year	Institute				Current Semester	Last Semester
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							
					PhD							
					MS							
					BS							

Faculty Summary

Annexure 14

Present Faculty

	Faculty Teaching Core Technology Subjects			Faculty Teaching Non-Technology Subjects		
	Bachelors	Masters	Doctorate	Bachelors	Masters	Doctorate
Dedicated Faculty (Departmental)						
Shared Faculty (departmental)						
Shared Faculty (from Other Departments)						
Visiting Faculty						

New inducted Faculty members

Since last NTC visit

Bachelors	
Masters	
Doctorate	

Faculty at the time of last visit

	Faculty Teaching Core Technology Subjects			Faculty Teaching Non-Technology Subjects		
	Bachelors	Masters	Doctorate	Bachelors	Masters	Doctorate
Dedicated Faculty (Departmental)						
Shared Faculty (departmental)						
Shared Faculty (from Other Departments)						
Visiting Faculty						

Faculty member who left since last NTC visit

Bachelors	
Masters	
Doctorate	

Annexure 15

Faculty Loading

List the faculty members in the same sequence as listed in Faculty Strength sheet

Sr. No	Name	Degree	Current Semester Loading			Last Semester Loading		
			Credit Hours		Course Titles	Credit Hours		Course Titles
			Theory	Practical		Theory	Practical	
		PhD						
		MS						
		BS						
		PhD						
		MS						
		BS						
		PhD						
		MS						
		BS						
		PhD						
		MS						
		BS						
		PhD						
		MS						
		BS						
		PhD						
		MS						
		BS						
		PhD						
		MS						
		BS						

University Income Generation Details

Annexure 16

Sr. no	Source of Income	Previous year Rs in Million	Current year Rs in Million
1	HEC Grants		
2	Tuition Fees		
3	Self-finance scheme		
4			
5			

Annexure 17

Breakup of the Operational Budget for the Program

Budget Heads	Previous year	Current year		Next year
	Expenditure Rs in Million	Allocation Rs In Million	Expenditure Rs In Million	Estimated Expenditure Rs In Million
Salaries				
Library				
Laboratories				
Teaching Aids				
Extra-curricular activities				
Field visits				
Training				
Cost per student				
CPD				
Seminars				
Scholarships				
Others				
G. Total				

Breakup of the Development Budget for the Program

Annexure 18

Budget Heads	Previous year	Current year		Next year
	Expenditure Rs in Million	Allocation Rs In Million	Expenditure Rs In Million	Estimated Expenditure Rs In Million
Development Budget				
1. Launching of New program (If planned)				
2. Establishment and expansion of Laboratories				
3. Addition of new books in the library				
4. Infrastructure – Additions / Expansion				
Others				
G. Total				

Annexure 19

General Criteria / Norms for the Establishment
Of Higher Education Institution

Component	Nature of Requirement	Standard / Norms
Department	Departments (Electrical, Mechanical, Civil, Chemical etc.)	Minimum 4 department in case of an institute
	Teachers: student Ratio (desirable)	1:20 (maximum for science subjects involving lab work
	No of administrative staff including laboratories, library and other staff for miscellaneous duties	1:2 ratio of administrative staff to teaching staff
Teaching Faculty	Teachers	At least 24 full time teachers (at least 6 per department)
	No of teachers (full time)required (cadre wise) per department	Professor = 1 Associate Professor = 1 Assistant Professors = 2 Lecturers = 2
	Associate Professors and Professors	Must be holders of Ph.D. Degree. This condition would not be a pre-requisite in case of professional institutions such as law, fine arts.

Annexure 19

Component	Nature of Requirement	Standard / Norms
Library	Journals	Subscription to at least 15 current journals of international repute with impact factor of at least 1.00. Access to electronic journals to be also provided
	Books required	At least 1500 books from major international publishers in the relevant field
Facilities	Hall / Lecture theatres (desirable)	Minimum of 12 to 15 sq. ft. per student
	Number of rooms required (desirable)	2 lecture rooms per department, 1 Seminar room, 1 Library cum reading room, 1 committee room
	Teaching and administrative staff (facilities Required for each Institute)(desirable)	1 staff room, 1 faculty office for each department
	Number of Laboratories required	At least 1 Lab per Core Subject with appropriate equipment & space
	Workshops (desirable)	35 to 45 sq. ft. per student
	PC (desirable)	1 for 3 students in case of IT courses
	Internet services (desirable)	1Mb access rate shall be provided

Annexure 19

Component	Nature of Requirement	Standard / Norms
Gross Area	Area in acres	For minimum 4 departments: 10 acres [3 acres in city & 7 acres on city fringes] depending upon the location having potential for further development. Virtual universities shall be excluded from the condition of land For minimum 1 department: 3-1/3 acres at least (depending upon the location having potential for further development
	Built-in / Covered Area	Minimum 100 sq. ft. per student
	General facilities: office, staff rooms, cafeteria, reading room, auditorium, committee room, conference room, housing for staff, parking space, and toilets etc.	Basic facilities for staff and students
Hostels (desirable)	Cubicles (desirable)	Min: 80 Max: 120
	Dormitories (desirable)	Min: 50 Max: 80
	Dinning (desirable)	Min: 8 - 10 Max: 12 – 15
	Gross Space (desirable)	Min: 200 Max: 250

Annexure 19

Component	Nature of Requirement	Standard / Norms
Scholarships	Scholarships and free – ships	At least 10% of the students to be given scholarships
Research	Funding of research	10 % of the institutional budget to be specified for research
Inspection	Peer review	1 scientist having impact factor of at least 1.00. will be associated in the inspection of the institution for NOC
Rating	Star system	Higher Education Commission (HEC) shall carry out rating exercise of private universities and grant star system based on their performance and excellence. The information shall be made public for general awareness
Accreditation		Accreditation of programs shall be done by the respective councils
Finances	Endowment Fund (Secured in the name of Trust / Society)	For 04 departments: Rs. 50 million (not applicable in case of public sector university) For 01 department : Rs. 15 million

Annexure 19

Component	Nature of Requirement	Standard / Norms
Finance	Tangible assets in the form of land / building etc.	For 04 departments: Rs. 100 million For 01 department: Rs. 25 million
	Working capital	For 04 departments: Rs.50.0 million (not applicable in case of public sector university) For 01 department: Rs. 10 million
	Total :	For 04 departments: Rs. 200 million For 01 department: Rs. 50 million