INSTITUTION OF ENGINEERS,

SRI LANKA

ACCREDITATION MANUAL FOR ENGINEERING DEGREE PROGRAMMES (ACCORDING TO WASHINGTON ACCORD)

August 2021

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1 INTRODUCTION

The Institution of Engineers, Sri Lanka (**IESL**) oversees the Engineering Profession in Sri Lanka, and in accordance with its Charter and provisions of the Act No. 17 of 1968 is empowered to admit to membership, classify and confer titles indicating the professional standing of its members. In fulfilment of its Charter obligations, the **IESL** has been responsible for the accreditation of engineering education programmes in Sri Lanka and in providing consultative feedback on the development of engineering education programmes comparable to global practices.

The Institution of Engineers, Sri Lanka evaluates undergraduate engineering degree programmes and accords accreditation in accordance with established criteria and procedures, through the Institution of Engineers Sri Lanka, Accreditation Board.

This manual outlines the criteria and procedures for accrediting an engineering degree programme conducted in Sri Lanka, by the Institution of Engineers, Sri Lanka.

1.1 Definitions

1.1.1 General

AEP – Accreditation Evaluation Panel: A team of evaluators appointed to undertake accreditation activities

Associate Member – An Associate Member is an Engineer registered at **IESL** in that category of membership, and possesses a four year full-time degree in engineering recognized or accredited by the Institution or an equivalent qualification acceptable to the Council.

Chartered Engineer – A Chartered Engineer is an Engineer registered at **IESL** as a Corporate Member. A Chartered Engineer is capable of assuming personal Professional Responsibility for the analysis and application of Engineering principles in the fundamental processes of Investigation, Planning, Design, Construction, Operation, Maintenance, Management and Development of Engineering works or plant, or in Engineering Research and/or Engineering Education

Council – The Council of the **IESL**

IESLAB – The Institution of Engineers, Sri Lanka Accreditation Board

IESL – The abbreviation used for **The Institution of Engineers**, **Sri Lanka**, incorporated by Act No. 17 of 1968 and amended by Act No. 3 of 1996.

1.1.2 Higher Education Provider / Higher Learning Programme

Academic staff – The staff responsible for teaching in the programme leading to the award of the degree

Assessment – Judgement of a student's work by the **HEP**

Degree – A graduate level engineering qualification in Sri Lanka normally titled 'Bachelor of the Science of Engineering'

Department – The entity responsible for the design and conduct of the programme to be accredited

Evaluation – Judgement of the engineering programme by the **HEP** or its appointed agency

External Reviewer – A suitable person with high academic standing outside the **HEP**, who scrutinises and reports on the curriculum, including programme contents, staff quality, assessment methods etc. as given in `Appendix E` to this document.

Faculty – The entity responsible for administration and conduct of different engineering education programmes at the **HEP**

GA – Graduate Attributes

HEP – Higher Education Provider: A provider of higher learning, authorised by legislation (either directly or indirectly) to award engineering degrees

ICP – Industry Consultative Panel: a body consisting of professionals from industries, government, professional organisation, regulatory, alumni etc., appointed by the **HEP** to ensure the programme's relevancy to the stakeholders' needs

LO – Learning Outcomes

OBE – Outcomes Based Education

PEO – Programme Educational Objectives - what graduates are expected to attain within a few years of graduation.

PLO/PO – Programme Learning Outcomes/Programme Outcomes - narrow statements describing what students are expected to know and able to do by the time of graduation.

Programme – The sequence of structured educational experience undertaken by students, leading, on completion and on satisfactory assessment of performance, to the award of an engineering degree

Stakeholders – All groups with key interest in engineering education and its outcome

Visiting staff – Staff from other **HEP** and/or practising engineers giving instructions on a part-time basis

WA – Washington Accord

2 PURPOSE OF ACCREDITATION

Engineering education provides the learning base on which each engineer's professional career is built. The regulatory body of the engineering profession requires its members to have competence in engineering, as well as an understanding of the effects of engineering on the society and the environment. The purpose of accreditation is to ensure that the engineering education programme concerned fulfils the basic academic requirements needed for an individual who successfully completes the programme to register with the Institution of Engineers as an Associate Member. The process of accreditation places emphasis on the quality of the students, academic staff, support staff, teaching and learning facilities, and environment and the quality assurance systems of the programme. It is a process that expects continual improvement of the programmes.

Accreditation thus provides awareness to the public about engineering education programmes that guarantees gaining entry into the engineering profession, while also giving an assurance to prospective students on the acceptance into the profession on successful completion of the degree. It also gives a feedback to the higher education provider on the minimum requirements of a graduate engineering education programme and the level of resources reasonably needed to meet these requirements.

Accreditation also provides a basis for international comparability, recognition and graduate mobility.

2.1 Institution of Engineers, Sri Lanka Accreditation Board (IESLAB)

The policy on accreditation of professional engineering education programmes is laid down by the **IESL** and may only be altered by the **IESL**. Implementation of this policy is the responsibility of the Institution of Engineers, Sri Lanka Accreditation Board.

2.1.1 Composition of Institution of Engineers, Sri Lanka Accreditation Board (IESLAB)

The Board comprises representatives of both the academia and the industry. The Composition of the Board, as stipulated in the Bylaws of the **IESL** (Bylaw 119 and 120) is given below. All members other than the ex-officio members are appointed by the Council of the Institution of Engineers, Sri Lanka. In appointing the members of the Board, the Council shall confine the membership to Chartered Engineers as far as possible, except when such persons are not available within the represented organisation and shall maintain a reasonable spread of various expertise across different branches of engineering.

(i) The Chairman, an eminent Practitioner/Teacher in engineering to be nominated by the Council of the Institution from a panel of three eminent Practitioners/Teachers proposed by a committee appointed by the Council of the Institution.

(ii) The President of the Institution of Engineers, Sri Lanka who will be an ex-officio member of the Board for the duration of the period of his/her term of office.

(iii) The Immediate Past President and the President-Elect shall be ex-officio members of the Board during their terms of office in those capacities.

(iv) Seven (7) Corporate Members of the Institution who shall be not below the rank of Senior Lecturer Grade 1, nominated by the Council of the Institution, out of which one each shall be from among the academic staff members of the Engineering Faculties of the University of Peradeniya, University of Moratuwa and University of Ruhuna and from the Faculty of Engineering Technology of the Open University of Sri Lanka and one each of the remaining three (3) from among the academic staff members in the field of engineering of any other Institute (State or Private) conducting a four year full-time Engineering Degree Programme recognized by the Institution.

(v) Six (6) Corporate Members of the Institution from the industry and nominated by the Council of the Institution.

(vi) Two (2) Corporate Members of the Institution who are Professors / Emeritus Professors and nominated by the Council of the Institution.

(vii) Member of the University Grants Commission who is in-charge of the Standing Committee relevant to engineering

2.2 Terms of Reference

The Terms of Reference of the **IESLAB** are as given below:

- To assist the **IESL** in formulating and updating accreditation policies and criteria.
- To make, and amend guidelines and operating procedures for accreditation.
- To oversee all operational arrangements and to appoint the evaluation panels.
- To evaluate undergraduate engineering degree and engineering technology degree programmes conducted in Sri Lanka for accreditation purposes in accordance with established criteria and procedures.
- To respond to any complaints or appeals concerning the accreditation process, and to any proposals for change.
- To evaluate and recommend actions for implementing and maintaining international accreditation agreements.
- To report periodically to the Institution on its work, and when appropriate, recommend changes to the Institution's policy on accreditation.
- To foster dissemination of developments and best practices in engineering education.
- To advise the **IESL** on public statements or representations that should be made in relation to engineering education.
- To advise and assist Sri Lankan Higher Education Providers in reviewing and making improvements to engineering degree programmes.
- To collaborate with other standing committees of the **IESL** on issues of mutual interest.

2.3 Accreditation Evaluation Panel

An evaluation panel is appointed by the **IESLAB** for the purpose of carrying out the accreditation of a programme seeking **IESL** accreditation.

The panel shall include at least two members with extensive academic experience and one member with extensive experience in employing practising graduate engineers. All of the panel members, especially those from industry, should be Chartered Engineers; this condition can be relaxed where necessary for those from academia.

Two alternatives for the composition of the Evaluation Panel are available. In both alternatives, the Evaluation Panel(s) will be supported by a representative of the Director, Accreditation.

Alternative 1: Panel Composition when evaluating one study programme
The Evaluation Panel will consist of:

- A chairperson, who is a member of the **IESLAB** or a senior academic, who will chair all sessions and be responsible for the report of the evaluation Panel
- One international Panel member from the academia of study programmes from Washington Accord signatory countries, from the broad discipline of the study programme being evaluated.

- Two other members typically chosen in accordance with their broad experience in engineering and their ability to evaluate generic programme outcomes and quality systems.

Alternative 2: Panel Composition when evaluating more than one study programme
The Evaluation Panel will consist of:

- A chairperson, who is a member of the **IESLAB** or a senior academic, who will chair all sessions common to all study programmes during the visit, such as the meetings with the Vice Chancellor, Dean and programme leaders, and be responsible for the reports of the evaluation Sub-Panels
- Three members for each discipline of study being evaluated, typically chosen in accordance with their broad experience in engineering and their ability to evaluate the generic programme outcomes and quality systems.
- Total number of members in a Panel appointed to evaluate 'N' number ($N > 1$) of study programmes would be ($3N + 1$), out of which at least two should be international Panel members from the academia of study programmes from Washington Accord signatory countries, preferably from two of the broad disciplines of study programmes being evaluate.
- The Panel will divide into sub-panels discipline-wise, during the site visit, when meetings are being held with the academic staff, students, alumni and employers of respective study programmes. There should be separate Self-Assessment-Report for each study programme.

However maximum number of programmes to be evaluated concurrently by a panel will be decided by **IESLAB**.

3 ACCREDITATION

Accredited Degree – A degree evaluated under the criteria stipulated in this Accreditation Manual, and found to be acceptable for the specified period by the **IESLAB** and approved by the Council. Graduates of such degree programmes are deemed to have fulfilled the academic requirements for registration as Associate Members and Chartered Engineers of the **IESL**. Such graduates are recognized as having academic qualifications equivalent to accredited Engineering Degree programmes in other Washington Accord member countries, as long as **IESL** remains a signatory of the Washington Accord.

Recognized Degree – A degree evaluated under the criteria stipulated by the Education Standing Committee of the **IESL** and found to be acceptable for the specified period and approved by the Council. Graduates of such degree programmes are deemed to have fulfilled the academic requirements for registration as Associate Members and Chartered Engineers of the **IESL**.

Full Accreditation – A programme that fully satisfies the minimum standards for accreditation set out by the **IESL**. Full accreditation in respect of programmes that have sought re-accreditation is normally given for a period of five (5) intake years. In case of programmes that are being accredited for the first time, this period of accreditation will cover a maximum of ten (10) intake years to cover retrospectively the last 5 batches that have been taken in at the time of accreditation visit (provided there have been no major changes to the programme) and up to another 5 batches that will be taken in after the accreditation visit.

Conditional Accreditation – Where there are minor shortcomings in meeting accreditation requirements, the programme may be given conditional accreditation to cover not more than two (2) intake years. The **HEP** must take necessary corrective measures to fulfil the conditions as stated in the Accreditation Report to ensure continuation of accreditation. If there are any graduating students of the intake years given conditional accreditation during the period of corrective action, they will be considered as holding accredited degrees. (*This situation would arise for new programmes being accredited for the first time*). However, if the programme fails to fulfil the conditions within the stipulated time period, accreditation will be declined until corrective action is implemented satisfactorily, and the programme is to undergo re-accreditation.

Decline Accreditation – A programme that does not meet the minimum requirements for accreditation set out by the **IESL**, and there are major shortcomings in meeting the requirements, will be declined accreditation and the **HEP** will be informed about the specific deficiencies to be rectified before re-applying for accreditation.

Terminate Accreditation – Accreditation of an already accredited programme may be terminated

(i) if the programme has undergone changes that would result in major shortcomings

(ii) if **HEP** fails to meet the conditions imposed at the time of granting conditional accreditation

(iii) if the **HEP** has provided false information to the **IESL** at the time of granting accreditation

4 ACCREDITATION POLICY

Accreditation of a degree programme is a quality assurance mechanism which will contribute towards the continuous improvement of the programme. Only the programmes will be accredited but not **HEP**s that offer programmes. However, the process of accreditation will consider the **HEP** in terms of its overall philosophy, objectives and resources taking into account the principles and policies for the development of engineering education by the **HEP** concerned.

Accreditation visits are an important and integral part of an accreditation process. They provide Institution of Engineers, Sri Lanka Accreditation Board (**IESLAB**), a first-hand assessment of curriculum and qualitative factors, such as facilities, intellectual environment, morale, professional attitudes and the quality of academic and support staff, students and quality management system as set out in this manual.

The **IESLAB** does not impose uniformity on higher education providers (**HEP**s) in relation to curricula and syllabuses, but encourages them to develop courses and modules making the best use of resources, responding to academic and technological advances, while recognizing the needs of the students, community and profession.

Module sequences in the curriculum must provide for breadth and depth appropriate to the discipline, with the prerequisites.

The quality of an engineering degree programme depends on more than just the curriculum and syllabus as indicated below.

4.1 The Learning Environment

In the accreditation process emphasis is given to the qualitative evaluation of not only the programme of education, but also the overall environment in which the programme is conducted. In the latter, the quality of the learning experience is reflected by the quality, morale and commitment of the academic staff, support staff and the students, and the quality of teaching facilities such as laboratories, the library and the computing facilities available to students. The number of academic staff devoted to the programme, including part-time visiting staff, must be adequate to effectively cover all of the curricular areas of the programme. There must be a sufficient number of full-time academic staff to ensure adequate levels of student-staff interaction, student counselling and the development and administration of the curriculum.

4.2 Exposure to Professional Engineering Practice

It is expected that the students are continually exposed to professional engineering practice throughout the programme of engineering education to enable them to develop an engineering approach and to learn to appreciate professional engineering ethics. In order to obtain this exposure, the programme of engineering education must specifically include a combination of the following:

- Use of staff with industry experience
- Practical experience in an engineering environment outside the teaching establishment
- Mandatory exposure to lectures on professional ethics and conduct
- Use of guest lecturers from industry
- Use of industry visits and inspections
- An industry-related project, particularly in the final year.

4.3 Quality of Graduates

The quality of the graduates is an important consideration in the evaluation of a degree programme in engineering. The degree programme must define expected programme learning outcomes (PLO) from their graduates consistent with their programme educational objectives (PEO) according to the needs of the discipline. The processes that are used to measure and evaluate these outcomes must be described.

The academic environment, calibre of the academic staff, the entry standards, staffing levels, teaching methods, facilities such as library and independent study rooms, funding, quality management systems and methods of assessment are some of the factors which influence the quality of the educational experience and the outcomes.

The major emphasis of the **IESL** accreditation process is to measure the PLO or learning outcomes of the programme that is being accredited. Programme learning outcomes (PLOs) are a range of skills and knowledge that a student will have at the time of graduation from the programme.

Engineering programmes must demonstrate that their graduates possess the **IESL** graduate attributes (GA) which are consistent with the Washington Accord (WA) requirements.

Assessment of student performance should demonstrate the effectiveness of the learning process in achieving the programme learning outcomes (PLOs). Also there should be an effective internal quality management system, an external review and benchmarking of the programme against those of reputed overseas universities to maintain the academic standards of programmes.

This Manual is exclusively prepared for Accreditation of programmes leading to an undergraduate degree in Engineering of four year full time or equivalent in duration. All such programmes will be evaluated for accreditation using this Manual. In the case of part time programmes or programmes employing non-traditional modes of delivery such as distance learning and alternative teaching and learning delivery strategies based on information technology, the onus will be on the HEP to demonstrate that the programme duration meets the **IESL** requirement of four years or equivalent.

Accreditation is voluntary and collaborative. The accreditation evaluation will be undertaken only after receiving a written request by the **IESL** for same from the **HEP** conducting the programme. The programme seeking accreditation will be evaluated by an **AEP** appointed by the **IESLAB** against the established accreditation criteria set out in this manual. Accreditation for the programme will be granted if it satisfactorily achieves the minimum requirements specified. All routes leading to the completion of the programme including part-time programmes may also be accredited along with the regular full-time programme if they have the same programme outcomes, curriculum, laboratory facilities and physical learning environment, quality assurance and the same standards of grading. However, in such situations separate applications should be submitted in respect of each such programme as per the Section (6.1) of this manual. Accredited degree programmes will be identified by the intake years.

Any changes made to an accredited programme in respect of its title, programme outcomes, content, mode of delivery, duration, specializations etc., shall be informed to the **IESL** for its approval, before implementing by the relevant **HEP**, if the accreditation status is to remain unchanged.

The list of accredited degree programmes are posted on the **IESL** website and will be regularly updated.

The **IESL** will ensure, through the process of accreditation, that the graduates from the accredited programme/s have acquired the generic attributes listed in Section (4.4), and that they will therefore be adequately prepared to enter the profession and practise engineering at professional level. The programme learning outcomes of each programme have to be consistent with these graduate attributes.

4.4 Generic Attributes of an Engineering Graduate

Engineering Knowledge	– Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.[1]
Problem Analysis	– Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
Design / development of solutions	– Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

[1] Definition of 'complex engineering problems' is provided in `Appendix F` in the table titled 'Range of Problem Solving'

Investigation	–	Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
Modern Tool Usage	–	Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations.
The Engineer and Society	–	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.
Environment and Sustainability	–	Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts.
Ethics	–	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
Individual and Team work	–	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
Communication	–	Communicate effectively on complex engineering activities[2] with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
Project Management and Finance	–	Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
Lifelong Learning	–	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadcast context of technological change.

Full list of the International Engineering Alliance Graduate Outcomes Exemplar Statements is in `Appendix F`.

4.5 Qualifying Requirements for Seeking Accreditation

A programme has to meet the following requirements to be eligible for accreditation evaluation:

- The **HEP** offering the programme should have obtained the approval for awarding a degree for the programme from the relevant government authority of Sri Lanka.
- The programme should be of a minimum duration of four years full-time or equivalent as specified by the **IESL**.
- The programme should have been recognized by the **IESL** after being evaluated by the **IESL** Education Standing Committee.
- The programme should be offered within an Engineering Faculty or similar entity of the **HEP**
- The programme has to be based on outcome based education.
- The minimum total credits to be earned by a student to receive the degree should be 130 academic credits and these have to be distributed among the academic years as uniformly as possible. Academic credit is defined as having minimum requirements given below:
- One academic credit will be awarded for 14 Active Hours (AHs) in a semester with AH as defined in Section (5.2.2.2)

[2]Definition of 'complex engineering activities' is provided in `Appendix F` in the table titled 'Range of Engineering Activities' in the section 'common range and contextual definitions'

5 CRITERIA FOR ACCREDITATION

The accreditation of an engineering degree programme encompasses an evaluation of qualifying requirements under the following ten criteria. The findings of the evaluation team will be reported as per the format given in `Appendix C`.

(a) Programme Objectives and Outcomes

(b) Programme Structure

(c) Educational Process

(d) Assessment

(e) Educational Culture

(f) Quality Systems

(g) Programme Administration & Statistics

(h) Operational Environment

(i) Staff and Students

(j) Resources & Facilities

5.1 Summary Accreditation Evaluation Report

The Summary Accreditation Evaluation Report of the programme will be made against the following four criteria, which summarizes the findings of the evaluation team, according to the format given in `Appendix D`.

(1) Academic Programme

(2) Staff and Students

(3) Facilities available in the **HEP**

(4) Quality Systems

5.2 Accreditation Criteria

5.2.1 Programme Educational Objectives (PEOs) and Programme Outcomes (POs)

The programme title should properly reflect its objectives and be professionally appropriate.

Programme Educational Objectives are what graduates from the programme are expected to attain within a few years of graduation. The objectives of the programme should be well stated, to be meaningful to students and employers, and consistent with the mission of the **HEP** and with the expectation of a professional engineering degree. They should be published in a way that is clearly visible to teachers and students of the **HEP**, ideally together with a demonstrated alignment between them and the Programme Outcomes.

Programme Outcomes are statements that describe what students are expected to know and be able to perform or attain by the time of graduation. These relate to the skills, knowledge and attitude that students acquire through the programme. Engineering degree programmes are required to specify the abilities and characteristics that students are expected to possess upon graduation. These outcomes must reflect the needs of the students and the employers. The engineering degree programme has to develop and implement assessment processes to demonstrate that their graduates have acquired the stated outcomes.

The achievement of the programme outcomes by all graduates should be clearly demonstrated, i.e. proven by the links between the programme outcomes, the module outcomes and the module assessment.

The skills, knowledge and attitudes that are expected from the graduates of a four year Bachelor's degree programme to be enrolled as an Associate Member of the Institution of Engineers, Sri Lanka are in line with those outlined and published by the International Engineering Alliance as in Section (4.4) and are to be attained by an engineering graduate <u>from any programme</u>, irrespective of the engineering discipline. The graduates are expected to successfully fit into society, satisfying the needs of the employers and the industry. The attributes required of an engineering graduate are his/her ability to `(See Section (4.4) for a more comprehensive version)`:

(i) Apply **knowledge** of mathematics, basic sciences and engineering fundamentals to solve complex engineering problems.

(ii) Identify, formulate, research literature, and **analyse** complex engineering problems to arrive at valid conclusions.

(iii) **Design** solutions to complex engineering problems; involving systems, components or processes that meet specified needs, including conflicting constraints.

(iv) Conduct **investigations** of complex engineering problems using **research based knowledge** and **research methods** (including experimental design, analysis & interpretation of data and synthesis of information).

(v) Create, select and apply appropriate techniques, resources, and modern engineering and **IT tools** to complex engineering activities.

(vi) Assess **societal**, **health**, **safety**, **legal**, **cultural and environmental** issues related to professional engineering solutions.

(vii) Demonstrate broad knowledge of **sustainable** development concepts and practices required for dealing with contemporary issues related to professional engineering practice.

(viii) Demonstrate broad knowledge of **ethical** responsibilities and professional standards.

(ix) Demonstrate ability to function effectively as an **individual** and in multidisciplinary and multi-cultural **teams**, with the capacity to be a leader or manager as well as an effective team member.

(x) **Communicate** effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

(xi) Demonstrate broad knowledge of **management** and business practices, including financial management, risk and change management.

(xii) Be prepared for **independent** and **lifelong learning** in the broad context of technological change.

The **HEP** must demonstrate that the engineering programme under review ensures the attainment of the knowledge profile and generic attributes expected by the **IESL** by explicitly mapping the learning outcomes to programme outcomes. (Details are given in `Appendix A`). The curriculum and assessment must be focused on an outcomes based approach (OBE) and not an input based approach.

5.2.2 Programme Structure

5.2.2.1 The Academic Programme

An accredited engineering degree programme should be capable of creating the platform from which individual aspirations could develop, and therefore should provide a coherent and integrated broad based knowledge with emphasis on principles of science and engineering with a certain degree of speciality in the chosen discipline, as set out in `Appendix B`.

The criteria for curriculum content specified in the following sections ensure that the graduate receives a foundation in mathematics and basic sciences, a broad preparation in engineering sciences, engineering designs and projects, and exposure to other non-technical subjects that complement the technical subjects. These components are judged both qualitatively and quantitatively. The **IESLAB** will accommodate deviations from the above- mentioned criteria if it is satisfied that such deviations serve to promote innovation in engineering education and disseminate good practices.

5.2.2.2 Definitions of Active Hours (AHs) and Academic Credits (ACs)

For an academic activity that is granted academic credit, and in which the number of hours associated with it corresponds to the actual contact time of that activity, such as lectures, tutorials, laboratory, design or fieldwork, an Active Hour (AH) is defined as follows:

- one (1) hour of lecture

- two (2) hours of tutorial, laboratory, design or field work

One AH per week continued over the duration of a semester is defined as an Academic Credit (AC). One (1) AC is equivalent to fourteen (14) AHs.

For activities in which contact hours cannot be used to properly describe the extent of the work involved, such as project study, work camps and industrial training, the following definitions are used for an Academic Credit (AC):

- one (1) week of project study
- two (2) weeks of work camp
- four (4) weeks of industrial training

5.2.2.3 Requirements of the Academic Programme

The title of the academic degree programme to be accredited must include the word "engineering" and it must be truly descriptive of the curriculum content, offered within an engineering faculty or similar entity. For accreditation, a Bachelors degree programme in engineering in Sri Lanka must be of a duration of not less than four (4) academic years of full-time equivalent study based on entry through a satisfactory level of achievement in relevant subjects at the General Certificate of Education (Advanced Level) examination conducted by the Department of Examinations of Sri Lanka, or through an equivalent qualification, as prescribed by the **IESL**. When a programme has several options, all options are examined, and each one must meet the established criteria. The **IESLAB** must be satisfied that the programme title is appropriate for all students graduating in the programme irrespective of the options taken. Although it is not the intention of the **IESLAB** or **IESL** to prescribe compulsory programme structures, curriculum details or teaching methods, broad guidelines which will satisfy expected outcomes are given here.

The entire programme must include a minimum of 130 Academic Credits (ACs). It is expected that accredited programmes will continue to have additional academic credits to demonstrate innovation and to achieve the special goals the particular engineering **HEP** may have for engineering education.

Appropriate laboratory experience must be an integral component of the curriculum, with instructions in safety procedures. The curriculum must prepare students to learn independently, and must expose them appropriately to engineering design, research and development activities. It must be ensured that the students are made aware of the role and responsibilities of the professional engineer in society by exposing them to ethics, equity, public and worker safety, and concepts of sustainable development.

5.2.2.4 Structure and Content

The initial education of a professional engineer should provide an in-depth core of scientific and technical knowledge and skills together with a sufficient breadth of experience in complementary studies, consisting of humanities, social sciences, arts, management, engineering economics and communication, in order to ensure continuing awareness of these disciplines. It is appropriate for the programme structure to be designed in such a way that it gives a progressive shift of emphasis from engineering science and principles in the early stages to more integrated studies in the final year.

The essential elements are grouped under several headings.

(a) **Mathematics, Basic Sciences and Computing (Minimum of 25 ACs)**

A minimum of twenty five (25) academic credits is recommended for the components of mathematics, basic sciences and computing.

Mathematics should include appropriate elements of linear algebra, differential and integral calculus, differential equations, probability, statistics, numerical analysis and discrete mathematics. Some of the mathematical techniques may be taught within other subjects in the programme where they are relevant.

The basic sciences component of the curriculum must include elements of physics and chemistry, and other relevant elements of life sciences and earth sciences. These subjects are intended to impart an understanding of natural phenomena and relationships through the use of analytical and/or experimental techniques.

(b) **Engineering Sciences, Engineering Design and Projects (Minimum of 75 ACs)**

A minimum of seventy five (75) academic credits from a combination of engineering sciences engineering design and projects and exposure to professional practice is recommended. Of this a minimum of 25ACs must be engineering design and projects; and a minimum of 25ACs must be an engineering discipline specialisation.

Engineering science subjects would normally have their roots in basic sciences and mathematics, but carry knowledge further towards creative applications. They may involve the development of mathematical or numerical techniques, modelling, simulation and experimental procedures. Application to the identification and solution of practical engineering problems is stressed. In addition to engineering science subjects pertinent to the discipline, the curriculum must include engineering science content, which imparts an appreciation of important elements of other engineering disciplines.

Engineering design integrates mathematics, basic sciences, engineering sciences and complementary studies in developing elements, systems and processes to meet specific needs. It is a creative and iterative process subject to constraints, which may be governed by standards or legislation.

The engineering curriculum must end with a significant design experience, which is based on the knowledge and skills acquired in earlier coursework. Such a project could give the student an exposure to the concepts of teamwork and project management. Whilst group projects, such as in design exercises, may be appropriate for work in earlier years, the final year project is required to demand individual analysis and judgement. Even though work may be carried out in small groups the student should be assessed independently from the work of others.

The curriculum should also include a significant research component that involves literature review and information gathering; conducting of investigations, whether by data analysis, experiment or simulation; and arriving at synthesised new knowledge.

The engineering sciences, engineering design and project components of the curriculum must include appropriate content, which requires the application of computer skills.

(c) **Complementary Studies (Minimum of 20 ACs)**

A minimum of twelve (12) academic credits for studies in management, engineering economics and communication and four (4) academic credits in humanities, social sciences, arts and professional ethics are recommended to complement the technical content of the curriculum.

While considerable flexibility is offered in the choice of suitable courses for the complementary studies component of the curriculum, some areas of study are considered to be essential in the education of an engineer. Accordingly, the curriculum must include studies on the impact of technology on society, engineering economics, and subject matter that deals with central issues, methodologies and thought processes of the humanities and social sciences.

Student's capability to effectively communicate, both orally and in writing, must also be developed. From the initial stages of the programme, careful attention must be paid to the development of clear and concise reporting skills of the students.

(d) **Exposure to Professional Engineering Practice**

Industrial training in a practical engineering environment, directly assisting professional engineers, would give the student a valuable insight into professional practice. Such experience would complement the formal studies at the educational establishment, and should ideally consist of several different types of experience. This must include practical experience in the basic manufacturing and construction techniques applicable to the student's chosen discipline of engineering. The opportunity to observe human and industrial relations, job organisation, maintenance, safety and environmental procedures from the point of view of the general workforce is an important component in the early preparation for a career as a professional engineer. **IESL** strongly advocates that each undergraduate undergoes industrial training for a period corresponding to six (6) academic credits (ACs), i.e., twenty four (24) weeks, and submits a report on the training certified by the employer's representative to enable assessment and the award of credits. The academic credits obtained for industrial training (subject to a maximum of six ACs) is considered under the category of engineering design and projects. Up to one (1) academic credit of the above however can be made up of work camp or full-time industry based project study components that strongly resemble professional practice.

5.2.3 Educational Process

Curriculum design of the programme should be effective in addressing each of the generic graduate attributes. Further, the curriculum should justify any specialist title carried by the programme and should be effective in imparting appropriate attributes and specialist knowledge. The programme outcomes in relation to professional engineering practice should be appropriate and the curriculum is required to provide adequate means for students to attain these outcomes. There should be adequate arrangements in place for programme delivery and student support, including staffing arrangements.

5.2.4 Assessment

The assessment processes should effectively measure the module learning outcomes, which contribute to the outcomes of the programme as a whole and their relationship to the stated objectives and the generic and specialist attributes, and should be properly moderated to ensure consistent standards. No learning outcome can be claimed without a corresponding piece of assessment.

5.2.4.1 Assessment of Programme Outcomes

The **HEP** must have systems in place to ensure that the stated outcomes are met and that the programme objectives and quality are continuously reviewed and improved. The system must include:

- Documented processes for programme planning, curriculum development and approval, and regular curriculum review. The introduction of new programmes or majors must relate to the educational objectives and needs of the country.
- An admissions system that ensures an acceptable standard of entry for students. It may include qualifying or remedial/bridging programmes where appropriate. There must be policies on the acceptance of transfer students, validation of programmes taken for credit elsewhere and recognition of prior learning, be it formal or informal.
- Processes for securing feedback and comments from students, graduates, employers of graduate engineers and representatives of the wider community, and evidence of their systematic application to review and continuing improvement of programme objectives, curriculum and content, and the quality of teaching and learning, including evidence that the action taken as a result of this feedback is communicated back to the various stakeholder groups. Post-programme processes should include graduate employment data, alumni surveys documenting achievement, and employers' surveys of longer-term performance and development.
- Substantial participation by practising professional engineers, and leading employers of engineering graduates in the Faculty's forward planning, and its processes for ensuring educational quality including assessment of graduate performance. There must be evidence of real dialogue and involvement. Details of the regular activities and input from the Industry Consultative Panel (ICPs) must be provided.
- A process for comparing or benchmarking programme standards (particularly final year projects and comprehensive design projects) with those of other universities, nationally and preferably internationally. This could be undertaken with the use of external examiners or external advisors.
- A record management system that enables audit of the above processes at any time and confirmation of their integrity.

5.2.4.2 Scheme of Assessment of the Programme of Study

The Rules and Regulations for assessment procedures of the programme of study must be made available and maintained by the Faculty.

The **HEP** should be able to demonstrate its management system for assessment of students, which should include:

(a) examination regulations;

(b) system of assessment and criteria for a Pass and Grades;

(c) procedures for preparation of examination papers;

(d) moderation of examination papers and continuous assessments;

(e) assessment and moderation procedures for final year projects, and;

(f) assessment of industrial training.

The **HEP** should have one or more External Reviewers for each programme of study to independently scrutinise and report on the examinations and assessments for each academic year. The main objective for having an External Reviewer is to benchmark each programme of study to internationally accepted levels. Therefore, the External Reviewer should be selected from one of the Washington Accord signatory countries, or an internationally recognized university at the forefront of engineering.

5.2.5 Educational Culture

There should be an appropriate Educational Culture for a forward- looking, proactive education and awareness of current developments in engineering education by all staff. The curriculum design and delivery, and assessment approaches should be holistic, and not fragmented. The staff is required to be active in role-modelling the generic attributes of a professional engineer. Further, there should be active programmes in place to promote the objectives and also to foster community consciousness, responsibility for national development and an international outlook.

5.2.6 Quality Systems

The **HEP** must demonstrate that it regards a quality engineering education as a significant and long-term component of its activities. This would most commonly be reflected in the **HEP**'s mission statement and in its strategic plans. It must have adequate policies and mechanisms for planning, development, delivery and review of engineering education programmes, and for academic and professional development of staff.

The **HEP** must have in place adequate policies and mechanisms for funding the programme; for attracting, appointing, retaining and rewarding well-qualified staff, and providing for their on-going professional development; and for providing and, updating infrastructure and support services. It must ensure that creative leadership is available to the University through the appointment of well-qualified and experienced senior staff in sufficient numbers.

The quality systems should encompass:

- Processes for programme planning and curriculum development and review are appropriate, and involve all academic staff.

- For a new programme, the rationale for its introduction, and evidence of demand and availability of adequate resources.

- Clear evidence that the results of assessments of students; performance and learning outcomes are being applied to the review and ongoing improvement of programme effectiveness.

- Effective processes for periodical auditing and securing feedback on all programme constituents and applying it to the review and ongoing validation and improvement of programme objectives, curriculum, assessments and quality of learning and teaching. The results of this feedback must be reported back to all stakeholders.

- Effective advisory mechanisms for consulting and involving practising professional engineers and leading employers of engineering graduates in forward planning and quality management.

- Process in place for benchmarking programme standards against those of other universities, nationally and/or internationally.

- Records of graduate employment data and alumni and employer feedback to demonstrate confidence in the programme, the Engineering HEP and the competence of its graduates.

- Effective records management system

- Records on
  (i) Delivery of modules against planned schedules
  (ii) Student Assessment
  (iii) Student feedback
  (iv) Peer reviews
  (v) External reviews and benchmarking programme standards against those of other universities, nationally and/or internationally

5.2.7 Programme Administration and Statistics

There should be admission policies appropriate and consistent in place for students from all backgrounds that are inclusive. Student numbers and estimated forward trends should be adequate for a viable programme. There should be arrangements for progression, graduation and the awards of honours as appropriate.

5.2.8 Operational Environment

There must be appropriate organisational arrangements in the **HEP** that are to be consistent with Section (A.3.1) and Section (A.3.2) in `Appendix A`. Further there should be long-term commitment and forward planning with the support of the leadership ensuring the quality and continuity of the programme.

5.2.9 Staff and Students

5.2.9.1 Academic Staff

The character of the educational experience of the student is greatly influenced by the competence and outlook of the academic staff. The number of staff devoted to the programme must be adequate to cover, by experience and interest, all curricular areas of the programme. The **HEP** may engage part-time or visiting staff members, who are outstanding professionals in their fields, to cover certain subject areas in the curriculum outside the specialisations of the full-time staff.

The academic staff teaching courses in the engineering curriculum are expected to have a high level of competence, and to be dedicated to the aims of engineering education. In general, the academic staff should have a postgraduate degree, preferably at doctoral level. However, staff with a good first degree, and having wide industrial experience along with other acceptable professional qualifications, may be considered to give an industrial flavour to the programme. This category of staff without adequate research experience should be encouraged to obtain such experience after recruitment. Academic staff without industrial experience and professional qualifications should also be encouraged to obtain them after recruitment.

The overall competence of the **HEP** will be judged by such factors as the level of academic education of its members, the diversity of their backgrounds, their ability to communicate effectively, their experience in teaching and research, their level of scholarship as shown by scientific and professional publications, their degree of participation in professional, scientific and learned societies and their personal interest in the students' curricular activities.

The teaching loads of academic staff should allow adequate time for participation in research and professional development activities. The university must ensure a balanced and conducive environment for effective teaching, research and professional development. The academic staff of the engineering **HEP** must provide proper curricular and career counselling to the students. To ensure effective teaching, the equivalent full-time academic staff to student ratio should be maintained at 1:12 or better but with minimum of 8 full-time dedicated engineering academic staff members, or better. There must also be a sufficient number of trained and qualified members of the technical and administrative staff to assist in the conduct of the educational programme. The staff to student ratios is to be calculated as set out in Section (A.3.9.4) of `Appendix A`.

5.2.9.2 Students

Students pursuing engineering education programmes must have a sound understanding of mathematics and physical sciences. The standard entry qualification for such programmes in Sri Lanka is the General Certificate of Education (Advanced Level) examination, or equivalent, with good passes in mathematics, physics and chemistry as prescribed by the **IESL**. The students also need to acquire English language skills to follow the course in English medium and possess competency in the use of computers and IT skills. The **HEP** must ensure that any student who does not meet these criteria would undertake additional suitable remedial programmes in order to attain the equivalent entry qualification with the concurrence of the **IESL**.

The quality of the educational experience is also reflected by the morale and commitment of the students.

5.2.10 Resources and Facilities

The resources and facilities available for the programme to be delivered are important as they influence the quality of educational experience gained by students. Therefore, there must be an adequate number of suitable classrooms, audio-visual and projection facilities, study areas, information resources (including a library), computing and information technology systems, computer-aided design facilities, laboratories and general infrastructure to meet the programme's objectives. This must enable students to learn the use of modern engineering and organisational tools, and explore areas beyond the formal dictates of their specific programme of study.

For programmes offered at multiple or remote locations, and those offered partly in the distance mode, sufficient communication facilities must be provided to give those students a learning experience and support equivalent to that of the on-campus students. There must also be adequate facilities for student-staff interaction. On-campus students should be encouraged to participate in the other activities of the University, and reasonable effort should be made to provide similar opportunities for other students.

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 engineering equipment, and in designing and conducting experiments. The equipment must be representative of modern engineering practice, including modern computerised equipment and software. Laboratory experiences must provide students with 'hands-on' experience and not just demonstrations. Where practical work is undertaken at another **HEP**, or in industry, arrangements must be made to provide reasonable accessibility and opportunities for learning.

6 ACCREDITATION PROCEDURE

The accreditation procedure of the **IESLAB** normally comprises the steps indicated in the following sections.

When a particular programme of study is offered at different locations and/or through different modes of delivery, accreditation status will apply only to the location and/or mode of delivery that has been reviewed. A separate application needs to be made in respect of the same programme offered at another location and/or through a different mode of delivery.

6.1 Application for Accreditation

An accreditation assessment is initiated only at the request of the **HEP**/Faculty that conducts the programme of study concerned.

- In the case of a programme of study seeking accreditation for the first time, the programme should have been previously recognized by the **IESL**. The request for accreditation of such a recognized programme must be made not less than six (6) months before the recognition lapses.
- In the case of a programme of study that has previously been accredited, a request for re-accreditation must be made not less than six (6) months before the accreditation lapses.
- In the case of a programme of study that has been conditionally accredited, report on implementation of the conditions must be submitted not less than six (6) months before the conditional accreditation lapses.

Once the request is received, the **IESL** Secretariat sends to the applicant **HEP**/ Faculty documentation required for the visit. This documentation includes information on the **HEP**/ Faculty / Department, the programme of study, the staff, students, teaching facilities and quality assurance systems as specified in `Appendix A`. The completed documents along with any additional supporting documents must be forwarded to the **IESL** Secretariat, which will acknowledge receipt of the same. The documentation is to be sent in both electronic and hard copy format, at least eight (8) weeks before the proposed date of the visit.

If the **IESL** Secretariat is satisfied that the information provided is adequate, it will communicate to the relevant institution details regarding the visit. Any additional information requested must be received within two (2) weeks. If the information is considered to be inadequate, further information is requested from the institution before an accreditation visit could be scheduled. If the requested information is not received within a further period of one (1) week, the application shall be deemed to have been withdrawn.

The Evaluation Panel (Visiting Team) appointed by the **IESLAB**, would normally meet four to five (4-5) weeks prior to the accreditation visit. The purpose of the meeting is to provide an opportunity for panel members to share their initial findings after consideration of the submitted documentation. It also enables the panel to collectively identify matters targeted for detailed investigation during the accreditation visit and to identify any additional data or materials that may be required in order to facilitate the evaluation process. The panel will also discuss a draft schedule for the visit proceedings.

A brief meeting report will be normally compiled, recording any issues of concern, key matters to be addressed during the visit and any request by the panel for additional supporting information. This report will be sent to the **HEP** for information. The requested material must be received at least one (1) week prior to the accreditation visit.

Included with the meeting report will be a draft visit schedule detailing various sessions and activities proposed for the visit. This schedule will be subsequently finalised in consultation with the **HEP**. The **HEP** will be asked to append to the final visit schedule the venue details for each session and a listing of the names, titles and affiliations of members of the senior leadership team, the academic staff and the external participants who will be attending sessions with the panel. It is emphasized that an effort must be made to arrange all the sessions with the evaluation panel at a single location, to minimise time being wasted moving around the **HEP** faculty. The only exception to this would be the laboratory and facility tours, and the meeting with the Vice Chancellor.

A meeting of the Evaluation Panel will normally be held on the day prior to the commencement of the accreditation visit. This meeting will enable the panel to make final preparations for the visit, to consider any additional supporting information submitted by the educational institution and to prepare strategic questions in readiness for each of the visit sessions.

6.2 Accreditation Visit

The Evaluation Panel makes the accreditation visit to the **HEP** that offers the programme. The visit will normally extend over a period of two and a half (2.5) days during which the visiting team gets an opportunity to assess qualitative factors such as intellectual atmosphere and morale in the **HEP**, professional attitudes and the quality of staff and students. During this visit the team gets the opportunity to carry out the following activities.

- Interviews with senior administrative officers including the Vice-Chancellor, the Dean of Engineering and the Heads of the Departments responsible for conducting the programme of study.
- The Head of Department or Dean is expected to make a 5 minute presentation only, summarising, but not repeating the submission documentation.
- Interviews with members of the academic staff to evaluate professional attitudes, motivations, morale and their opinions on the theoretical and practical elements of the curriculum.
- Interviews with students, individually and in groups.
- Interviews with non-academic staff to assess their competence to support the academic programmes.
- Visits to physical features such as laboratories, workshops, libraries and computing facilities to evaluate their adequacy and effectiveness.
- A review of recent examination question papers and samples of answer scripts, laboratory instruction sheets, student transcripts (anonymous, if necessary), student reports, models or equipment constructed by students, and any other evidence of student performance for every module covered in the programme.

At the end of the visit, the visiting team will meet with the Dean of Engineering, and the Heads of the Departments responsible for conducting the programme, to review the perceived strengths and weaknesses of the programme.

6.3 Report of the Visiting Team

The visiting team shall prepare a report of their findings on the programme of study in the prescribe format and present to the **IESLAB** within a period of eight (8) weeks after the date of the visit (`Appendix C`). This report covers perceived strengths and weaknesses of the programme, areas in which it conforms to and deviates from the accreditation criteria, as interpreted by the team, with recommendations on matters of concern and suggestions for improvement. This report should not include any recommendations regarding accreditation.

Eight (8) weeks after the date of the visit, the visiting team's findings, as outlined in their report, are sent to the **HEP** concerned by the **IESL** Secretariat for their comments, and to indicate any factual errors to ensure accuracy and completeness. The response of the **HEP** must be received by the **IESL** Secretariat within a period of four (4) weeks.

The visiting team will also prepare the Summary Accreditation Report (`Appendix D`), which includes the recommendations to the **IESLAB**. The completed `Appendix C` and `Appendix D` will then be submitted to the **IESLAB**.

6.4 Accreditation Decision

The **IESLAB** makes a recommendation on accreditation to the **IESL** Council by considering the documentation provided by the **HEP**, the visiting team report, any further clarifying correspondence and the Summary Report (`Appendix D`) prepared by the visiting team. The **IESLAB** may not necessarily agree with the recommendations of the Panel in the Summary Report.

The next few paragraphs relate to the decision making process of **IESLAB** and **IESL** Council. At both these meetings, any persons, who are participating and may be considered to have an affiliation to or conflict of interest with the **HEP**/Study Programme being evaluated, should indicate the nature of their affiliation or conflict. They should thereafter temporarily leave the meeting unless the Chair decides otherwise, based on valid and substantiated reasons.

The **IESLAB** may recommend one of the following:

- To grant full accreditation for a period of five (5) years.
- To grant conditional accreditation for a shorter period (not more than two years) subject to receipt of a report that convinces the **IESLAB** that matters giving rise to its concerns have been adequately resolved. After reviewing this report, the **IESLAB** may recommend extending the accreditation to the full five (5) years, or to terminate conditional accreditation at the end of the period granted.
- To decline or terminate accreditation, depending on whether it is a new programme or an already accredited programme.

Based on the report and recommendation submitted by the **IESLAB**, the **IESL** Council makes its decision on accreditation of the programme of study concerned.

If **IESLAB** or **IESL** Council decides to change the respective decisions of either the Evaluation Panel or the **IESLAB** as the case may be, then the reasons for such changes should be minuted.

The Institution's decision is conveyed to the **HEP** through the Dean of Engineering, who will be provided with a comprehensive explanation for it. The **HEP** is expected to inform the staff and the students of the accreditation process and the accreditation status of the programme of study.

6.5 Formal Review/Appeals

In the event of a decision by the **IESL** to terminate the accreditation of a programme or to decline accreditation to an accredited or unaccredited programme, the **HEP** may appeal to the President of **IESL** for a formal review of its decision. This appeal must be made within four (4) weeks of receiving the decision of the **IESL**, and must state the grounds on which it is based. Grounds for appeal are normally limited to errors of fact or breach of the Policy, Criteria and/or Procedures set out in this document.

The **IESL** Council will appoint a sub-committee to consider the matter and, if appropriate, will then instruct the **IESLAB** to subject the programme to a second evaluation visit by a newly constituted visiting team. The same accreditation procedure will be followed by the new visiting team using the originally submitted Self-Assessment Report, which will report to the **IESLAB** for a recommendation to the **IESL**. Following the report of the sub-committee, the Council's decision is final.

6.6 Informal Evaluation or Visit

A **HEP** may request the **IESLAB** for an informal evaluation of a proposal for a new programme of study at an appropriate time during its development stage. The **IESLAB** will arrange an informal visit by a team for the purpose of providing comments and advice to the **HEP**/ with respect to the programme. However, no assurance will be given by the **IESLAB** as to the eventual accreditation of the programme. The visiting team will present a report to the **HEP**, but no report will be presented to the **IESLAB**. The cost of such evaluation or visit shall be borne by the **HEP** concerned.

6.7 Publication of Accreditation Status

The **IESL** will publish a list of accredited programmes of study, together with their effective dates, on an annual basis. The list maintained by the **IESL** includes only those programmes, which have received accreditation. This list is available on request.

The records and deliberations of the **IESLAB** and the **IESL** concerning accreditation of a programme of study shall be kept confidential.

6.8 Cost of Accreditation Evaluation

The **HEP** has to bear the total cost of the accreditation process including the **IESL** overheads and may be required to make an advance payment before the accreditation visit is undertaken.

7 REFERENCES

The Institution of Engineers, Sri Lanka gratefully acknowledges the information contents taken from the following sources:

[1] Board of Engineers, Malaysia

[2] Canadian Council of Professional Engineers

[3] The Institution of Civil Engineers, UK

[4] The Institution of Engineers, Australia

[5] The Institution of Engineers, Malaysia

[6] The Institution of Engineers, South Africa

[7] The Institution of Mechanical Engineers, UK

[8] The Institution of Professional Engineers, New Zealand

Appendix A

Documents for Accreditation

A.1 Introduction

The documents as prescribed below must be submitted in respect of the programme being requested for accreditation. It is the responsibility of the **HEP** to provide accurate information and sufficient evidence for the purpose of evaluation.

The documents must contain information on, but not limited to the following:

- general information and the objectives and outcomes of the programme;
- the ways in which the programme achieves the objectives, including development of the generic graduate attributes and the attributes appropriate to any specialist title, and assists each student to meet the required outcomes;
- teaching staff and students;
- teaching facilities;
- assessment and quality management system, and how it ensures that each graduand has met the required outcomes;
- the methods used to secure external validation and critical comment on the programme objectives and outcomes, and to apply such comment to the continual improvement of the programme and the Faculty, and evidence of their effectiveness;
- any other relevant information.

It should not be necessary to develop extensive documentation specifically for the purpose of accreditation. The purpose of accreditation is to evaluate the systems already in place, not to require their creation. In a well-managed university, most of the documentation requested should already exist.

An acceptable submission is likely to comprise a collection of existing documents, including a text providing a coherent overview. The overview text should address each of the criteria, and refer to the relevant supporting material to the extent that existing documentation provides evidence that the criteria are met.

Submission must be comprehensive, easily readable, and free-standing. The overview text must address each major point in a definitive way. It will not be sufficient merely to provide a collection of disparate items, or point to a web site, and leave the Board to find the relevant information and make the connection for itself. Supplementary information (such as QA policies, staff CVs, module outlines etc.) can be provided on a CD.

A.2 Documents to be Submitted

The Faculty offering the programme should submit five (5) copies of documents based on Section (A.3) for accreditation. The submitted documents should be concise, but of sufficient depth and detail, preferably not exceeding one hundred (100) pages. Other detailed information should be included as appendices. Documentation should be bound in one or more volumes for convenience and should include a Table of Contents.

The documents should also include:

- The University Calendar;
- The Handbook, Calendar supplement, or other official publication relating to the Engineering Faculty, and containing the public statement of programme's details; and
- University/Faculty/Department prospectus.

Alternatively this document could be sent in electronic format, or as a mix of both.

The Board/Panel may at any stage request further information. If the submitted documents do not meet these guidelines, the applicants may be asked to re-apply and submit new documents.

A.3 Information to be Made Available

As a guide for the applicants, the following sections describe the format of information to be made available to the Panel. Additional information may be provided in support of the application.

For the Evaluation Panel visit the following information must be made available:

- Copies of all current promotional literature
- A list showing the name/s of the staff member/s currently responsible for delivery of each academic module

- For a full range of example academic modules at each year level and for each module, a dossier of materials including the module outline document distributed to students, examples of teaching materials and resources, examples of formative and summative assessment materials including examination papers, and specifications for assignments, projects and laboratory activity, examples of a range of graded student work including submissions and examination scripts, journals and portfolios, professional practice log books. Examples of low, medium and high achievement should be available, demonstrating a distinction in grading across the various performance thresholds. A full list showing the range of grades awarded for this module last time it was run should be supplied.
- Of particular interest are graded student design and project reports/thesis submissions at various year levels. Displayed materials should be organised clearly against year levels and the records for each academic module separately identified. The range of displayed materials should be selected in order to demonstrate the delivery of the full range of generic capabilities in graduates including a clear indication of the standard of technical competence.
- Prime documentation associated with teaching and learning planning, review, management and quality improvement should be made available. Any appropriate records of formal proceedings, reports and submissions, trend and data analysis, quality system records or evidence of action implemented should be presented for perusal. This should include records of meetings of programme teaching teams, staff-student consultative forums, industry consultative panels body meetings, key documents associated with formal programme reviews as well as appropriate meeting records and documented action follow ups at all organisational levels.
- Details of any stakeholder surveys including teaching quality and module/programme evaluations, student destination surveys, employer or graduate surveys. As well as access to the survey instruments, any outcome summaries, subsequent reporting, follow up action and information describing influences this data has had on the continuous improvement processes should be presented.
- Available department and/or research annual reports.
- Access to the department's records management system.
- Access to the institution's and/or engineering department's human resource policy documents, including:
  - appointment and tenure (an example of selection criteria would be welcome);
  - promotion (an example of promotion criteria would be welcome);
  - professional development - as an engineering academic and professional educator;
  - supervision and staff counselling;
  - appointment, training, supervision and counselling of sessional staff; - any merit-based reward systems.

SELF ASSESSMENT REPORT

A.3.1 Organisation of the HEP

Outline the organisational structure of the University, including:

A.3.1.1 Title and name of Chief Executive Officer of the HEP

e.g. Vice Chancellor

A.3.1.2 Name of the principal academic entity responsible for engineering education hereinafter called the Faculty, names and relative sizes of comparable entities in other disciplines;

e.g. Faculty of Engineering

A.3.1.3 Title and name of the Head of the Faculty

e.g. Dean of Engineering

A.3.1.4 Title and name of person at corporate level to whom the Head of Department reports

e.g. Dean of Engineering

Provide evidence of the **HEP**'s long-term commitment to engineering as a discipline, for example through corporate mission statements and strategic plans, or otherwise.

Provide evidence of the **HEP**'s engagement in long-term planning processes (excerpts from the University's strategic plan would be welcomed).

Statement of whether the **HEP** has prime responsibility (subject to University approval processes) for programme design; programme content; programme delivery; management of resources; appointment and supervision of staff; and professional activities of staff (research, consulting, staff development).

A.3.2 Organisation of the Faculty

Describe the organisational structure of the Faculty including:

A.3.2.1 Titles and names of officers having responsibility across the Engineering Faculty

e.g. Dean, Faculty Registrar, etc.

A.3.2.2 Names of sub-entities and scope of their responsibilities

e.g. Department of Civil Engineering

A.3.2.3 Titles and names of the Heads of the sub-entities

A.3.2.4 Accountabilities in relation to educational programmes and to staff supervision

A.3.3 General Information on the Programme to be Accredited

A.3.3.1 Title of Department

A.3.3.2 Name of Head of Department

Contact name / E-mail for visit if different from Head of Department

A.3.3.3 Address of Department

Tel :

Fax :

E-mail :

A.3.3.4 Staff Member(s) responsible for the submission

Name of main contact(s) for the Programme(s):

Tel :

Fax :

E-mail :

(`if different from A.3.1.4`)

A.3.3.5 Date of submission

A.3.3.6 Visit date

`(if not yet agreed, leave blank)`

A.3.3.7 Names of current / most recent external examiners since the last accreditation

Include affiliation of examiners

A.3.3.8 Response to previous accreditation recommendations

Give the date of the last accreditation visit and your response to any conditions or recommendations attached to the last accreditation and how you have dealt with them.

A.3.3.9 Programme development since last accreditation

Describe any major changes made to the Programme(s) since that date and give the date they were implemented.

`(Include changes such as conversion to modules and semesters)`

Date :

Major Changes :

A.3.4 Programme Information

(A separate submission of Section (A.3.4) is required for EACH programme for which accreditation is being sought but cross referencing of information should be used wherever possible)

A.3.4.1 (a) Title of programme as it appears on the Degree Certificate

Discipline as it appears on the transcript

A.3.4.1 (b) Type of programme and duration

Please give the date the course was first offered in its present form.

(i) Date of first implementation of the Programme

(ii) Date on which programme was first accredited

(iii) Is it a new programme?

(iv) Type of programme
Identify whether the course is full-time, part-time or sandwich, and if the latter, thick or thin.
(complete all types for which accreditation is sought)

Full-time (F/T)		(tick if appropriate)		
Minimum number of academic years			Normal contact hours per year	

Part-time (P/T)		(tick if appropriate)		
Minimum number of academic years			Maximum number of academic years	
			Minimum contact hours per year	

Sandwich (S)		(tick if appropriate)		
Minimum number of years			Type of sandwich (state Thick/Thin)	
State the year(s) in which industrial experience takes place				

A.3.4.1 (c) From which Professional Institution(s) is accreditation being sought?

1. Institution of Engineers, Sri Lanka
2.
3.

A.3.4.2 Mission, Objectives and Outcomes of the engineering degree programme - BscEng

State the mission and the programme objectives and relate how the programme objectives and programme outcome are consistent with **IESL** criteria on graduate abilities listed under Section (5.2.1)

A.3.4.3 Programme Structure

Provide a diagram for the programme structure for each mode of delivery, clearly showing core and optional subjects, and all possible routes through the overall programme.

A.3.4.4 Complete Table NT1, in the format given below for the study programme

Table NT1 - Content of the academic programme

Module Group	Module Code	Credit Value	Credit distribution among different categories										Total Credit Values of Compulsory Modules	Total Compulsory Credit Value of Elective Modules (basket wise)
			Math, Basic Sciences and Computing			Engineering Sciences and Engineering Design		Complementary Studies						
			Mathematics	Basic Sciences	Computing	Eng. Design and Project	Eng. Discipline Specialization	Management	Eng. Economics	Communications	Humanities and Social Sciences	Engineering Ethics		
Compulsory Modules														
Elective Modules (Basket wise*)														
Total Credit Value														

A.3.4.5 NT2 Table: Mapping of LO-PO for each Module

Use PO achievement levels H, M and L as depicted below. (guidance is given in Appendix G)

H – High M – Medium L – Low

ILOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
LO1	H	H		M			L			M		L
LO2	H	M	L	M	L	H		L		M	M	L
LO3	M											
LO4	M		H		H			L		L		
Module	H	M	M	M	L	L	L	L		M	L	L

A.3.4.6 NT3 Table: Mapping for the full Programme

(Please refer guidelines in Appendix G)

Table NT3 - Mapping for the full programme

Module		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M1					M			L			M		L
M2		H	M	L	M	H	H		L		M	M	L
M3		M											
M4		M		H		H			L		L		
Semester 1 Total	H												
	M												
	L												
M1		H			M			L			M		L
M2		H		L	M	H	H		L		M	M	L
M3		M											
M4		M		H		H			L		L		
Semester 2 Total	H												
	M												
	L												
M1		H			M						M		L
M2		H		L	M	H	H		L		M	M	L
M3		M											
M4		M		H		H			L		L		
M9		H											
Semester 3 Total	H												
	M												
	L												
M1		H			M			L					L

Table NT3 - Mapping for the full programme

Module		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M2		H		L	M	H	H		L		M	M	L
M3		M								M			
M4		M		H		H					L		
Semester 4 Total	H												
	M												
	L												
M1		H	H					L			M		L
M2		H	M	L		H	H		L		M	M	L
M3		M											
M4		M		H					L		L		
Semester 5 Total	H												
	M												
	L												
M1			H		M			L			M		L
M2		H				H	H		L		M	M	L
M3		M											
M4		M		H					L		L		
Semester 6 Total	H												
	M												
	L												
M1		H	H		M			L			M		M
M2		H	M	L	M	H	H		L		M	M	L
M3		M					L						
M4		M		H		M			L		L		

Table NT3 - Mapping for the full programme

Module		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Semester 7 Total	H												
	M												
	L												
M1		H	H		M						M		L
M2		H	M	L	M	H			L		M	M	L
M3		M								M			
M4		M		M		H			L		M		
Semester 8 Total	H												
	M												
	L												
Programme Total	H												
	M												
	L												

A.3.5 Programme Content

A separate submission of Section (A.3.5) is required for EACH programme and for EACH year for which accreditation is being sought, however, please cross-reference information whenever possible.

A.3.5.1 Curriculum

Degree: ______________________________ **Year**: __________

Subject (indicate core, or elective, or optional)	Timetabled work in hours per week						No. of teaching weeks	Total hours	No. of Credits	Assessment (%)				
	Lectures	Tutorials	Lab work	Projects/ Presentations	Guided self-study	Others (please specify)				End semester exam	In-class assessment	Off-class assessment	Projects/ presentations	Laboratory assessment

A.3.5.2 Syllabi / Module Descriptors

Copies of syllabi, Module Descriptors and the relevant book list for each year of the degree should be provided (five copies). The descriptors should show the pre-requisites and co-requisites.

Following Module Descriptors should be included:

(a) module code and name
(b) credit rating
(c) pre-requisites
(d) co-requisites
(e) lecture time allocations of delivery
(f) tutorial time allocations of delivery
(g) laboratory time allocations of delivery
(h) intended learning outcomes (LO)
(i) content outline
(j) recommended references
(k) assessment modes with relevant weightages for each LO

This must include the links between the programme outcomes and the module outcomes as shown by the module assessment. An explicit mapping must be provided showing how the generic attributes are embedded into the programme.

A.3.5.3 (a) Final Year Projects - Major Individual Project

Outline the arrangements for project allocation, supervision, marking and moderation. A list of final year project titles and marks, together with mean and standard deviation, should be given for the most recent year available. What are the implications for a student who fails a final year project?

A.3.5.3 (b) Comprehensive Design Projects - Group Projects

Provide details of the Comprehensive Design Projects. State the average number of students in each group and show the marking arrangements for individual assessments. Also, outline the arrangements for project allocation, supervision and moderation. A list of Comprehensive Design Project titles and marks, together with mean and standard deviation, should be given for the most recent year available.

What are the implications for a student who fails a comprehensive design project?

A.3.5.4 Design

State how the concepts of engineering design are introduced into the programme and outline the sequence of design exercises and individual / group projects, including any design-make-test work and how the design is assessed.

A.3.5.5 Non-technical Subjects

Describe the opportunities offered for the study of non-technical subjects, such as business and social aspects of engineering, including law, humanities, finance, management development, health and safety, environmental responsibilities, foreign languages and any other complementary subjects, and give details of the assessment methods.

A.3.5.6 Communication Skills of Students

Describe briefly how the following skills are developed and assessed:

(a) standard of English used in written work
(b) oral communication skills
(c) drawing and sketching abilities or other relevant forms of visual communications, including use of computer-aided-design
(d) group working skills
(e) engineering problem-solving skills
(f) project management skills

A.3.5.7 Industrial Visits, Industry Speakers and/or Field Courses

Give brief details of industrial visits and/or field courses (particularly, residential field courses) or any other provision by the University for students to obtain relevant experience off the campus. How do these experiences contribute to the degree result? Give the names of staff members responsible.

Provide details of all presentations by industry specialists in the programme, and where in the programme structure these experiences are provided, for the last twelve months.

A.3.5.8 Industrial Training Placements/ Experiences

(a) **Sandwich Programme**
Give brief details of industrial training and placements, how these are monitored and the names of staff members responsible. Does the industrial training or the sandwich year contribute to the degree result? How is this industrial training and placement assessed?

(b) **Full-time Programme**

(i) Is there a compulsory element in the full-time programme for students to undertake an industrial placement or gain industrial experience?

(ii) If not, how many students have not had any experience on graduation? Give the figures for the last three graduating years.

Industrial Experience - Full-time Programme	**20 ___**	**20 ___**	**20 ___**
Number of students on full-time programme who have not had any industrial experience			
Total number of students graduating from full-time programme(s)			

(c) How many students in the last three graduating years have been sponsored (including Mahapola and other scholarships)

Sponsored Students	**20 ___**	**20 ___**	**20 ___**

A.3.5.9 Industrial Consultative Panel (ICP)

Please state membership, when it was established and how frequently the committee meets

(a) Provide the agenda and minutes of the previous five meetings
(b) Show how Industrialists contribute to programme design and content development
(c) Outline the industrial input to the delivery of the programme(s)

Give details of Visiting Industrial Lecturers and state whether attendance is compulsory.

A.3.5.10 Period of Study Overseas

Give brief details of any period of time spent overseas, indicating the length of time spent abroad and in which institution. Outline the arrangements to ensure that the study is compatible with that in the home University, and show how it is assessed. Does this period contribute to the degree result?

A.3.5.11 Tutorials

Give brief details of tutorial arrangements including purposes of the tutorial system (e.g. subject, overall academic review, pastoral, practical, etc). State the size of tutorial groups, student-staff contact hours etc.

A.3.5.12 Inter-departmental Teaching, External Teaching/Lectures

(a) State which subjects are taught by the staff from other departments or other institutions, and give brief details of any franchise arrangements. Give brief details of the arrangements for assessment.

(b) Give details of any lectures delivered off campus.

A.3.6 Entry Standards

A.3.6.1 Published Requirements

Give the published entry qualifications requirement

A.3.6.2 Student Entry Qualifications

(a) Please give, for each of the last three years, the actual qualifications and subjects of each student admitted to each programme. Give details of the qualifications offered by overseas students. Show separately the number of students with `GCE 'A' Levels`. (This information may be given as an annexure)

(b) Please provide, for each of the last three years, a histogram of the entry points score for `'A' Levels`.

A.3.6.3 Selection Procedures

(a) Describe briefly the procedures adopted for admitting potential students. State whether all students are interviewed, and give the policy adopted for overseas applicants

(b) Please indicate the following for each of the past three years' entries

	20___	20___	20___
1. Total number of applicants			
2. Number of Students interviewed			
3. Offers made			
4. Planned intake			
5. Actual intake			

A.3.7 Progression and Classification

A.3.7.1 Progress through the programme

Please complete a flow diagram showing the last three complete cohorts through the system and a separate sheet for the last three intake years if these are different. Show clearly the progress of students through the programme for each option:

(a) direct entrants

(b) re-sit numbers from previous years

(c) failures (classified, if possible as for academic or non-academic reasons)

`(see student progress)`

A.3.7.2 Methods of Assessment

(a) Give details of the programme assessment/examination procedures/systems including the relevant weighting for examinations, projects and other coursework and the weighting for each year's results

(b) Give details of pass marks, grades and any provision for compensation, together with referral procedures and opportunities to re-sit examinations. What are the arrangements for resubmitting coursework and project work?

(c) What are the conditions governing progression from one year to the next?

(d) In percentage terms, what is deemed to constitute a pass, and to what extent can marginal cases be condoned / retrieved?

(e) If a grading system is used, give the percentage marks that determine the Grades?

(f) State the criteria for the award of Classes; e.g. predetermined percentages of candidates, predetermined boundaries as percentage marks, performance criteria for individually assessed items.

A.3.8 Student Membership Status and Destination

A.3.8.1 Professional Membership

(a) Explain how students are introduced to their relevant Professional Institutions

(b) What proportion of the cohorts are members of Professional Institutions or Societies?

20 ___			20 ___			20 ___		
Inst./Soc.	Number	Present	Inst./Soc.	Number	Present	Inst./Soc.	Number	Present

A.3.8.2 Departmental Staff/Student Committee

Please provide details, and state how often the Departmental Staff/Student Committee meets. Provide minutes of the previous five meetings.

A.3.8.3 Destination of Graduates

Please indicate the employment category of the graduates for each of the last three years.

	20 ___	20 ___	20 ___
1. Permanent employment in engineering, computer science or occupations relevant to the degree programme			
2. Commercial, financial, non-engineering employment			
3. Research / further study			
4. Unemployed / temporary work			
5. Returned to own country			
6. Not known			
Total number in the cohort			

A.3.9 Staff

A.3.9.1 Teaching and Research Staff

Please provide the details shown below for each member of the academic staff and visiting industrial lecturer involved in the programme.
Ensure that details of all industrial experience are provided.
This information may be presented in any format suitable to the Department provided that it is brief and addresses all the requirements.
Under 'Research' the columns refer to:

(a) the number of research students currently supervised
(b) the number of refereed research papers published in the last five years
(c) the number of current consultants

Name	Present post	Date of joining **HEP**	EPF No. / Pension No.	Category*	Period out on sabbatical leave during last 5 years (Applicable only for Category A)	Period serving on sabbatical leave during last 5 years (Applicable only for Category E)	Period serving on contract during last 5 years (Applicable only for Category F)	Academic Qualifications	Membership of Professional Bodies or Societies	Professional Duties (eg External Examiner)	Brief resume (with approx. dates of industrial experience incl. any current activities)	Present teaching Subject(s)		Research		
												Module Name/ Code	Student contact hours per year	a**	b**	c**

*Please indicate the category in the mentioned letter as follows:

Full time active staff -- A
Part time -- B
Full time active staff from other programmes in the institution -- C
Full time staff on sabbatical leave -- D
Staff serving during sabbatical leave from other institution -- E
Full time contract staff -- F

a** = Number of research students currently supervised
b** = Number of referred research papers published in the last five years
c** = Number of current consultancies

A.3.9.2 Summary of Professional Qualifications of Teaching and Research Staff

The total number only for each Institution or Society is required

Institution / Society	Chartered Engineers	Graduate Engineers	Incorporated Engineers

A.3.9.3 Staff Development Policy including Continuing Professional Development (CPD) Requirements / Achievements

(a) Brief details of Policy

(b) Please specify funding details for staff training / development

(c) Give examples of staff attendance at conferences and seminars (in the past two years)

(d) What is the take-up of staff development opportunities?

(e) Are all staff eligible, or, is staff training / development confined mainly to new members?

A.3.9.4 Student / Staff Ratio

(a) Give the departmental equivalent full time staff / student ratio based on full-time equivalent staff involved in delivering the programme and students. Department full-time staff, staff teaching support subjects from other departments and industry/sessional/part-time staff must be clearly distinguished.

	Equivalent Full Time Academic Staff to Student Ratio	**Total Equivalent**	**Description**
A	Total number of full-time active staff for undergraduate teaching into this programme. *(Note: this does not include staff on study leave or research only staff. For staff on sabbatical leave, 0.1 deduction should be made per member for each year of leave falling within the 5 year period considered for accreditation)*		Provide evidence of EPF or pension scheme of each member under Section (A.3.9.1)
B	Full-time equivalent of academic staff serving while on sabbatical leave, or contract basis		0.2 contribution per member per year within the 5 year period considered for accreditation
C	Full-time equivalent of academic staff from other programmes serving this programme		0.2 contribution per year for teaching at least one full module in each semester (Pro-rata, if not)
D	Full-time equivalent of part-time academic staff serving this programme		0.2 contribution per year for teaching at least one full module in each semester within the 5 year period considered for accreditation. (Pro-rata, if not). (Claim from this category is limited to 10% of the total full time equivalent staff)
E	Total Full-time equivalent academic staff $= A + B + C + D$		
F	Total Full-time equivalent students		
G	Full-time equivalent staff to student ratio $= E : F$		When an academic department offers more than one degree programme, and when the staff cannot be uniquely identified to individual degree programme, the staff: student ratio must be computed with respect to the entire student population in the department and the entire number of equivalent full-time academic staff in the department.

A.3.9.5 Support / Technical Staff

(a) Please give the technical staff / full-time academic staff ratio for the Department.

(b) Explain clearly how this figure is derived

(c) Give details of all relevant technical staff, differentiating between permanent (P) and short-term research support staff (R). In a large department, a summary by grade will suffice

Name	**Qualifications**

A.3.10 Research, Consultancy and Postgraduate Programmes

A.3.10.1 Research

Give details of the research work carried out within the Department during the last three years. The details should include:

(i) the title and focus of the project

(ii) the value and period of the project

(iii) the way research influences teaching and student work

A.3.10.2 Consultancy

Give details of the consultancy work carried out within the Department during the last three years. Details should include:

(i) examples of clients

(ii) the total value

(iii) the way consultancy work influences teaching and student work

(The information in `Appendix (A.3.10.1)` and `Appendix (A.3.10.2)` may be presented in any format suitable to the Department, provided it is brief. However, item(iii) should be included on this submission form. For a large Department a summary is acceptable.)

A.3.10.3 Postgraduate Programmes and Short Courses

Give details of related postgraduate programmes and in-career courses offered by the Department, including the number and duration of courses and the total number of students on each course, for the past three years.

A.3.11 Resources

A.3.11.1 Facilities

Give briefly, details of the resources, which are available to students, in each of the areas designated, and any changes since the last visit. Indicate how many students can be accommodated in laboratories/workshops, design/drawing facilities, library and computer facilities at any one time. What facilities are available for students for their final year projects and comprehensive design projects.

Resources – Provide brief details	**Access** (availability other than for timetabled work i.e. evenings, week-ends)
Laboratories / Workshops	
Details of annual expenditure on equipment or major expenditure on laboratories / workshops Explain how the laboratory equipment is being upgraded in a systematic way.	
Drawing / Design Facilities	
Provide details of annual expenditure on equipment or major expenditure on drawing / design facilities.	
Library	
Please give details of annual expenditure on: (a) journals (b) books (c) other Give details of the online journals that students and staff can access.	
Computing Facilities	
State (a) number of computers within the Department (b) number of computers within the University to which students have access (c) how often is equipment replaced? (d) specialist software available to students and staff	

Resources -- Provide brief details (include details of what facilities are available in these rooms, i.e. computers, overhead projectors, data projectors etc.)	**Access** (availability other than for timetabled work i.e. evenings, week-ends)
Study Rooms	
Lecture Rooms	

Details of Space of Facilities

Space of Laboratories

Laboratory	Number of lab-sessions per batch	Number of students per lab-session	Floor area in square meters (m^2)
Total			

A session to be minimum of 2 hours duration

Teaching and other student spaces

Facility	Usage description such as lecture hall, examination hall, study area, library, restrooms, circulation space etc.	Number of student occupied by the facility at a time	Floor area in square meters (m^2)
Total			

In the case of common facilities with other programmes the effective space shall be calculated based on student numbers (the student number of programme applied/Total number of students of the Faculty)

(** Generally, the world universities maintain an approximate space of 10 m^2 per student.)

A.3.11.2 Income to Support the Teaching Programme

Please give figures for the last five years

Income	20___	20___	20___	20___	20___
Government					
Research / Consultancy					
Other					
Total					

A.3.11.3 Resource Changes

Please state anything distinctive or unusual about the resources for the programme - e.g. new or refurbished accommodation or major equipment, shortage of space or difficulties over sharing space.

A.3.12 Quality Assurance and Systems

(i) Give a brief statement on teaching quality assurance procedures within the Department and state how they relate to the institutional QA requirements. Include information on

  (a) maintenance and improvement of standards of lectures and other modes of teaching and learning, assessment and examinations;

  (b) program review procedure;

  (c) moderation of examinations, students' work, including monitoring and feedback;

  (d) the role of the External Reviewer

(ii) Provide records of the examination, curriculum development or other meetings as evidence on how QA procedures have been developed and the action taken by the Department to implement QA procedures.

(iii) Provide in digital form the QA policies for the above procedures.

(iv) Provide External Reviewer's report

(v) Provide details of benchmarking the programme against those of overseas universities.

A.3.13 Future Plans

A.3.13.1 Planned Changes

Give details of any major changes planned or intended in the programme structure or content, facilities, equipment, staff or student intake. What are the implementation dates?

`(Changes to the curriculum that are agreed as per department policy and to be implemented within the period for which accreditation is being sought should appear in Appendix (A.3.3.9))`

A.3.14 Staff Profile

Provide a listing of all academic staff who teach in the Faculty of Engineering, indicating their qualifications (degrees, professional memberships, honours and other post nominal). Include adjunct staff, and visiting or part-time staff who have principal responsibility for subjects. For the adjunct and visiting staff, give the titles of their substantive appointments.

Indicate numbers of visiting staff who perform supporting roles (i.e., do not have principal responsibility for subjects) and typical occupational categories e.g., practising engineers, other professionals, research students.

Discuss the competency of the teaching staff to cover all areas of the curriculum, and indicate any strategies for reinforcing areas of weakness, staffing new areas of specialisation, and succession planning for academic and organisational leadership.

Provide information about other units of the University, which teach subjects in the engineering programme(s), and about any staff outside the University who have responsibility for substantial elements of the engineering programme(s).

For any programme or pathway conducted substantially outside the University (e.g., contracted to another university, or remote campus with different staff), describe the staffing arrangements that apply, and the methods used by the University to assure itself of the capabilities of the staff involved.

A.3.15 Staff Policy

Outline the University/Faculty policies in relation to staff, including:

- appointment;
- promotion;
- supervision and staff counselling;
- appointment, supervision and counselling of visiting staff;
- professional development of staff; and
- any merit-based reward systems

Describe the University's arrangements for managing staff workloads indicating the approximate proportions of academic staff activity devoted to undergraduate teaching, postgraduate teaching, student consultation and counselling, research and research supervision, consulting and other professional activity, developmental programmes and administration.

Provide information about the number of staff undertaking professional development programmes, and the range of programmes undertaken.

Appendix B

Academic Programme Content

B.1 Academic Programme Content

(a) **Engineering Science and Principles**

Academic programme will be expected to cover the knowledge profiles, which are part of the graduate attributes, and following information may be used at an appropriate level for the broad areas as a guide line

Civil	**Mechanical**	**Production**	**Electrical**	**Chemical**	**Electronic**	**Computer**	**Textile and Clothing**	**Earth Resources**	**Materials**
Strength and properties of materials	Strength and properties of materials	Manufacturing systems and industrial engineering	Circuits and systems	Chemical thermodynamics and kinetics, Process stoichiometry	Signals and systems	Computer systems	Properties of textile materials	Exploration, mining and testing of earthen materials	Engineering materials, Mechanics of materials
Applied mechanics: Statics and dynamics	Mechanics and Mechanics of machines	Mechanics of machines, control systems and robotics	Electrical machines and drives	Transport phenomena, Heat, mass and momentum transfer	Electronics (analog, digital and physical)	Software engineering	Yarn and fabric manufacture	Applied mechanics	Applied mechanics: Dynamics
Structural analysis and design	Vibrations, dynamics and Control systems	Manufacturing technology & processes	Electrical power systems	Separation process and particle technology	Communication systems	Operating systems	Textile engineering	Structural analysis of minerals	Mechanical behaviour of materials
Fluid mechanics and hydraulic engineering	Fluid mechanics and Fluid Machinery	Production planning and control/ operations management	Electronics principles and power electronics	Chemical reactor engineering	Wave propagation	Computer architecture	Chemical processing of textiles	Remote sensing and GIS	Fluid mechanics and thermodynamics
Soil mechanics and geotechnical engineering	Thermodynamics, fluid dynamics and heat transfer	Product design & development	Computer systems, fields and waves	Process analysis and control, Safety analysis and control	Computer systems	Computer networks	Computer systems, fields and waves	Geology	Electrical & magnetic properties of materials
Construction planning, technology and management	Machine elements design and system designs	CAD/CAM & Computer integrated manufacturing	Control systems	Material science and technology	Control systems	Theory of electricity, Principles of electronics	Textile testing and quality control	Gemmology	Failure analysis and selection of materials

Alongside these basic subjects, there must be a study of the principles and applications of:

Civil	**Mechanical**	**Production**	**Electrical**	**Chemical**	**Electronic**	**Computer**	**Textile and Clothing**	**Earth Resources**	**Materials**
Geology	Manufacturing systems	Mechatronic systems & industrial automation	Power system analysis	Material and energy balance flow sheeting	Electronic system analysis and design	Object oriented programming	Control systems and automation	Hydrology	Materials and ceramic sciences
Environmental engineering	Energy and the environment, & sustainability	Electrical power and machines	Electrical drives and applications	Polymer science and engineering	Computer architecture	Databases	Yarn and fabric Mechanics	Mining Methods	Characterisation of materials
Highway and transportation engineering	Electrical power and machines	Engineering measurements & metrology	Measurement and instrumentation	Plant and equipment design, Piping and instrumentation	Electronic measurement	Data communication	Financial management, Human Resource management	Mine Ventilation	Process and Polymer Engineering
Water resources	Measurement and Instrumentation	Plant management & layout design	Electrical protection systems	Energy systems -- conservation and management	Electronic control and instrumentation	Microprocessor based systems	Non-wovens and technical Textiles	Rock blasting	Ferrous/ non-ferrous metals and alloys
Surveying	CAD and computer application in Mechanical engineering	Management, economics, & accounting	High voltage Engineering	Biotechnology, Biochemical and food process engineering	Internet technology and applications	MIS and professional practice	Environmental Management	Surveying, Environmental aspects	Design and fabrication of polymer products
Project management	Electronics and microprocessors	Quality assurance	Electrical energy utilisation	Viability, legal framework and reliability		Data structures and algorithms	Operations management and MOT	Mine management	Degradation of materials

These are supporting studies without which an engineer will lack some of the understanding, which is necessary to be able to practice effectively across a broad spectrum of industries and functions.

(b) **Mathematics, Statistics and Computing**

These subjects should be studied to a level necessary to underpin the engineering subjects of the programme and with a bias towards application in the teaching. The use of numerical methods of solution is encouraged, with an appreciation of the power and limitations of the computer for modelling engineering situations. Wherever practicable, it is preferred that mathematics, statistics and computing be taught in the context of their application to engineering problems, and it follows that some mathematical techniques may be learnt within other subjects in the programme. In addition to the use of computers as tools for calculation, analysis and data processing, courses should introduce their application in such areas as:

Civil	**Mechanical**	**Production**	**Electrical**	**Chemical**	**Electronic**	**Computer**	**Textile and Clothing**	**Earth Resources**	**Materials**
Computer aided analysis and Design	Mathematical applications	Computer aided engineering (CAE)	Mathematical applications	Computer aided analysis and design	Mathematical applications	Mathematical applications	Computer aided design	Computer aided analysis and design	Computer aided analysis and design
Economic analysis for decision making	Computer aided design and manufacture	Numerical methods	Statistical techniques	Economic analysis for decision making	Statistical techniques	Statistical techniques	Statistical techniques	Economic analysis for decision making	Economic analysis for decision making
Database management	Numerical methods	Programming techniques	Computer aided design	Databases and information systems	Computer aided design	Numerical computations	Information systems	Database Systems	Database Systems
Management information systems	Programming techniques	Operations research	Electrical properties of materials	Operational research	Software engineering	Automation	On-line control of production systems	Mine development	Operational research
Business and management systems	Industrial engineering Operational Research	Statistical techniques	Management systems	Business and management systems	Management systems	Systems analysis and design	Management and marketing systems	Management systems	Management systems
Statistical techniques	Industrial economics and management	Manufacturing systems modelling & simulation	Numerical computation	Numerical methods	Numerical computation		Operational research	Numerical computations	Numerical computations

(c) **Engineering Applications -- Materials, Design, Manufacture, Construction**

Emphasis on engineering applications in a degree programme aims to ensure that all engineering graduates have a sound understanding of up-to-date industrial practice, and in particular:

Civil Engineering

- To appreciate the characteristic and structural behaviour of materials in a variety of user environments;
- To be able to analyse and design structural components from these materials;
- To appreciate the range of construction methods currently available and the skills which they require in people;
- To appreciate the cost aspects of material selection, construction methods, operation and maintenance in their interaction with design and product marketing;
- To understand the whole process of industrial decision-making in design, construction and use, and how it can be influenced not only by technical ideas but also by the practical constraints of financial and human resources and by the business and social environment of engineering.

Mechanical Engineering

- To appreciate the characteristic behaviour of materials in a variety of user environments;
- To appreciate the range of manufacturing methods currently available and the skills which they require in people;
- To be able to analyse and design structural components from these materials integrating optimum use of material and sustainability aspects where applicable
- To appreciate the cost aspects of material selection, manufacturing methods, operation and maintenance in their interaction with design and product marketing
- To understand the whole process of industrial decision-making in design, manufacture and use, and how it can be influenced not only by technical ideas but also by the practical constraints of financial and human resources and by the business and social environment of engineering.

Production Engineering

- To appreciate the characteristic behaviour of materials in a variety of user environments;
- To appreciate the range of manufacturing methods currently available and the skills which they require in people;
- To appreciate the cost aspects of material selection, manufacturing methods, operation and maintenance in their interaction with design and product marketing to understand the whole process of industrial decision-making in design, manufacture and use, and how it can be influenced not only by technical ideas but also by the practical constraints of financial and human resources and by the business and social environment of engineering.

Chemical Engineering

- To appreciate the characteristic and structural behaviour of materials in a variety of user environments;
- To be able to adopt these materials in process design and analysis;
- To understand the general sequence of processing steps for any given type of chemical process;
- To calculate and analyse the material and energy flows for a given chemical process;
- To understand the selection or estimation of process operating conditions, selection of process equipment, maintenance and process troubleshooting;
- To analyse the various types of unit operations and processing steps, and to decide on their relative advantages and disadvantages on the basis of environment, economics, safety and operability;
- To understand the various process control schemes for the purpose of maintaining production quality, ensuring process safety and preventing waste.

Electrical and Electronic Engineering

- To appreciate the characteristic behaviour of materials in electrical and electronic systems;
- To be able to analyse and design electrical and electronic systems from devices / components made of various materials;
- To appreciate cost effectiveness of component / device / equipment / material selection, manufacturing process and integration process, operation and maintenance;
- To appreciate the range of manufacturing and processing methods currently available and the skills which they require in people;
- To understand the whole process of industrial decision-making in design, manufacture and use, and how it can be influenced not only by technical ideas but also by the practical constraints of financial and human resources and by the business and social environment of engineering.

Computer Science and Engineering

- To appreciate the characteristic behaviour of hardware, software and networking systems;
- To be able to analyse and design hardware, software and networking technologies, and to use them in the design of information systems to achieve required goals;
- To appreciate the range of methodologies available for the development of hardware, software and networking systems;
- To appreciate the importance of improving performance of hardware, software and networking systems;
- To understand the process of information technology, and how it can be influenced not only by technical ideas but also by the practical constraints of financial and human resources and by the business and social environment of engineering.

Textile and Clothing Process Engineering

- To appreciate the characteristics and structural behaviour of textile materials;
- To be able to use textile materials in analysing, designing and fabricating textile structures;
- To appreciate the range of manufacturing and processing methods currently available, and the skills they require in people;
- To understand the general sequence of processes and material flow of any textile / clothing manufacturing system;
- To understand the various process control schemes for the purpose of maintaining quality of production and optimising production;
- To understand the whole process of industrial decision making in the analysis, design, manufacture and use, and the influence of constraints such as financial, human and environmental, on the decision making.

Earth Resources Engineering

- To appreciate the characteristic behaviour of earth resources in a variety of user environments;
- To be able to understand the general sequence of steps in the processing of earth resources;
- To appreciate the range of mining, processing and testing methods currently available, and the skills that they require in people;
- To analyse and design ventilation systems for underground mines;
- To understand the environmental effects of mining and the mitigatory measures, surveying, remote sensing and GIS applications for decision making, and how it can be influenced not only by technical ideas but also by the practical constraints of financial and human resources and by the business and social environment of engineering.

Materials Engineering

- To be able to understand the structure-properties relationship of engineering materials and the basics of materials science in order to predict performance at the design, manufacture and in-service stages in the core areas of polymers, ceramics, metals and composites;
- To be able to apply scientific and engineering principles to ensure that materials are selected, processed, fabricated and used to achieve their intended performance;
- To appreciate the materials process technology with cost effective materials selection, manufacturing methods, product design and marketing and industrial maintenance;
- To develop competence in laboratory work, ability to use information technology and a high level of skills in communication and presentation;
- To understand the industrial environment for decision making, and how it can be influenced not only by technical ideas but also by the practical constraints of financial and human resources and by the business and social environment of engineering.

Appendix C

Report of the Evaluation Panel

In addition to the summary as given in `Appendix D`, a separate accreditation panel report as detailed below is to be submitted:

C.1 General Information

- Panel membership: Chairman and Panel Members;
- Name of the University seeking accreditation for a programme;
- Name of the Faculty;
- Name of the Department;
- Date of submission of request for accreditation;
- Date of receipt of initial documentation.

For each programme evaluated:

- title of programme;
- degree awarded on completion, with abbreviation;
- University awarding the degree, if different from above;
- level of accreditation sought;
- year of first introduction of the programme, and year of major revisions; and
- year of last accreditation assessment, and outcome.

C.2 Account of Proceedings

Date(s) of visit(s) to the University, and a brief account of the proceedings: meetings with staff, students, constituents, facilities and materials inspected, points noted in the process.

C.3 Action Since Last Accreditation

Provide a response to all the recommendations made by the previous evaluation of a programme or programmes. Detail the action taken by the University and results.

C.4 Commendations

The Panel will highlight any outstanding areas/aspects of the programme being assessed.

C.5 Evaluation Against Criteria

The Panel's final evaluation of compliance with the criteria should be done after taking into account of the University's response to the draft report. Each of the 10 criteria (a) to (j) is evaluated in relation to all modes in which each programme is offered, and the Compliance Status described as one of the four below. Each compliance status will also have a corresponding rating score, as shown.

- Total or substantial failure to comply with (Rating = 0)
- Significant deficiencies to be remedied before accreditation can be recommended (Rating = 1)
- Acceptable level of compliance: Minor shortcomings to be identified and development action recommended (Rating = 2)
- Substantial or full compliance: Any opportunities for improvement to be noted and innovations and examples of good practice to be commended (Rating = 3)

The Panel provides comments under each heading on identified shortcomings, examples of innovation and good practice, and directions recommended for future development.

There may be a re-construction of Tables NT1, NT2 and NT3 of `Appendix A`, as determined by the Evaluation Panel.

C.5.1 Individual Criteria

(a) **Programme objectives and outcomes**

- The objectives are well stated, likely to be meaningful to students and employers, and consistent with the mission of the University and with the expectation of a professional engineering degree.
- The programme title properly reflects its objectives and is professionally appropriate.
- The obtainment of the programme outcomes can be clearly demonstrated by all graduates, i.e. this is proven by the links between the programme outcomes, the module outcomes and the module assessment.

Rating: **0 | 1 | 2 | 3**

Compliance Status:

(b) **Programme structure**

- The programme structure is consistent with Section (5.2.2.4).
- The programme structure at introductory level is compatible with students' backgrounds at entry.
- Descriptions of subjects and other elements are adequate, for all modes and pathways.
- Arrangements for exposure to professional engineering practice meet Sections Section (4.2) and Section (5.2.2.4).

For reporting under (a) and (b), there may be a re-construction of Tables NT1, NT2 and NT3 of `Appendix A`, as determined by the Evaluation Panel.

Rating: **0 | 1 | 2 | 3**

Compliance Status:

(c) **Educational process**

- Curriculum design is effective in addressing each of the generic graduate attributes (Section (4.4)).
- Curriculum justifies any specialist title carried by the programme and is effective in imparting appropriate attributes and specialist knowledge.
- The programme outcomes in relation to professional engineering practice are appropriate and the curriculum provides adequate means for students to attain these outcomes.
- Arrangements for programme delivery and student support, including staffing arrangements, are adequate.

Rating: **0 | 1 | 2 | 3**

Compliance Status:

(d) **Assessment**

- The assessment processes effectively measure the outcomes of the programme as a whole and their relationship to the stated objectives and the generic and specialist attributes.
- The assessment processes are properly moderated to ensure consistent standards
- Clear processes exist for the assessment of individual students undertaking group work, particularly with the final year project and comprehensive design project.
- An appropriate variety of assessment processes and opportunities are employed, consistent with Section 5.2.4.
- The assessment processes adequately ensure that each individual graduate has met the degree requirements and stated programme outcomes.
- The criteria and processes for the award of honours are appropriate.

Rating: **0 | 1 | 2 | 3**

Compliance Status:

(e) **Educational culture**

- There is clear evidence of a forward-looking, proactive educational culture and awareness of current developments in engineering education by all staff.
- Approaches to curriculum design and delivery and to assessment are holistic, and not fragmented.
- Staff are active in role-modelling the generic attributes of a professional engineer.
- There are active programmes in place to promote the objectives and also community consciousness, nationalisation and internationalisation.

Rating: **0 | 1 | 2 | 3**

Compliance Status:

(f) **Quality system**

- Processes for programme planning and curriculum development and review are appropriate, and involve all academic staff.
- For a new programme, the rationale for its introduction, and evidence of demand and of availability of resources, are adequate.
- There is clear evidence that the results of assessment of student performance and learning outcomes are being applied to the review and ongoing improvement of programme effectiveness.
- There are effective processes for securing feedback from all programme constituents and applying it to the review and ongoing validation and improvement of programme objectives, curriculum, assessment and quality of learning and teaching. The results of this feedback must be reported back to all stakeholders.
- There are effective advisory mechanisms for consulting and involving practising professional engineers and leading employers of engineering graduates in forward planning and quality management.
- There are programmes in place or under active development, for benchmarking programme standards against those of other universities, nationally and / or internationally.
- Graduate employment data and alumni and employer feedback are available and give confidence in the programme, the Engineering Faculty and the capability of its graduates.
- The Faculty has an effective records management system

Rating: **0 | 1 | 2 | 3**

Compliance Status:

(g) **Programme administration and statistics**

- Admission policies are appropriate and consistent for students from all backgrounds.
- Policies on advanced standing and credit transfer are clear
- Student numbers and estimated forward trends are adequate for a viable programme.
- Arrangements for progression, graduation and the award of honours appear appropriate.

Rating: **0 | 1 | 2 | 3**

Compliance Status:

(h) **Operation environment**

- Organisational arrangements in the University and the Engineering Faculty are consistent with Sections `Appendix (A.3.1)` and `Appendix (A.3.2)` in `Appendix A`.
- Evidence of long-term commitment and forward planning are consistent with Section A.3.1 in `Appendix A`.

Rating: **0 | 1 | 2 | 3**

Compliance Status:

(i) **The staff and students**

- The qualifications, experience, and professional standing of the staff are appropriate.
- The overall staff profile demonstrates a capability to meet the objectives of the programme and the Engineering Faculty, and appears to be adequately distributed in relation to the programme / teaching commitments.
- The staff members are competent to cover all curriculum areas in relation to the programme(s) to be accredited, including those relating to any specialist title.
- There are adequate arrangements in place to assure the quality and capability of staff or provide from outside the University who have major responsibilities in relation to the programme.
- Appropriate use is made of visiting staff who provide complementary expertise to that available within the Faculty.
- Policies and practice in relation to staff recruitment, supervision, promotion and workload management are appropriate.
- There are adequate arrangements for the support of visiting staff.
- Staff members are undertaking an appropriate range of professional and educational development programmes.

TEACHING STAFF -- GENERAL INFORMATION

(1) Number of Academic Staff (full-time) with service of 5 years and more ☐

(2) Number of Academic Staff (full-time) with service of less than 5 years ☐

(3) Number of Academic Staff (part-time) ☐

Qualifications of Academic Staff:

(1) **Highest Academic Qualifications**

Qualification	**Number**	**Remarks**
(i) Doctorate		
(ii) Masters		
(iii) Bachelors		
(iv) Diploma in Education		
(v) Other Qualifications (please specify)		

(2) **Professional Qualification (e.g. Registered P.E., Member of Professional Body**

Type of Qualification	**Number**	**Remarks**
(i) Chartered Engineers		
(ii) Members of Professional Bodies		

(3) **Posts**

Position	**Number**	**Remarks**
(i) Professors		
(ii) Associate Professors		
(iii) Senior Lecturers		
(iv) Lecturers		
(v) Instructors / Temporary Instructors		
(vi) Technical Officers		
(vii) Others (please specify)		

** Attachment:
List of names of academic staff (both full-time and part-time) with their academic and professional qualification is to be attached separately.

Rating: 0 | 1 | 2 | 3

Compliance Status:

(j) **Resources and facilities**

- The University's arrangements for funding the University are appropriate.
- Allocation of resources to programmes within the University is appropriate.
- Adequate resources are available to meet the programme objectives. Future trends, or steps being taken to address them, indicate continuing viability.
- Adequate facilities and infrastructure are available to students and staff.
- Sufficient modern facilities are made available for staff and students

Rating: 0 | 1 | 2 | 3

Compliance Status:

C.5.2 Compliance under each summary of criterion

When reporting under this section, the Panel can use the table given below to map numerical value of the evaluated Rating explicitly against the four summary criteria of Academic Programme; Staff and Students; Facilities available in Faculty / Department; and Quality Systems. Averaged Rating is R. (*See* `Appendix D`).

SN	Criteria	1. Academic Programme	2. Staff and Students	3. Facilities Available in HEP	4. Quality Systems
(a)	Programme Objectives and Outcomes	✔			
(b)	Programme Structure	✔			
(c)	Educational Process	✔			
(d)	Assessment				✔
(e)	Educational Culture		✔	✔	
(f)	Quality Systems				✔
(g)	Programme Admin and Statistics	✔	✔		
(h)	Operational Environment			✔	✔
(i)	Staff	✔	✔		
(j)	Resources and Facilities			✔	

C.6 Recommendations

The Panel will provide a series of recommendations intended to assist with the processes of continuing quality improvement and to summarise the outcomes arising from the above discussion.

C.7 Report and University Response

The Board refers the report of the Panel to the University / Faculty for clarification / comment on factual matters.

C.8 Recommendation and Comments

The Evaluation Panel will not make any recommendations regarding accreditation in their report described in this Appendix. However, their recommendations are made in the Summary Report (`Appendix D`), which is prepared after receiving the response of the University / Faculty to the Panel's report. A recommendation to the **IESL** will be made by the EAB after considering the report of the Panel, the response to it from the University / Faculty and the Summary Report of the Panel.

Appendix D

Summary Accreditation Report

SUMMARY ACCREDITATION REPORT

D.1 General Information

(a) University / Institution

1. Name of the University / Institution: ....
2. Programme for Accreditation: ....

(b) Evaluation Panel Members

1. Chairman: ....
2. Members: (a) ....

   (b) ....
3. Official (if any): ....

(c) Medium of Instruction and Reference Materials Available

1. Medium of instruction of programme evaluated: ....
2. Language of available reference materials: ....

D.2 Evaluation Criterion

The following guidelines are provided to enable the Evaluation Panel to come to a final determination of the accreditation sought by the Study Programme.

The average for each summary criterion should be calculated using each evaluator's judgement and rating scores for individual criteria as per `Appendix` (`C.5`). After computing the average rating from all evaluators for each of the 4 summary criteria as `'R'`, then the following can be used as a guide for arriving at the final classification for each summary criterion.

Average numerical value of 'R' for each of the summary criteria 1 to 4 of `Appendix D`	**Classification**
$0 \leq \mathtt{R} < 1$	Poor
$1 \leq \mathtt{R} < 2$	Satisfactory
$2 \leq \mathtt{R} \leq 3$	Good

Overall Comments/Remarks for SUMMARY CRITERION No.1. Academic Programme Poor/Satisfactory/Good

Overall Comments/Remarks for SUMMARY CRITERION No.2. Staff and Students Poor/Satisfactory/Good

Overall Comments/Remarks for SUMMARY CRITERION No.3. Facilities available in the **HEP** Poor/Satisfactory/Good

Overall Comments/Remarks for SUMMARY CRITERION No.4. Quality Systems Poor/Satisfactory/Good

D.3 Evaluation Panel Assessment Report

Evaluation panel assessment report summary

Overall Comments / Remarks:

(i) Strength
(ii) Weakness
(iii) Concerns
(iv) Opportunities for Improvement
(v) Other comments / remarks

Date of Visit: ....

Programme Title: ....

Faculty: ....

D.4 Recommendation by Evaluation Panel

(a) **Full Accreditation** ☐
Comments:

....

....

(b) **Conditional Accreditation** ☐ * with conditions
Duration: ☐ Year

Comments:

....

....

Conditions to meet:

(i) ....

(ii) ....

(c) **Decline Accreditation / Terminate Accreditation** ☐
Comments:

(i) ....

(ii) ....

Prepared and submitted by Evaluation Panel:

(i) Chairman .... Signature:

(ii) Member .... Signature:

(iii) Member .... Signature:

Date: ....

D.5 Action by IESL Accreditation Board (IESLAB)

(a) **Date Submitted to IESLAB**:

. . . .

(b) **Comments by IESLAB**:

(i) . . . .

(ii) . . . .

(iii) . . . .

(c) **Recommendation by Board**:

Concur with Evaluation Panel * Yes / No

If not agreeable with Evaluation Panel's recommendation, **IESLAB** recommendations are:

(i) Full Accreditation	☐
(ii) Conditional Accreditation	☐
(iii) Decline Accreditation / Terminate Accreditation	☐

Conditions to meet:

(i) . . . .

(ii) . . . .

Date: Signature

Chairman, **IESLAB**

D.6 Action by Institution of Engineers, Sri Lanka

(a) Report presented to **IESL** on: . . . .

(b) Decision of **IESL**: . . . .

(c) Action to be followed:

(i) Finalize the 'Document to be forwarded to Study Programme together with the Council Decision'. This document should be the 'Conclusions' section of the Review Panel Report covering (1) Commendations; and (2) Detailed Comments and Recommendations.

. . . .

(ii) . . . .

(iii) . . . .

Date: Signature

Executive Secretary, **IESL**

D.7 Action by the Secretariat

Accreditation Certificate No. .... was issued to the Faculty/Department of ....

.... the University of .... on:.......................

Note: *Delete whichever is not applicable*

Appendix E

External Reviewer's Report

E.1 External Reviewer's Report

The external reviewer's report should contain, but not be limited to, the following:

(i) Assessment of the curriculum including programme content.

(ii) Assessment of staff quality including qualifications and industrial exposure. Also to assess loading of each staff in teaching, research, consultancy and supervision of student projects.

(iii) Assessment on staff-student ratio. If not sufficient, the corrective action to be taken by the University to correct as noted.

(iv) Assessment on the process of preparation of question papers i.e., procedures for setting, vetting, quality assurance, confidentiality and security.

(v) Assessment on the question papers and marking schemes set for the last two semesters of the course the standard of questions, coverage of syllabus, adequate balance between theory and application, questions set are of equal level, adequate choice of questions, appropriateness of marking scheme.

(vi) Assessment on the marked answer scripts from a sample of good, average and weak candidates. Assessment of the fairness / disparity of marking, whether follow-through method is adopted where one section of the answer is incorrect, the response of the candidates to the questions, the distribution of marks.

(vii) Assessment on coursework, laboratory work, assignments, design projects and final year projects.

(viii) Assessment on examination regulations available.

(ix) Benchmarking programme of study to internationally accepted levels.

Appendix F

IEA Graduate Outcomes Exemplar Statements and Professional Competencies

INTERNATIONAL ENGINEERING ALLIANCE (IEA) GRADUATE OUTCOMES EXEMPLAR STATEMENTS AND PROFESSIONAL COMPETENCIES

(As ratified at IEA Biennial meetings Kyoto, June 2009)

Washington Accord	:	4+ years Professional Engineer programmes
Sydney Accord	:	3+ years Engineering Technologist programmes
Dublin Accord	:	2+ years Engineering Associate programmes

July 2009

F.1 Accord Programme Profiles

The following tables provide profiles of graduates of three types of tertiary education engineering programmes. See sr. no. 2 below for definitions of complex engineering problems, broadly-defined engineering problems and well-defined engineering problems.

F.1.1 Knowledge Profiles

A Washington Accord programme provides:	**A Sydney Accord programme provides**:	**A Dublin Accord programme provides**:
WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline	**SK1**: A systematic, theory-based understanding of the natural sciences applicable to the sub-discipline	**DK1**: A descriptive, formula-based understanding of the natural sciences applicable in a sub-discipline
WK2: Conceptually-based mathematics, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modelling applicable to the discipline	**SK2**: Conceptually-based mathematics, numerical analysis, statistics and aspects of computer and information science to support analysis and use of models applicable to the sub-discipline	**DK2**: Procedural mathematics, numerical analysis, statistics applicable in a sub-discipline
WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline	**SK3**: A systematic, theory-based formulation of engineering fundamentals required in an accepted sub-discipline	**DK3**: A coherent procedural formulation of engineering fundamentals required in an accepted sub-discipline
WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.	**SK4**: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline	**DK4**: Engineering specialist knowledge that provides the body of knowledge for an accepted sub-discipline
WK5: Knowledge that supports engineering design in a practice area	**SK5**: Knowledge that supports engineering design using the technologies of a practice area	**DK5**: Knowledge that supports engineering design based on the techniques and procedures of a practice area
WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline	**SK6**: Knowledge of engineering technologies applicable in the sub-discipline	**DK6**: Codified practical engineering knowledge in recognised practice area.
WK7: Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the professional responsibility of an engineer to public safety; the impacts of engineering activity: economic, social, cultural, environmental and sustainability	**SK7**: Comprehension of the role of technology in society and identified issues in applying engineering technology: ethics and impacts: economic, social, environmental and sustainability	**DK7**: Knowledge of issues and approaches in engineering technician practice: ethics, financial, cultural, environmental and sustainability impacts
WK8: Engagement with selected knowledge in the research literature of the discipline	**SK8**: Engagement with the technological literature of the discipline	
A programme that builds this type of knowledge and develops the attributes listed below is typically achieved in 4 to 5 years of study, depending on the level of students at entry.	A programme that builds this type of knowledge and develops the attributes listed below is typically achieved in 3 to 4 years of study, depending on the level of students at entry.	A programme that builds this type of knowledge and develops the attributes listed below is typically achieved in 2 to 3 years of study, depending on the level of students at entry.

F.1.2 Graduate Attribute Profiles

Differentiating Characteristic	**. . . for Washington Accord Graduate**	**. . . for Sydney Accord Graduate**	**. . . for Dublin Accord Graduate**
Engineering Knowledge:	**WA1**: Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to the solution of complex engineering problems.	**SA1**: Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in SK1 to SK4 respectively to defined and applied engineering procedures, processes, systems or methodologies.	**DA1**: Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in DK1 to DK4 respectively to wide practical procedures and practices
Problem Analysis: Complexity of analysis	**WA2**: Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. (WK1 to WK4)	**SA2**: Identify, formulate, research literature and analyse broadly-defined engineering problems reaching substantiated conclusions using analytical tools appropriate to the discipline or area of specialisation. (SK1 to SK4)	**DA2**: Identify and analyse well-defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity. (DK1 to DK4)
Design/development of solutions: Breadth and uniqueness of engineering problems i.e. the extent to which problems are original and to which solutions have previously been identified or codified	**WA3**: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. (WK5)	**SA3**: 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. (SK5)	**DA3**: Design solutions for well-defined technical problems and assist with the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. (DK5)
Investigation: Breadth and depth of investigation and experimentation	**WA4**: Conduct investigations of complex problems using research-based knowledge (WK8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.	**SA4**: Conduct investigations of broadly-defined problems; locate, search and select relevant data from codes, data bases and literature (SK8), design and conduct experiments to provide valid conclusions.	**DA4**: Conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements.
Modern Tool Usage: Level of understanding of the appropriateness of the tool	**WA5**: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations. (WK6)	**SA5**: Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to broadly-defined engineering problems, with an understanding of the limitations. (SK6)	**DA5**: Apply appropriate techniques, resources, and modern engineering and IT tools to well defined engineering problems, with an awareness of the limitations. (DK6)

Differentiating Characteristic	**. . . for Washington Accord Graduate**	**. . . for Sydney Accord Graduate**	**. . . for Dublin Accord Graduate**
The Engineer and Society: Level of knowledge and responsibility	**WA6**: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems. (WK7)	**SA6**: 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 problems. (SK7)	**DA6**: Demonstrate knowledge of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technician practice and solutions to well defined engineering problems. (DK7)
Environment and Sustainability: Type of solutions.	**WA7**: Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts. (WK7)	**SA7**: Understand and evaluate the sustainability and impact of engineering technology work in the solution of broadly defined engineering problems in societal and environmental contexts. (SK7)	**DA7**: Understand and evaluate the sustainability and impact of engineering technician work in the solution of well defined engineering problems in societal and environmental contexts. (DK7)
Ethics: Understanding and level of practice	**WA8**: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice. (WK7)	**SA8**: Understand and commit to professional ethics and responsibilities and norms of engineering technology practice. (SK7)	**DA8**: Understand and commit to professional ethics and responsibilities and norms of technician practice. (DK7)
Individual and Team work: Role in and diversity of team	**WA9**: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.	**SA9**: Function effectively as an individual, and as a member or leader in diverse teams.	**DA9**: Function effectively as an individual, and as a member in diverse technical teams.
Communication: Level of communication according to type of activities performed	**WA10**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	**SA10**: Communicate effectively on broadly defined engineering activities with the engineering 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	**DA10**: Communicate effectively on well-defined engineering activities with the engineering community and with society at large, by being able to comprehend the work of others, document their own work, and give and receive clear instructions
Project Management and Finance: Level of management required for differing types of activity	**WA11**: Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	**SA11**: Demonstrate knowledge and understanding of engineering 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.	**DA11**: Demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member or leader in a technical team and to manage projects in multidisciplinary environments
Lifelong Learning: Preparation for and depth of continuing learning.	**WA12**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	**SA12**: Recognize the need for, and have the ability to engage in independent and life-long learning in specialist technologies.	**DA12**: Recognize the need for, and have the ability to engage in independent updating in the context of specialized technical knowledge.

F.2 Common Range and Contextual Definitions

F.2.1 Range of Problem Solving

`References to the Knowledge Profile are shown thus: {WK3, WK4, ...}`

In the context of both Graduate Attributes and Professional Competencies:

Attribute	Complex Engineering Problems have characteristic WP1 and some or all of WP2 to WP7	Broadly-defined Engineering Problems have characteristic SP1 and some or all of SP2 to SP7	Well-defined Engineering Problems have characteristic DP1 and some or all of DP2 to DP7
Depth of Knowledge Required	**WP1**: Cannot be resolved without in-depth engineering knowledge at the level of one or more of WK3, WK4, WK5, WK6 or WK8 which allows a fundamentals-based, first principles analytical approach	**SP1**: Cannot be resolved without engineering knowledge at the level of one or more of SK4, SK5, and SK6 supported by SK3 with a strong emphasis on the application of developed technology	**DP1**: Cannot be resolved without extensive practical knowledge as reflected in DK5 and DK6 supported by theoretical knowledge defined in DK3 and DK4
Range of conflicting requirements	**WP2**: Involve wide-ranging or conflicting technical, engineering and other issues	**SP2**: Involve a variety of factors which may impose conflicting constraints	**DP2**: Involve several issues, but with few of these exerting conflicting constraints
Depth of analysis required	**WP3**: Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models	**SP3**: Can be solved by application of well-proven analysis techniques	**DP3**: Can be solved in standardised ways
Familiarity of issues	**WP4**: Involve infrequently encountered issues	**SP4**: Belong to families of familiar problems which are solved in well-accepted ways	**DP4**: Are frequently encountered and thus familiar to most practitioners in the practice area
Extent of applicable codes	**WP5**: Are outside problems encompassed by standards and codes of practice for professional engineering	**SP5**: May be partially outside those encompassed by standards or codes of practice	**DP5**: Are encompassed by standards and/or documented codes of practice
Extent of stakeholder involvement and conflicting requirements	**WP6**: Involve diverse groups of stakeholders with widely varying needs	**SP6**: Involve several groups of stakeholders with differing and occasionally conflicting needs	**DP6**: Involve a limited range of stakeholders with differing needs
Interdependence	**WP7**: Are high level problems including many component parts or sub-problems	**SP7**: Are parts of, or systems within complex engineering problems	**DP7**: Are discrete components of engineering systems

In addition, in the context of the Professional Competencies			
Consequences	**EP1**: Have significant consequences in a range of contexts	**TP1**: Have consequences which are important locally, but may extend more widely	**NP1**: Have consequences which are locally important and not far-reaching
Judgement	**EP2**: Require judgement in decision making	**TP2**: Require judgement in decision making	

F.2.2 Range of Engineering Activities

Attribute	**Complex Activities**	**Broadly-defined Activities**	**Well-defined Activities**
Preamble	Complex activities means (engineering) activities or projects that have some or all of the following characteristics:	Broadly defined activities means (engineering) activities or projects that have some or all of the following characteristics:	Well-defined activities means (engineering) activities or projects that have some or all of the following characteristics:
Range of resources	**EA1**: Involve the use of diverse resources (and for this purpose resources includes people, money, equipment, materials, information and technologies)	**TA1**: Involve a variety of resources (and for this purposes resources includes people, money, equipment, materials, information and technologies)	**NA1**: Involve a limited range of resources (and for this purpose resources includes people, money, equipment, materials, information and technologies)
Level of interactions	**EA2**: Require resolution of significant problems arising from interactions between wide ranging or conflicting technical, engineering or other issues,	**TA2**: Require resolution of occasional interactions between technical, engineering and other issues, of which few are conflicting	**NA2**: Require resolution of interactions between limited technical and engineering issues with little or no impact of wider issues
Innovation	**EA3**: Involve creative use of engineering principles and research-based knowledge in novel ways.	**TA3**: Involve the use of new materials, techniques or processes in non-standard ways	**NA3**: Involve the use of existing materials techniques, or processes in modified or new ways
Consequences to society and the environment	**EA4**: Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation	**TA4**: Have reasonably predictable consequences that are most important locally, but may extend more widely	**NA4**: Have consequences that are locally important and not far-reaching
Familiarity	**EA5**: Can extend beyond previous experiences by applying principles-based approaches	**TA5**: Require a knowledge of normal operating procedures and processes	**NA5**: Require a knowledge of practical procedures and practices for widely-applied operations and processes

Appendix G

Guidelines for Filling the Tables NT2 and NT3

G.1 Guidelines for Filling the Tables NT2 and NT3

Learning Outcomes should be written in the Module Outlines using the action verbs following **SOLO** Taxonomy or **Bloom's** Taxonomy. The descriptions below are for the **SOLO** taxonomy, which is recognized as being more suited for engineering programmes. However, action verbs from **Bloom's** taxonomy can also be used. These action verbs are not exhaustive, and verbs consistent with the appropriate Level & Description can be used - it is the Description that is more important. Note that the verbs used to describe the Graduate Attributes in Section (4.4) and Section (5.2.1) bear NO relation to the verbs used in the taxonomy below. It may be more helpful to use the labels (in **bold** characters) in Section (4.4), and ensure that they are delivered at increasingly higher levels through the program.

Table G.1: Some descriptions and action verbs in the assessment according to **SOLO** taxonomy

Level	Description	Typical Action Verbs used in the Assessments
1	Uni-structural (**single aspect** of a problem)	Memorize, Identify, Recognize, Count, Define, Draw, Find, Label, Match, Name, Quote, Recall, Recite, Order, Tell, Write, Imitate
2	Multi-structural (**several aspects** of a problem considered independently)	Classify, Describe, List, Report, Discuss, Illustrate, Select, Narrate, Compute, Sequence, Outline, Separate
3	Relational (**several aspects** of a problem and how they **relate** to each other to form a coherent problem **structure**)	Apply, Integrate, Analyze, Explain, Predict, Conclude, Summarize (précis), Review, Argue, Transfer, Plan, Characterize, Paraphrase, Solve (a problem), Compare, Contrast, Differentiate, Organize, Debate, Make a case, Construct, Review, Examine
4	Extended Abstract (**generalize** the problem **structure** and **abstract** it to a higher level concept; OR perceive the structure from **different perspectives**; OR **extend** ideas to new areas)	Design, Theorize, Hypothesize, Generalize, Rearrange, Generate, Create, Compose, Invent, Devise, Originate, Make an original case, Solve novel problem from first principles, Interpret, Contextualize, Assess, Recommend, Extrapolate, Critique, Translate

Notes:

1. Only those Learning Outcomes that are assessed by take home tests, marked assignments (group or individual), examinations, reports or other form of assessment will be considered as contributing to the Module Outcomes (MOs) and Program Outcomes (POs). Knowledge that is imparted without adequate assessment of the Learning Outcomes (LOs) cannot be considered, as there is no indication that the student has acquired the expected outcome.

2. Ideally there should be no more than 5 or 6 ILOs for a one semester module. Module Outlines should also give the Assessments for each Learning Outcome, and the assessments should be described using the action verbs according to the **SOLO** or **Bloom's** taxonomy. These then give the level of assessments for the LO's, with higher orders in the Taxonomy corresponding with higher levels of Assessment.

3. The LO-PO mapping of the individual modules is done by the individual lecturer in charge of the Module, or the Module coordinator, as he/she has detailed knowledge of the module. The (`H`, `M`, `L`) in the LO-PO matrix (Table NT2) should correspond to the Taxonomy level of assessment of each LO.

4. Thus, for the LO-PO Matrix (NT2 Table), for each Module, if the LO is assessed at
   - SOLO Level 4, contribution to the PO → `H`
   - SOLO Level 3, contribution to the PO → `M`
   - SOLO Level 1 and/or 2, contribution to the PO → `L`

If **Bloom's** taxonomy is used, this approximate conversion can be employed:

- Bloom's Level 5 and 6, contribution to the PO → H
- Bloom's Level 3 and 4, contribution to the PO → M
- Bloom's Level 1 and 2, contribution to the PO → L

The overall contribution from the module to the PO must be derived from the individual contributions from the LOs. (Note: even the highest level of contribution (H, M, L) towards a PO from a set of LOs can be transferred to the NT3 Tables, provided that LO has a significant assessment associated with it.)

N.B.1: All Modules should not be contributing to all PO's, except perhaps the Comprehensive Design Project or Capstone Project.

N.B.2: Whatever the action verbs used in the LOs, assigning of a PO achievement level of H should be minimized in early semesters of the program.

5. The MO-PO Matrix (NT3 Table) is prepared by combining the last rows of all CORE Modules in the programme, in the order that a student would be normally taking these modules in the program (Semester by Semester or Year by Year). Survey or field camps, industrial training or industry internships that are CORE Modules that are assessed for Learning Outcomes should be included. Please note that Elective Modules should be excluded from this matrix, unless it can be established that all the elective modules make the identical contribution to the Program Outcomes, in whatever combination they are taken. This means that all modules in every basket of electives should have common LO-PO mappings -- if necessary by using the "lowest common level" for each PO from all the electives in the basket. Optional modules should not be included in the Table.

6. After making the MO-PO Matrix, please make sure that
   (a) Sufficient number H's (e.g. a minimum of 2 or 3) in the later years in the programme for each PO, i.e. the PO's are assessed at a higher level of knowledge/understanding/skill/ability as the student progresses through the programme.
   (b) There is a proper scaffolding for the Hs with Ms and Ls in the earlier years of the programme (Minimum of 2 to 3 each of Ms and Ls for each PO).

7. If there are any gaps in the Matrix, i.e. the requirements as given in 7 above are not satisfied, the staff must review the program together to identify how the gaps can be filled by improving the assessments in the modules. Often it will need some adjustments in the assessments, to elicit the higher-level learning outcomes from the students. These changes should be recorded, and the documentation should include when the changes were made; and the corresponding module outlines and students' assessment collection be available for review.

8. Please note that the Curriculum Mapping, Module Outlines/ Details, and the Assessment Collection are the proof of delivery of the PO's, and there should be consistency among these.

9. Note also that the POs should also be aligned to the Programme Educational Objectives, which should be defined by each **HEP**.

10. Note that the NT3 table is an indication of what the **HEP** plans to deliver. However, every attempt should be made to track and document what each student has achieved (with an appropriate pass mark) throughout the program with respect to each PO.

11. The Table below gives a sample (NOT a prescription) of possible verbs that can be associated with targeting the achievement of various POs at different levels

Programme Objective (Section 4.4)	**Low**	**Medium**	**High**
Engineering Knowledge	list	summarize	interpret
Problem Analysis	identify	analyze	contextualize
Design/ development of solutions	select	integrate	devise
Investigation	discuss	examine	extrapolate
Modern Tool Usage	identify	apply	generate
The Engineer and Society	outline	review	recommend
Environment and Sustainability	recognize	contrast	assess
Ethics	illustrate	examine	generalize
Individual and Team work	discuss	debate	compose
Communication	illustrate	argue	critique
Project Management and Finance	compute	assess	rearrange
Lifelong Learning	recall	differentiate	translate