National Policy on Engineering, Technology and Technical Education in Sri Lanka

1. History in Engineering, Technology and Technical Education in Sri Lanka

Establishment of the Government Technical College (GTC) in Maradana, Colombo in 1893 was the first step of the engineering education of the Sri Lanka. GTC became the pioneering institution for science and engineering education in Sri Lanka and its name was changed to the Ceylon Technical College (CTC) in 1906. The CTC provided technical education in civil, electrical and mechanical engineering fields.

The Ceylon University Association was founded in 1906 by local scholars such as James Peiris, Marcus Fernando and Ponnambalam Arunachalam and campaigned for the establishment of an institution in the rank of a University in this country. As a result, the Ceylon University College was established in 1921, the science section of the CTC was transferred to form the Department of Science, at the newly established university college which was affiliated to the University of London. The college didn't award degrees under its own name but prepared students to sit the external examinations at the University of London. The college was based in Colombo. The CTC began preparing students for the external degrees in Engineering of the University of London since 1933 as well as for associate membership examinations of the professional institutions of civil, electrical and mechanical engineering. In 1942 the CTC was separated from the Education Department and was made the *Ceylon Technical College Department*.

The Buchanen-Riddel Commission's recommendations were incorporated into the *Ceylon University Ordinance No. 20 of 1942* which established the University of Ceylon on 1 July 1942 by amalgamating Ceylon University College with Ceylon Medical College which was established in 1870. In October 1945, the university council of the University of Ceylon resolved to establish its engineering faculty. The plan to set up the faculty was initiated by appointing E.O.E. Pereira, a senior engineer in the Public Works Department as a professor in Civil Engineering. However, his plans did not materialize until December 1949, when a crisis occurred at the Ceylon Technical College where the entire batch of Civil Engineering failed to pass the qualifying examination of the University of London. After that, the Ministry of Education took a decision to close down the technical college and move the engineering education permanently to the Engineering Faculty that is to be set up at the University of Ceylon.

On 1 July 1950, the University of Ceylon established its Faculty of Engineering, with staff and students from the Ceylon Technical College forming its nucleus. At the initial stages it was based in the Colombo campus and used facilities of the Technical College, later it was moved to Peradeniya Campus and the process was completed in 1964. Three fields of study that had been conducted till then at the Ceylon Technical College formed the first three founding Departments of study, namely Civil Engineering, Electrical Engineering and Mechanical Engineering. The initial intake of students was 25 of which 19 students were taken from outside and the remaining 6 were transferred from the Faculty of Science of University of Ceylon. Total initial academic staff was 12. It included Prof. E.O.E. Pereira - Head of the Civil Engineering Department, Prof. R.H. Paul - Head of the Electrical Engineering Department, Mr. J.C.V Chinnappa - Head of the Mechanical Engineering Department, who later became a Professor. Professor Pereira was elected as the Dean of the faculty in the

inaugural faculty meeting. The intake of students reached 150 by 1964. Until then, the total number of graduates produced had been 384 numbers.

In October 1964, the first batch of students was transferred from Colombo to Peradeniya. From 1964 to 1971, the faculty functioned under the old regulations. Due to the language regulations of 1956, students entering the Faculty had to switch from their respective mother language to English - the medium of instruction of the Faculty - to follow lectures. This caused some difficulties for students, which were addressed partially in 1970 by making bilingual streams for first year students. The first new department, Department of Mathematics was created in 1965 by Prof. E. F. Bartholomeusz. In 1971, the faculty received an IBM 1130, the first university computer in the country. The student unrests in 1965 and 1966 prompted the government to create a National Council for Higher Education (NCHE) to overlook the university system as the executive authority. In 1971, three other departments, Department of Production Engineering, Department of Chemical Engineering and Department of Agricultural Engineering were added to the Faculty. At present, the Faculty of Engineering of the University of Peradeniya has seven departments and annual intake is 450 students.

Under the provisions of the University Act No 01 of 1972, the University of Ceylon was established on the 15th of February 1972, incorporating all the existing universities and the Ceylon College of Technology as campuses of a single university. The Ceylon College of Technology at Katubedda earned university status, as the Katubedda Campus of the then University of Ceylon on February 15, 1972. The Department of Architecture which was located in Colombo at that time was transferred to Katubedda with the formation of this new Campus. The campus at the beginning had only one faculty, i.e. Faculty of Engineering and Architecture. The first president of the campus was Dr. L. H. Sumanadasa, who steered the progress of the Institution. With Ceylon becoming a republic on May 22, 1972, the corporate name of the institution was changed to read as the University of Sri Lanka Katubedda Campus. The existing Diploma in Technology programme was upgraded to a B.Sc. Engineering degree programme and all students from the first intake of Dip. Tech. became eligible for a degree. Further, the name of the Technicians Course operated by the campus was changed to read as the National Diploma in Technology (NDT).

With the gaining of university status, the technical education programmes conducted at the Katubedda Campus were expanded. The Department of Town & Country Planning was established within the Faculty of Engineering & Architecture in 1973. Furthermore, in 1974, with the formation of a link-programme between the University and the University of Leeds in the UK, the School of Applied Science was instituted. Under this school, the Departments of Chemical Engineering, Materials Science and Mining & Minerals Engineering were established. In 1975, a Computer Centre with a modest computer was established within the Department of Electrical Engineering to serve the entire university. With the development in engineering education at Katubedda, the first postgraduate programme was inaugurated at the Department of Civil Engineering in 1976. Katubedda campus became the University of Moratuwa on 22nd December 1978 under the Universities Act No. 16 of 1978.

Deviating from conventional university frame work, the Open University of Sri Lanka (OUSL) was established in 1980 at Nawala, Nugegoda, for the purpose of providing higher educational facilities to persons above 18 years of age with relevant basic qualifications through distance learning techniques. The Faculty of Engineering Technology of the Open University of Sri Lanka, initiated in 1985 is one of the pioneers in the world for the delivery of engineering education through distance education mode.

The Faculty of Engineering of University of Ruhuna was established on 1st July 1999 at Hapugala, Galle. First batch of students was admitted on 27th March 2000. Engineering education of the country was expanded with the establishment of Faculties of Engineering at the University of Jaffna, south Eastern University and University of Sri Jayawardanapura in 2013, 2015, 2016, respectively.

With reference to technical education, the Ceylon Technical College was separated from the Education Department in 1942 and was made the *Ceylon Technical College Department*. In 1966 the engineering technician's courses were transferred to the Institute of Practical Technology (IPT). In 1964 it was absorbed into the *Department of Technical Education and Training* over the next decades the several technical colleges were established around the country and the existing junior technical colleges were upgraded. Technical education continued to thrive in 1980's and 1990's. Table 1 gives the summary of technical institutes and their programmes.

Table 1: Summary of technical education and institutes in Sri Lanka

Name of the Technical Education Institute	Technical Education Programme(s)	Commencement Year
Colleges of Technology There are 28 colleges of technology at present which come under Ministry of Secondary and Tertiary Education	Technical courses	1942
Institute of Technology University of Moratuwa (ITUM)	National Diploma in Technology (NDT)	1967
Sri Lanka Institute of Advanced Technological Education (SLIATE) There are three institutes at Mattakuliya, Labuduwa and Jaffna	Higher National Diploma in Engineering (HNDE)	1990
Institute of Engineering Technology (*Previously Technician Training Institute*)	National Diploma in Engineering Sciences (NDES)	1990
Ceylon German Technical	Technical courses related to	1959

Training Institute (CGTTI) Presently under Ministry of Youth Affairs and Skills Development	automobile number	

The Institution of Engineers, Ceylon, formed in 1956 and incorporated by an act of parliament in 1968, was the successor to the then Engineering Association of Ceylon, which was founded in 1906 at Anuradhapura by a few dedicated engineers serving in the public sector. Renamed, The Institution of Engineers, Sri Lanka (IESL) the Institution became signatory to the Washington Accord on June 13, 2014 for the jurisdiction of Sri Lanka. Being a signatory to the Washington Accord, the four year full time engineering degree programmes accredited by the IESL will be considered as substantially equivalent to four year engineering degree programmes that have been accredited by the other signatories to the Washington Accord. Graduates with four-year accredited engineering degrees from local Universities after 2014/06/13 are eligible to be recognized by other Washington Accord signatories and deemed to have met academic requirements for practice in their respective jurisdictions (countries) of those signatories.

2. Objective of the Policy

To catalyze the National Economic Development drive by harmonizing the Engineering, Technology, and Technical education in Sri Lanka for catering national needs by maintaining international standards.

3. Scope of the Policy

- This policy covers the engineering, technology and technical education from the level of Technicians up to Engineers, as discussed in the following chapters of this policy.
- This policy refers to the relevant sections of the other regulatory bodies when and where necessary as stipulated therein (e.g., Roles and responsibilities developed by ECSL)
- This policy shall maintain the international standards while adopting them for national needs
- Strategies under this policy referred as Programs and Projects to be implemented for achieving policy Objectives.

4. Background of this Policy in line with Government Development Policy Framework

Engineering practice spans over a wide spectrum of work, requiring practitioners at different levels with different qualifications and experiences. This ranges from a Craftsman at the ground level up to a Chartered Engineer at the highest level, with many intermediate levels. Appropriate scaffolding of these levels with well-defined boundaries is a prime necessity to gather the synergy and the momentum to deliver the best outcome of the professional practice for the national development initiatives.

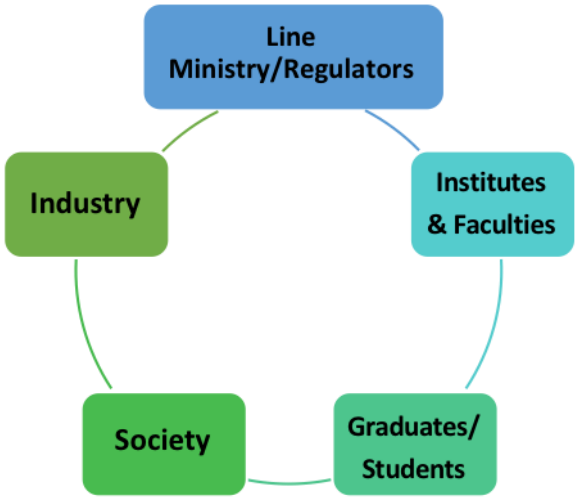
For a more effective and enthusiastic practice of the profession, the number of practitioners towards the lower layers should be more compared to the numbers towards the upper layers, in the shape of a pyramid.

In order to sustain the profession with national relevance, intelligent and resourceful individuals should be attracted to it, through social status, economic stability and gainful employment within the country. To create due recognition for the professionals in the practice of engineering in the country it is necessary to recognize the following urgent requirements.

1) Identify and define rational levels of practice for professionals involved in engineering in the country, to be inline with the internationally accepted norms.
2) Scaffold practice-levels appropriately with clear boundary demarcations on competencies, roles and responsibilities allowing minimum overlaps.
3) Establish minimum accredited/recognised academic qualifications training and experience needed to reach each level.
4) Establish clear academic and experience criteria for carrier progression between levels, and also between different layers within same level
5) Amend the present Engineering Council Act enabling rational categorisation of engineering practitioners to be inline with national development requirements as well as internationally well accepted norms (Ex. Engineers, Technologists, Technicians).
6) Develop a rolling and comprehensive statistical model to periodically-predict the numbers of practitioners required for each level and coherent ratios between levels (Ex. Engineers : Technologists : Technicians = 1 : 4 : 16).
7) Deploy educational infrastructures of the country, appropriately, to produce the numbers required at each level.
8) Strengthen the Accreditation arm of the IESL for evaluating and standardising educational programs that offer academic qualifications for engineering practice levels for regulatory and global mobility requirements, complying with respective international accords or agreements (Ex. Washington Accord, Sydney Accord and Dublin Accord all to be administered by the IESL Accreditation arm)
9) Identify and promote establishment of professional bodies for scientific dialogue, continuing professional & ethical development, etc. for each practice-level.
10) Create service minutes appropriate to each engineering practice level for the recruitment to government service as well as guidelines for the non-government sector employment so as to minimise inconsistencies in placement, promotion and career progression.

So, policy directives are to be considered on the spirit of government development policy on the above 10 points with broader considerations. This needs to be done as a matter of urgency for the benefit of all practitioners and the overall professional network as a whole. The same will be instrumental for optimizing the engineering capacity, creativity and utility for our country, which is the corner-stone for sustainable development.

5. Main stakeholders in the implementation of this Policy



Key Stakeholders	Role of the Stakeholder
Ministry of Higher Education (Line Ministry)	"To delight students, the industry, staff and other stakeholders of the higher education system of Sri Lanka by formulating and implementing results oriented policies & strategies and to deliver results in an effective and efficient manner through a participatory process to produce the best intellectuals, professionals, researchers, entrepreneurs to deliver innovative solutions to make Sri Lanka "**the Wonder of Asia**".
University Grants Commission (UGC)	"To foster management and good governance in facilitating the provision of undergraduate, postgraduate and professional education of highest quality with high impact research, quality teaching and industry engagement through a coordinated system of State Universities and HEIs, to create knowledge leaders who are passionate about meeting the triple bottom line."
Engineering Council of Sri Lanka	ECSL is responsible to: • maintain the professional standards and conduct of engineering practitioners, • register different categories of engineering practitioners, and • provide for matters connected therewith or incidental thereto.

Institution of Engineers, Sri Lanka	"As the apex national body of engineers in Sri Lanka which ensures internationally recognized and locally relevant standards in the professional practice and education in engineering, while actively supporting national development and diligently serving its members and the society at large." • In fulfillment of its Charter obligations, IESL has been responsible for the recognition/accreditation of engineering education programmes in Sri Lanka and in providing consultative feedback on the development of engineering education programmes comparable to global practice. • IESL evaluates undergraduate engineering degree programmes and accords recognition (to cater to the local requirements) and accreditation (to cater to the international recognition requirements) in accordance with established criteria and procedures, through its Education Committee and Accreditation Board respectively.
Institution of Incorporated Engineers of Sri Lanka	"To provide a framework to elevate the professional status of the engineering/technology diplomates to the best effect, with frontiers of knowledge by continuous upgrading of skills to keep abreast with the latest developments in Technology, to enable them to exert appropriate influence in the society."
Tertiary and Vocational Education Commission	"As the apex body in the TVET sector, they are committed to establish and maintain an efficient and effective technical education and vocational training system which is relevant to socio- economic goals and changing market needs"
Technical or Technological Institute of the Government of Sri Lanka **(i) Department of Technical Education & Training** **(ii) Sri Lanka Institute of Advanced Technological Education** **(iii) Industrial Technology Institute of Sri Lanka**	"Function as a provider of high quality internationally recognized Technical Education and Training to their valued customers nationally and internationally. "To create excellent higher national and national diplomates with modern technology for sustainable development." "To conduct innovative R & D and provide internationally competitive technical services to accelerate industrial development for the benefit of the people of Sri Lanka."
Faculties & Institutes **(i) University** **(ii) Faculty** **(iii) Department** **(iv) Academic staff**	An institution of higher learning authorised by legislation (either directly or indirectly) to award professional engineering degrees. The entity responsible for academic administration and conduct of different engineering education programmes at the University. The entity responsible for the design and conduct of the programme to be recognized/ accredited. The staff responsible for teaching in the programme leading to the award of the degree. 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 large enough to cover, by experience

	and interest, all curricular areas of the programme.
Graduates/Students	The graduates are expected to successfully fit into society, satisfying the needs of the employers and the industry with a required level of competencies in knowledge, skills and attitudes.
Industry	It is another most important stakeholder of engineering community, providing opportunity to engineering aspirants to enhance their knowledge with a prosperous career. Dynamic and rapid developments in the economy and labour market create a higher demand for employability skills of the workforce.
Society	Society at large always has a greater exception from the regulators, institutes, engineering professionals and engineering graduates on the evolving role of the engineer in the society.

6. Description of International Treaties/Accords in line with Sri Lankan Engineering Education

Globally, the forefront federation body of Professional Engineering Practitioners is the International Engineering Alliance (IEA), under which clearly defined three areas of engineering practice have been collectively outlined and accepted by the member country professional bodies. The academic standards for these three areas, namely; Engineer, Engineering Technologist and Engineering Technician have been broadly defined and agreed upon by the signatory countries as three international accords.

Washington Accord for Engineers	**Sydney Accord for Engineering Technologists**	**Dublin Accord for Engineering Technicians**
A level of knowledge in mathematics, science, engineering fundamentals, and an engineering specialization applicable to the solution of complex engineering problems.	A level of knowledge in mathematics, science, engineering fundamentals, and an engineering specialization applicable to solution of defined and applied engineering procedures, processes, systems, or	A level of knowledge in mathematics, science, engineering fundamentals, and, an engineering specialization applicable to wide practical procedures and practices.

	methodologies.	
Signatories (20): USA 1989, Canada 1989, UK 1989 Australia 1989, Ireland 1989, New Zealand 1989, Hong Kong 1995 South Africa 1999, Japan 2005 Singapore 2006, Taiwan 2007 South Korea 2007, Malaysia 2009 Turkey 2011, Russia 2012, Sri Lanka 2014 India 2014, China 2016, Pakistan 2017 Peru 2018	**Signatories (10):** Canada 2001, South Africa 2001 UK 2001, Hon Kong 2001 Australia 2001, Ireland 2001 New Zealand 2001, USA 2009 South Korea 2013, Taiwan 2014	**Signatories (08):** Canada 2002, Ireland 2002, South Africa 2002, UK 2002, Australia 2013, South Korea 2013, New Zealand 2013, USA 2013

7. Mapping of Engineering and Technology Education with Industry Requirements for Identification of Categories

International standards of classification of Engineering profession mainly based on the IEA standards and Accords. It is very important to identify and classify different categories based on the academic requirements for the practice of engineering at different levels.

The following table shows how some countries in the IEA classifying engineering practitioners under the three accords have required their academic qualifications.

No.	Accord / Professional Body	Washington Accord	Sydney Accord	Dublin Accord
1	Engineers Australia (EA)	Professional Engineer	Engineering Technologist	Engineering Associate
		4 Year Engineering Degree	*3 Year Engineering Technology Degree*	*2 Year Higher National Diploma*
2	Engineers Canada (EC)	Engineer	Technologist	Technician
		4 Year Engineering Degree	Technology Course	Technician Course
3	Institution of Engineers, Ireland (IEI)	Chartered Engineer	Associate Engineer	Engineering Technician
		Master of	3 Year Degree	2 Year Course

		Engineering (MEng)		
4	Engineers New Zealand	Professional Engineer	Engineering Technologist	Engineering Technician
		4 Year Engineering Degree	3 Year Engineering Technology Degree	2 Year Higher National Diploma
5	Accreditation Board Korea	Engineer	Technologist	Technician
		4 Year Engineering Degree	4 Year Degree in Technology	2 Year Associate Degree
6	Engineering Council UK	Chartered Engineer	Incorporated Engineer	Engineering Technician
		Master of Engineering (MEng)	3 Year Degree	NVQ Level 3 of UK

In line with the practices adopted by above signatories of accords under IEA, it is proposed to have the following categories for engineering practitioners in Sri Lanka with provision for professional upgrading within each category.

Accord	**Academic Qualifications**	**Title**	
		With Academic Qualifications only	**After obtaining Professional status**
Washington Accord	4 Year Engineering Degree - SLQF L7	Engineer	Chartered Engineer
Sydney Accord	3 Year Engineering Degree - SLQF L5 or 1+3 Year Technology Degree - SLQF L5	Engineering Technologist	Professional Engineering Technologist
Dublin Accord	2 Year Higher National Diploma - SLQF L4/ NVQ L6	Engineering Technician	Professional Engineering Technician

8. Professional Institutions encompassing above Categories

Currently two institutions, Institution of Engineers, Sri Lanka requiring an academic qualification of a 4 year Degree in Engineering for corporate membership and Institution of Incorporated Engineers requiring an academic qualification of a 2 year National Diploma in Engineering/Technology, are responsible for registering five different categories of engineering practitioners, as per the Engineering Council of Sri Lanka. To fall in line with the international requirement as well as to create consistency and coherence in the national level practice, it is proposed to establish a professional body for the Engineering Technologist sector and make amendments as depicted in the

following table to the engineering practitioner categories in the Engineering Council Act of Sri Lanka. It should be noted that total number of ECSL categories will be increased to seven.

Current categories in the ECSL Act	**Proposed categories**	**Minimum Academic Qualification**	**Institution responsible for nomination**
Chartered Engineer	Chartered Engineer	4 Year Engineering Degree - SLQF L7	IESL
Associate Engineer	Engineer		
Affiliate Engineer	Professional Engineering Technologist	3 Year Engineering Degree - SLQF L5/ NVQ L7 or 1+3 Year Technology Degree - SLQF L5/ NVQ L7	Institute of Engineering Technologists, Sri Lanka
	Engineering Technologist		
Incorporated Engineer	Professional Engineering Technician	2 Year Higher National Diploma - SLQF L4/ NVQ L6	IIESL
Engineering Diplomate	Engineering Diplomate		
Engineering Technician	Technician	1 Year Diploma or Certificate – SLQF L2/ NVQ L4	TVEC

Institution of Engineers Sri Lanka

Membership categories under this Institution may include:

- Fellow (Chartered Engineer)
- Member (Chartered Engineer)
- Engineer
- Student

Institution of Engineering Technologists Sri Lanka

Membership categories under this Institution may include:

- Fellow (Professional Engineering Technologist)
- Member (Professional Engineering Technologist)
- Engineering Technologist
- Student

Institution of Incorporated Engineers Sri Lanka

Membership categories under this Institution may include:

- Fellow (Professional Engineering Technician)
- Member (Professional Engineering Technician)
- Engineering Diplomate
- Student

9. Mobility Between Categories

The graduate attributes and professional competency for each of three categories of engineering practitioner define the benchmark route or vertical progression in each main category (Engineer, Technologist, Technician) from base level to professional level. IEA Graduate attributes and Competency document does not address the movement of individuals between main categories, a process that usually requires additional academic qualifications and pre qualifications.

The graduate attributes and professional competencies, through their definitions of the level of demand, knowledge profile, and outcomes to be achieved, allow a person planning such a change to gauge the further learning and experience that will be required.

10. Policy Implementation and Monitoring Framework

The Line Ministry is responsible for the implementation of this policy in collaboration with relevant stakeholders. The policy documents shall be reviewed every three years. The Institution of Engineers, Sri Lanka shall lead the policy review with the support of other stakeholders.

Implementation of the policy shall be monitored by the Steering Committee, which is co-chaired by the line Ministry Secretary and the President of the Institution of Engineers, Sri Lanka.

11. Projects and Programs under this Policy

a. Program-1 Education Curriculum Development Program

i. Project -1 Review and revision of curriculum under each academic study program producing engineering practitioners, to avoid any duplication and which to cater for national development needs.

b. Program-2 Institutional Strengthening Program

i. Project -1 – Strengthening of IESL accreditation arm
ii. Project-2 – Amendment of ECSL Act, IESL Act
iii. Project-3 – Establishment institution for Technologist (?)

12. Implementation Program

Implementation Program has to be approved in the first steering committee and shall be monitored thereafter.

Annex-1- Strategic Estimation of National Requirements under Engineering, Technology and Technical Categories

National Requirement under each category of output under engineering and technical education has to be established as a statistical model considering the government's envisaged development policies. This model has to be developed in an updatable way considering specific indices or economic

development changes. Statistical model shall depict the Macro level picture, including sectoral, regional, and migrations.

Annex-2- Matrix Indicating vertical and Horizontal Mobility under Categories.

Annex-3- Matrix indicating Requirements Under Each Accords

End.