# ENG 104.2: ENGINEER IN SOCIETY (1 UNIT)

- **INTRODUCTION**

There is considerable misunderstanding in the minds of people as to what is engineering or the role of the engineer in the society. But let us start from the beginning in the account of the creation as narrated in the book of Genesis we read "And God said "Let there be light and there was light.

Let us note that this light which from other accounts had been created million of years ago has never failed us; but man-made lights do fail us and in this country more often than not. Further on, in the same narrative we read. "And God said let the waters under the heavens be gathered together into one place, and let the dry land appear, and it was so." To the scientific mind, this may be sneered at as the compression of a process which took millions of years to achieve into a word of command. This may be so; but at this point in time both Moses and the Scientists have made intelligent guesses. The creative Force responsible for the formation of our planet was the first engineer. In the first act you might call him an Electrical Engineer and in the second act where the greatest drainage scheme ever was performed, you might call him a Civil Engineer.

- **SCIENCE, TECHNOLOGY AND ENGINEERING:**

  - ✓ A scientist always discovers new things but an engineer works out how this thing can be used for human welfare and commercial culture.

  - ✓ Engineering is all around us, so people often take it for granted, like air and water. Ask yourself, what do I touch that is not engineered?.

  - ✓ Engineering is the application of science to the common purpose of life.

- **DEFINITIONS:**

  - ✓ **DEFINITIONS OF SCIENCE:**

    Science is the study of the natural physical world. as it is through knowledge of truth and laws.

  - ✓ **DEFINITIONS OF TECHNOLOGY:**

    Technology is an art or act of applying techniques, processes and procedures using scientific and engineering knowledge, tools, devices and processes to create products.

  - ✓ **DEFINITIONS OF ENGINEERING:**

    Engineering is as a profession that applies scientific knowledge to the practical problems of creating, operating and maintaining structures, devices and services.
    Engineering initiates the use of laid down scientific theories and laws attached with extensive practical works to solve problems by attempting to produce practical tools to enhance its life on earth. The urge for a better life forced the early scientist to dive into real engineering inventions that has eventually changed our world today.

- **HISTORICAL DEVELOPMENT OF ENGINEERING, SCIENCE AND TECHNOLOGY.**

Historical records had it that the birth of technology dates back to the time of our pre-historic ancestors.

From this beginning, man had gone on to fashion for himself various tools and equipments aimed at making his life easier by reducing the amount of energy he expends in doing his work. In those early days the composite materials used for fashioning these tools were wood, stone, flint and bone. Then came the Bronze age at about 2000 BC when the use of copper followed by that of bronze introduced from East Mediterranean lands led to the making of ploughs and superior implements of copper and bronzes, smiths and carpenter tools.

This was followed by the Iron age at about 1000 B.C. which led to the manufacture of improved and more effective types of the tools and equipments previously mentioned with the addition of scythes, sword, saws and chisels.

It was from these early beginnings that engineering started. Historians recorded that as early as 300 B.C, the Egyptians employed a 'Chief of Works' or 'Master Builders' who directed and supervised the building of temples, tombs, and irrigation projects.

Ancient Greek also had its master builders who were known as Architektons i.e. Arch-technicians from which the word Architect which we use today was derived. They were experts at town planning and the provision of water supplies. The Romans then took over and getting their inspirations from the Greeks they built roads, bridges, aqueduct and other structures essential to human comfort and urban life. The simple balance was employed in Egypt for more than 1000 years before even the first known formal theory was put in treatise form. The ancient Babylonians, Assyrians, Egyptians, Indians and Chinese had highly developed technology before the Greek civilization which invented science as it is known today, and advanced most of its concepts. However as time goes on the process was reversed so that the scientific concept precedes the technological application. These ancient engineering became practically extinct with the collapse of the Roman Empire and was only revived through the Arabs of Africa and the Near East who conserved them, and it was from them that it found its way back to Europe during the Middle ages. Gradually but surely the revival of the early engineering practice grew up in Europe until about the 13th century when it developed into Military Engineering first in France, and later in Britain From then on it took some rapid steps forward until the dawn of the Industrial Revolution in Britain when machines started to replace manual labour. It was at this time that the term Civil Engineer was used to distinguish those engineers who work in the city from the Military Engineers who work with the armies.

- **HISTORY OF ENGINEERING IN NIGERIA**

During the early colonial days up to the end of the last century there was very little development. There were very few amenities. The emphasis was on opening up the country. The few roads existing which were untarred and constructed by District Officers, invariably followed well defined footpaths. Lagos the capital had no tarred road and hardly any traffic. The main hazards for pedestrians were the push cycle and hand drawn carts called Rickshaws.

The history of technology or engineering in Nigeria is a highly chequered one in order of emergence as a secular profession for Nigerians, it was the third profession after Law and Medicine being the first two to emerge at the latter part of the last century.
Engineering made its debut as a profession undertaken by Nigerians on the **5th of December 1893**, when the **late Herbert Heelas Macaulay** was elected an Associate Member of the Institution of Civil Engineers, London Chapter, which perhaps made him the first professional engineer produced by black Africa. He was followed by the late George Debayo Agbebi who was the first Graduate Engineer, having obtained the B.Sc degree of Birmingham University in 1911. Then, there was an interval of about 20 years before young Nigerians started to venture again into the engineering field in the persons of Isola Phillps 1st Class Honours B Sc. of London University, 1930; Robert O. Staveley, 1934; Adekunle Coker, 1934; Oladotun Coker 1935; Ekundayo Ajayi, 1936. Of all these, only four worked in the civil service of the Nigerian Government. Thus, this has motivated the study of Engineering as a profession in Nigeria.

Engineering has been described as a profession that applies scientific knowledge to the practical problems of creating, operating and maintaining structures, devices and services.

As a technologist, an engineer has been described as a man who turns the inventions and discoveries of scientists into practical usefulness to mankind. In other words, he is an applied scientist.

The accepted training of an engineer in Nigeria today requires that he should complete a 5-years engineering course in a University leading to a B.Eng. degree, 1-year mandatory N.Y.S.C service, to be followed by at least 4-years planned training for experience with a view to becoming a member of one of the Professional Engineering institutions such as the Nigerian Society of Engineers (NSE), or any of the accredited foreign engineering institutions for Civil, Mechanical, Electrical, etc.

An engineer MUST register with the Council of Registered Engineers of Nigeria (COREN) before he could practice independently in this country.

Engineering Drawing is a basic course which is useful to those who would follow careers other than engineering because all inventions are not necessarily always made by engineers. Therefore such people will be able to make a sketch of any idea that may occur to them, which can then be spelt out in detail by the engineer. Also because engineering touches on practically all facets of modern living, the non-technical professional will be able to put his ideas even more clearly when he is holding discussion with an engineer on a technical subject.

Owing to the tremendous advancement which technology has made since the end of the Second World War, much thought has been given as to the adequacy of the training now being given to engineers. As we look at today's knowledge output and project the trend into the near future, the conclusion is inescapable that today's 4-year graduate may be unable to maintain a position of leadership in his profession. The tidal wave of new knowledge will be too great; the pace of technological change is too swift. Companies that generate or use such knowledge will need to back the 4-year graduate with increasing number of engineers who have had much more science, much more mathematics, and much more experience working with senior scientists and engineers from a variety of fields. The average engineer will have to spend the equivalent of one day per week in some form of formal education.

It is also agreed that in order to make the engineer to be more aware of the needs and aspirations of the Society he serves, there is a necessity to include other subjects which are not engineering subjects in his syllabus as is now done in some developed countries.

Opportunities to gain practical experience are very few in the Public sector nowadays unlike the past when there was as considerable amount of such opportunities.

As with contractors, so with Industries since the country now operates an Industrial Training Fund, there should be no difficulty in placing our graduate engineers in industry for post graduate experience, or our undergraduate where we operate a sandwich course of training in order to make sure that industry does not quibble over the acceptance of trainees, government should make it mandatory for all industries to indicate the number of trainees under the I.T.F that they would accept every year. It should be a condition for granting any industry permission to operate in this country, renewal of practicing licence, or for awarding contracts to foreign contractors. A clause should be written into every contract to ensure that contractors give effect to their undertaking to train. Young graduate engineers and technicians who are doing their N.Y.S.C service should also be allocated to firms carrying out engineering contracts in the country; and the Firms should be paid allowance out of the I.T.F for each graduate thus placed. However, the schedule of practical experience intended for the trainee should be properly written out, and there should be a system of inspection by Government agents to make sure that the training is carried out as planned.

The young engineer should also write a full detailed reports of his experienced on the completion of his training period The method outlined above is necessary because I have come across a young engineer at a professional interview who after 4 years service in the private sector had only a drawing for the installation of an elevated 400 gallons of water tank for a petrol filling station to show as the only evidence of his practical.

Some of the criticisms that have been levelled against the engineer in this country. The most common criticism is on the ineffectiveness of our public utility services such as Electricity, Telephones, Water supply, refuse collection, Poor Roads e.t.c. There are several reasons for the unsatisfactory nature of some of these services or the reasons sometimes given by the people handling the establishments for their unsatisfactory performance. One cardinal factor that contributes to the ineffectiveness of some of our public utility services is the way the government decides on who heads these vital organizations. Unless such appointments, for which engineers are definitely not responsible, are made purely on merit, professional competence and integrity, there will not be a change to the better in the performance of these services which are so essential to the development of this country.

Nigerians have been described as a race that does not keep records. This malady also affects telephone cables including some which were recently buried. The result is that when a contractor is given a job to do which involves digging of a trench, the excavator invariably breaks a water pipe or ruptures a telephone cable with the attending interruption of the operation of those services.

The main constraint to improved services all over the country is insufficient funds. An engineer can only perform at his best if he is given the funds to carry out the work he is given to do.

Engineering Drawing should be made compulsory subject in all our schools. The reason is that it is indispensable for anybody who intends to follow an engineering or technological career. It is also useful to those who would follow careers other than engineering because all inventions are not

necessarily always made by engineers. Therefore such people will be able to make a sketch of any idea that may occur to them, which can then be spelt out in detail by the engineer.

Also engineering touches on practically all facets of modern living, the non-technical professional will be able to put his ideas ever more clearly when he is holding discussion with an engineer on a technical subject. All our secondary schools throughout the country should also have training in metal and woodwork as extra curricula activities.