

## **ENG 104.2 - ICT, FINANCE AND MANAGEMENT IN ENGINEERING PRACTICES**

### **❖ INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) SYSTEMS IN ENGINEERING PRACTICE.**

Basically, ICT is an abbreviation for Information and Communications Technology. In a simple understanding, this is a technology that revolves around the use of Computers, High Electronic Technological Devices and Internet to create, store and retrieve information. Practically, it tends to reduce every activity into some sort of information, which helps us to take accurate decisions and actions.

#### **➤ THE COMPUTER SYSTEM**

At the center of ICT is the Computer System. And the computer in its simplest form can be looked as an IDIOT. Yes, it is an idiot, because it cannot do anything on its own, unless it is directed to do so. It must be driven by sets of instructions (called programs), which are written by human beings, like me and you.

#### **➤ FUNCTIONAL PARTS OF A COMPUTER SYSTEM**

When you look at the computer by functional parts, you will see the following:

##### **a) MICROPROCESSOR (SIMPLY THE PROCESSOR)**

The microprocessor is likened to as the heart of the computer, if you make an analogy of computer with the human being. It is the processor that defines the core power and computational ability of the computer.

##### **b) MEMORY**

The memory refers to the section of the computer in which the various programs and applications run. It can be likened to the human brain, and it is measured in bytes. It is very instructive to note the following:

- i) A byte is made up of eight (concatenated bits, while a bit is basically binary digit of one (1) or zero (0).
- ii) 1,024 not 1, 000 bytes make 1 kilobyte (KB)
- iii) 1,024 kilobytes make 1 megabyte (MB)
- iv) 1,024 megabytes make 1 gigabyte (GB)
- v) 1,024 gigabytes make 1 terabyte (TB)

##### **c) INPUT/OUTPUT (PERIPHERAL) DEVICES**

The Input and Output devices refer to those devices with which you send (Input) data into the computer and see (Output) the result, which the computer provides. It can be likened to the hands, legs, ears, eyes, etc of the human beings.

### **SIZE AND STRUCTURE OF A COMPUTER SYSTEM**

Here we have three main classifications as follows:

#### **a) MAINFRAME COMPUTER**

This is the type of computer that existed before the 1980s. It was generally very large in size and used cathode-ray tubes (CRT). No single human being uses the system at a time. You hardly find such computer system is existence today.

#### **b) MINI COMPUTER**

This type was less in size than the Mainframe, but was still large.

#### **c) MICROCOMPUTER**

This is a computer that is built around a microprocessor. The first microcomputer was introduced by Apple Inc, based in USA (makers of the award-winning iPad tablet & iPhone). Today they also make the Macintosh (Mac) model of computer systems.

## **FACTORS NECESSARY TO EFFICIENTLY USE THE COMPUTER AND OTHER ICT FACILITIES**

- i.) **PASSION/INTEREST** - Without passion one will get frustrated using the computer effectively. Nonetheless, passion/interest can be forced on people when they have to use ICT facilities in their workplaces.
- ii.) **ABILITY TO READ AND INTERPRET INSTRUCTIONS CORRECTLY** - You acquire this principle gradually. And after a while you will see that you can manipulate/operate ICT devices seamlessly.
- iii.) **TIME** - You must devote some good measure of time to carrying out your work on the computer and other ICT facilities.

## **COMMON CAD APPLICATIONS IN THE INDUSTRY**

Some of the common CAD Applications, which are available in the industry today.

- i.) **AutoCAD** - is a commercial computer-aided design (CAD) and drafting software application.
- ii.) **STAAD or STAAD.Pro** - is a structural analysis and design software application most widely used structural analysis and design software products worldwide.
- iii.) **MATLAB** (matrix laboratory) - is a multi-paradigm numerical computing environment and proprietary programming language developed by MathWorks.
- iv.) **ELECTRONIC WORKBENCH (EWB)** - is a simulation package for electronic circuits. It allows you to design and analyse circuits without using breadboards, real components or actual instruments.
- v.) **OrCAD** - it is a software used mainly by electronic design engineers and electronic technicians to create electronic schematics and electronic prints for manufacturing printed circuit boards.

## **❖ MANAGEMENT ESSENTIAL IN DEVELOPING THE ENGINEER TO PROMOTE PRODUCTIVITY IN ANY ENTERPRISE.**

### **➤ Attributes of Managerial Excellence.**

- 1) They are available.
- 2) They are technical.
- 3) They enable autonomy.
- 4) They support experimentation.
- 5) They grow talent.
- 6) They promote fairness.
- 7) They build a relationship with team members.
- 8) They recognize individuality.
- 9) They clear a path to execution.
- 10) They build team culture.
- 11) They guide the team.
- 12) They maintain a positive working environment.
- 13) They inspire the team.
- 14) They facilitate external communication.

15) They drive alignment.

As a leader, you should hire and promote managers who best demonstrate each of these 15 attributes of managerial excellence.

#### ❖ **FINANCIAL MANAGEMENT.**

##### ➤ **How Understanding Finance Helps Your Engineering Career**

The relationship between Finance and Engineering is a simple one. Engineering costs money and finance, provides it.

Understanding money can help an engineer:

- i.) Make smarter design decisions
- ii.) Make your businesses more successful
- iii.) Make your clients happy
- iv.) Differentiate yourself from your peers and get promoted faster.

It is easy for an engineer to become focused on the technical detail of their profession, particularly when a project is technically large or innovative and also for the engineer to see the relationship between finance and engineering as being one where finance has the simple role of funding engineering project.

##### ➤ **Benefits of Financial Management to Engineers**

- v.) Create a budget and track performance
- vi.) Create a financial dashboard reflecting key metrics
- vii.) Evaluate the economic viability for capital investments
- viii.) Interpret financial statements

#### ❖ **HUMAN RELATIONS**

Human relations is defined as relations with or between people, particularly in a workplace or professional setting. Because a company depends on good human relations through its organizational structure, developing these skills is important. Technology has greatly impacted human relations because so much of our communication occurs without the advantage of seeing body language. This can result in miscommunications. Many workers telecommute to work.

##### ➤ **Merits of Technology in Human Relations**

- i.) It Improves communication.
- ii.) It encourages Innovation and Creativity.
- iii.) It improves on Human Resource Management.
- iv.) It saves Time.
- v.) It creates Mobility.

##### **Demerits of Technology in Human Relations**

- i.) It causes Distraction at Work.
- ii.) It leads to high Maintenance costs.
- iii.) It makes employees lazy.
- iv.) It affects Workplace Relationships.
- v.) It is Risky.

The activities performed by Human Resource Management professionals fall under five major domains

- i.) **Organizational design** - Organizational design involves the arrangement of work tasks based on the interaction of people, technology and the tasks to be performed in the context of the objectives, goals and the strategic plan of the organization. HRM activities such as human resources planning, job and work analysis, organizational restructuring, job design, team building, computerization, and worker-machine interfaces fall under this domain.
- ii.) **Staffing** - Recruitment, employee orientation, selection, promotion, and termination are among the activities that fit into the staffing domain.
- iii.) **Performance Management and Appraisal** - The performance management domain includes assessments of individuals and teams to measure, and to improve work performance.
- iv.) **Employee and Organizational Development** - Employee training and development programs are concerned with establishing, fostering, and maintaining employee skills based on organizational and employee needs.
- v.) **Reward Systems, Benefits and Compliance** - Reward systems, benefits and compliance have to do with any type of reward or benefit that may be available to employees. Labour law, health and safety issues and unemployment policy fall under compliance component.

➤ **Henri Fayol's Principles of Management**

- 1. **Division of work** - Work should be divided in the most efficient way.
- 2. **Authority** - Authority is the right to give orders and accountability within those orders and also to make sure tasks are met.
- 3. **Discipline** - Discipline is penalties applied to encourage common effort, as a successful organization requires the common effort of all workers.
- 4. **Unity of command** - Workers should receive orders from only one manager.
- 5. **Unity of direction** - Everyone in the organization should move toward a common goal and understand how the team will achieve that goal.
- 6. **Subordination of individual interests to general interests** - The interests of one person shouldn't have priority over the interests of the organization as a whole.
- 7. **Remuneration** - Many things should be considered when paying employees, including cost of living, supply of qualified people, and business success.
- 8. **Centralization** - The decisions are made centrally which does not allow as much flexibility as decentralized decision making.
- 9. **Scalar chain** - This refers to how authority is divided among managers. lower-level managers should always keep upper-level managers informed.
- 10. **Order** - All materials and people related to one kind of work should be organized and neat. Things should be easy to find.
- 11. **Equity** - All employees should be treated equally.
- 12. **Stability of tenure of personnel** - Retention of employees should be a high management priority.
- 13. **Initiative** - Management should take steps to encourage workers to take initiative.
- 14. **Esprit de corps** - Managers should encourage harmony among employees.