

Final term paper

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ProgramB- tech (Electrical)

Subject High voltage

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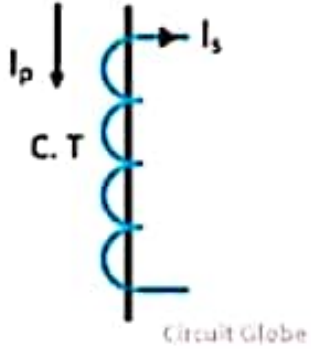
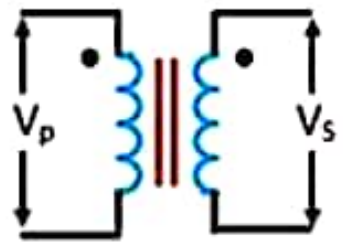
Questions No:- 01 (Part A)

Answer :- Difference Between Current Transformer (CTs) & Potential Transformer (PTs).

There are several types of differences between the voltage and the current transformer.

One of the major difference between them is that the current transformer converts the high value of current into low value whereas the potential or voltage transformer converts the high value of voltages into low voltage. Some other differences between the current and the potential transformer are explained below in the comparison chart

in the comparison chart

| Basis for Comparison | Current Transformer | Potential Transformer |
|----------------------|---|---|
| Definition | Transform the current from high value to the low value. | Transform the voltage from high value to the low value. |
| Circuit Symbol |  |  |
| Core | Usually built up with lamination of silicon steel. It is made up of with high quality steel operating at low flux | It is made up of with high quality steel operating at low flux densities |
| Primary Winding | It carries the current which is to be measured | It carries the voltage which is to be measured |
| Secondary Winding | It is connected to the current winding of the instrument. | It is connected to the meter or instrument. |
| Connection | Connected in series with the instrument | Connected in parallel with the instrument. |
| Primary Circuit | Has a small number of turns | Has a large number of turns |
| Secondary Circuit | Has a large number of turns and cannot be open circuit. | Has a small number of turns and can be open circuit. |

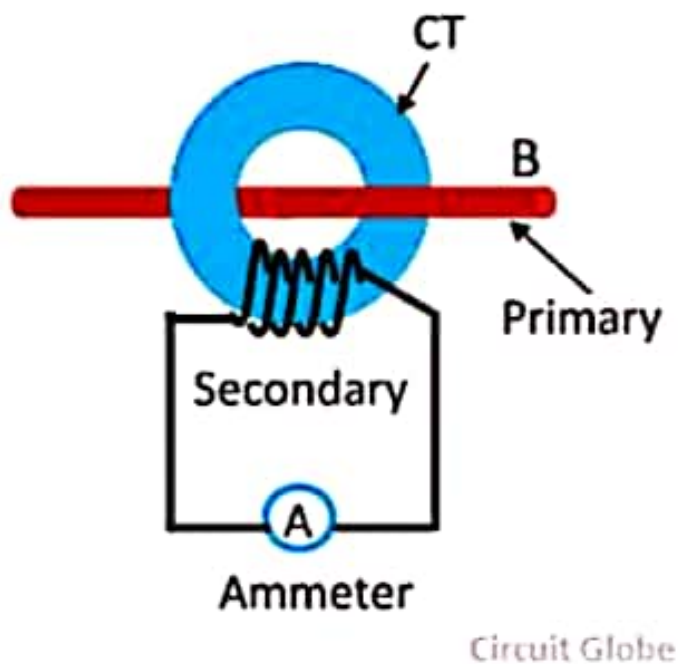
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| | | |
|----------------------|---|---|
| Range | 5A or 1A | 110v |
| Transformation Ratio | High | Low |
| Burden | Does not depends on secondary burden | Depends on the secondary burden |
| Input | Constant current | Constant Voltage |
| Full line current | The primary winding consists the full line current. | The primary winding consists the full line voltage. |

| | | |
|--------------|---|---|
| Types | Two types (Wound and Closed Core) | Two types (Electromagnetic and Capacitor voltage) |
| Impedance | Low | High |
| Applications | Measuring current and power, monitoring the power grid operation, for operating protective relay, | Measurement, power source, operating protective relay, |

Definition of Current Transformer

A current transformer is a device which is used for the transformation of current at a higher value to a lower value with respect to the earth potential. It is used with the AC instruments for measuring the high value of current.

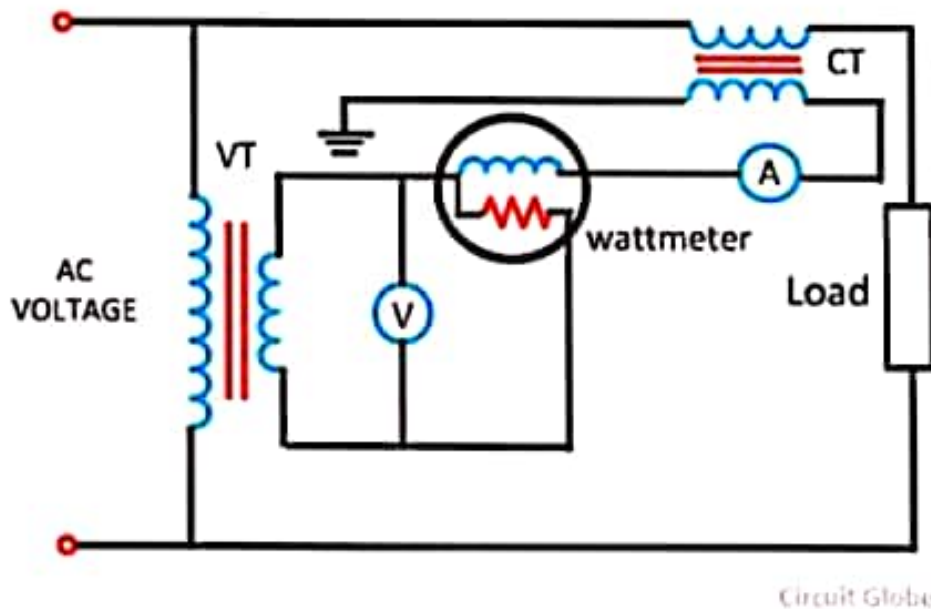


The line current is too high, and it is very difficult to measure them directly. Thus, the current transformer is used which decrease the high value of current into a fractional value which is easy to measure by the instrument.

The primary of the current transformer is connected directly to the line whose value is to be measured. The secondary of the current transformer is connected to the ammeter or meter which measured the line value regarding fractions.

Definition of Potential Transformer

A voltage transformer is the type of Instrument transformer which is used for the transformation of the voltage from a higher value to a lower value.



The primary terminal of the potential transformer is connected to the line for measuring the line voltage. The potential transformer reduced the high value of voltage into the small value which can easily be measured by the voltmeter or meter.

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Questions No :- 02 (Part (A)

Anser :- The Dangar of working power line the are runs to parallel to an energised

This Is the most Important rule: Work at a safe distance from all power lines. The Occupational Safety and Health Administration (OSHA) requires that equipment be kept at least 10 feet away from power lines with voltages up to 50kV.

- ★ Before employees install lines parallel to existing energized lines, the employer shall make a determination of the approximate voltage to be induced in the new lines, or work shall proceed on the assumption that the induced voltage is hazardous.
- ★ Unless the employer can demonstrate that the lines that employees are installing are not subject to the induction of a hazardous voltage or unless the lines are treated as energized, temporary protective grounds shall be placed at such locations and arranged in such a manner that the employer can demonstrate will prevent exposure of each employee to hazardous differences in electric potential.
- ★ Checking structure before climbing. Before allowing employees to subject elevated structures, such as poles or towers, to such stresses as climbing or the installation or removal of equipment may impose, the employer shall ascertain that the structures are capable of sustaining the additional or unbalanced stresses. If the pole or other structure cannot withstand the expected loads, the employer shall brace or otherwise support the pole or structure so as to prevent failure.

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Questions No :- 02 (Part :- (B)

Anser :- a) The Eletricity Act :-

The Electricity Act, 1910 governs the law relating to supply and use of electrical energy and extends to whole of Pakistan. It is a pre-partition act and implemented in Pakistan with subsequent amendments made therein from time to time.

An Act to consolidate the laws relating to generation, transmission, distribution, trading and use of electricity and generally for taking measures conducive to development of electricity industry, promoting competition therein, protecting interest of consumers and supply of electricity to all areas, rationalization of electricity tariff, ensuring transparent policies regarding subsidies, promotion of efficient and environmentally benign policies, constitution of Central Electricity Authority, Regulatory Commissions and establishment of Appellate Tribunal and for matters connected therewith or incidental thereto.

b) The OSH act :-

The Occupational Safety and Health Act of 1970 is a US labor law governing the federal law of occupational health and safety in the private sector and federal government in the United States. It was enacted by Congress in 1970 and was signed by President Richard Nixon on December 29, 1970.[1] Its main goal is to ensure that employers provide employees with an environment free from recognized hazards, such as exposure to toxic chemicals, excessive noise levels, mechanical dangers, heat or cold stress, or unsanitary conditions. The Act created the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH).

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Questions No :- 03

Answer :- Arc interruption is a process where you interrupt the path of an arc with the purpose of extinguishing it. For arc interruption, we use different processes like air blast, high air pressure turbulence, and arc splitting to increase the resistance of the arc, so that the current reduces to a level where it ceases to flow.

Air Blast Circuit Breaker:-

Air blast circuit breakers use compressed air or gas as the arc interrupting medium. In the air blast circuit breaker, compressed air is stored in a tank and released through a nozzle to produce a high-velocity jet; this is used to extinguish the arc. Air blast circuit breakers are used for indoor services in the medium high voltage field and medium rupturing capacity. Generally up to voltages of 15 KV and rupturing capacities of 2500 MVA. The air blast circuit breaker is now employed in high voltage circuits in the outdoors switch yard for 220 KV lines.

Sulphur Hexafluoride (SF6) Circuit Breaker

A circuit breaker in which SF6 under pressure gas is used to extinguish the arc is called SF6 circuit breaker. SF6 (sulphur hexafluoride) gas has excellent dielectric, arc quenching, chemical and other physical properties which have proved its superiority over other arc quenching mediums such as oil or air. The SF6 circuit breaker is mainly divided into three types

Non-puffer piston circuit breaker

Single- puffer piston circuit breaker.

Double-puffer piston circuit breaker.

The circuit breaker which used air and oil as an insulating medium, their arc extinguishing force builds up was relatively slow after the movement of contact separation. In the case of high voltage circuit breakers quick arc extinction properties are used which require less time for quick recovery, voltage builds up. SF6 circuit breakers have good properties in this regards compared to oil or air circuit breakers. So in high voltage up to 760 kV, SF6 circuit breakers is used.

Oil circuit breaker :-

is a Electrical Device in this types of circuit breaker which used oil as a dielectric or insulating medium for arc extinction. In oil circuit breaker the contacts of the breaker are made to separate within an insulating oil.

A vacuum circuit breaker :-

is a kind of circuit breaker where the arc quenching takes place in vacuum medium. The operation of switching on and closing of current carrying contacts and interrelated arc interruption takes place in a vacuum chamber in the breaker which is called vacuum interrupter.

Questions No :- 04

Answer :-

The transmission system & Distribution system are divided in Different categories

- ★ Primary transmission line
- ★ Secondary transmission line
- ★ Primary Distribution
- ★ Secondary Distribution

Distribution system :- Is start to 11 kv to 33 kv voltage level

distribution is the final stage in the delivery of electric power; it carries electricity from the transmission system to individual consumers. Distribution substations connect to the transmission system and lower the transmission voltage to medium voltage ranging between 2 kV and 35 kV with the use of transformers.

Primary distribution :-

Primary (distribution) feeders. The primary distribution system is that part of the electric distribution system between the distribution substation and distribution transformers. It is made up of circuits called primary feeders or distribution feeders. Primary distribution voltages range from 4 kV to 35 kV phase-to-phase (2.4 kV to kV phase-to-neutral)

Secondary distribution systems :-

A low-voltage network or secondary network is a part of electric power distribution which carries electric energy from distribution transformers to electricity meters of end customers.

Secondary distribution is 440V and 230V are used where domestic consumers

Transmission System :-

A transmission system is a system that transmits a signal from one place to another. The signal can be an electrical, optical or radio signal. ... Also, transmission system is the medium through which data is transmitted from one point to another.

Today, transmission-level voltages are usually considered to be 110 kV and above. Lower voltages, such as 66 kV and 33 kV, are usually considered subtransmission voltages, but are occasionally used on long lines with light loads.

Primary Transmission System :-

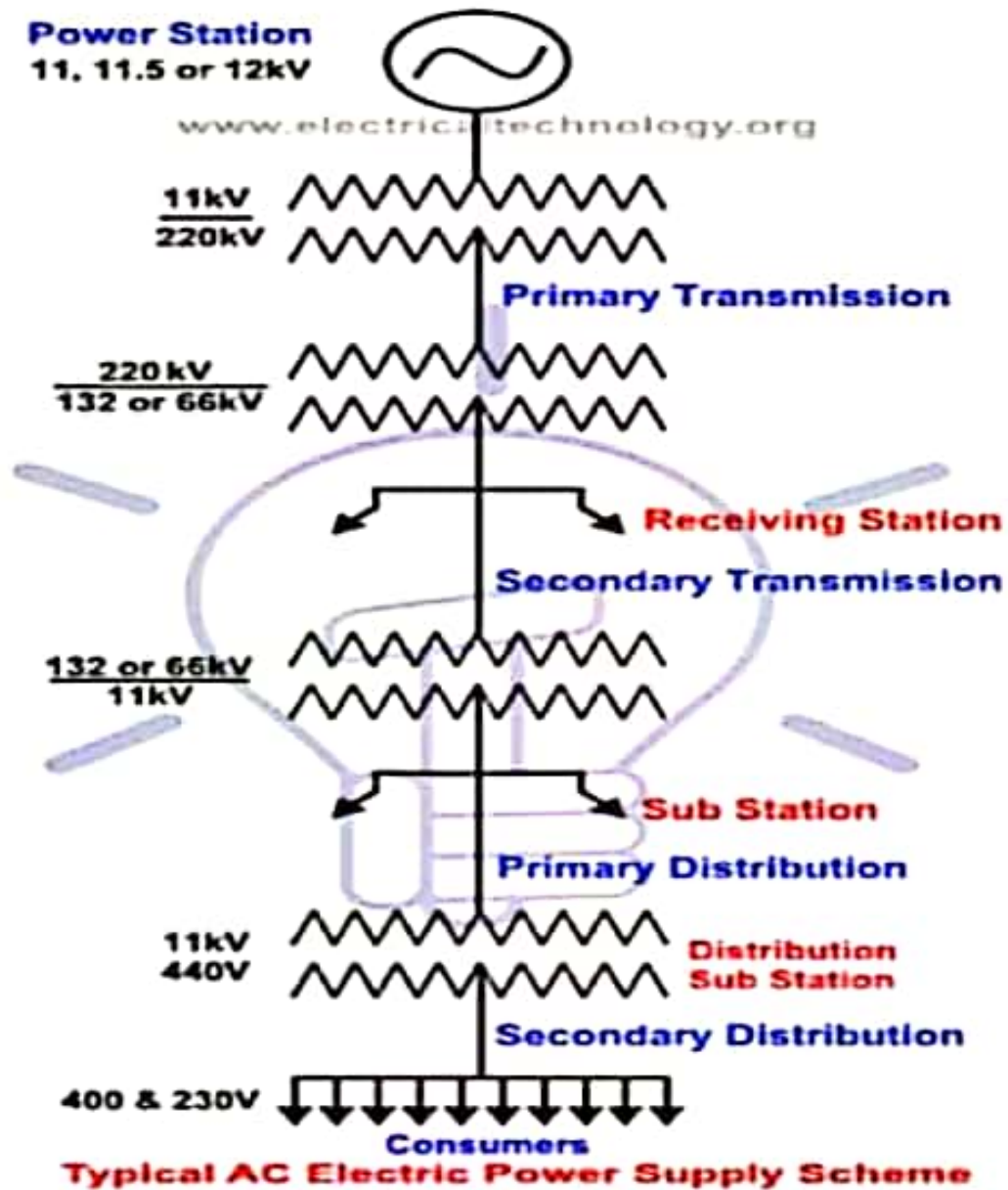
The voltage is stepped down at a receiving station to 33kV or 66kV is called primary transmission line .

Secondary transmission system :-

Secondary transmission lines emerge from this receiving station to connect substations located near load centers (cities etc.). The voltage is stepped down again to 11kV at a substation.

Questions No:- 04

My Hometown proper diagram :-



My Home town proper Details :-

| Power station | primary transmission line | Secondary transmission lines | Primary distribution line | Secondary distribution line |
|---------------|---------------------------|------------------------------|---------------------------|-----------------------------|
| Tarbela | Grid station mardan | Par-Hotl mardan | Khuda Noor kalay mardan | Consumers |
| 11.5 or 12 KV | 220 KV | 132 or 66 KV | 11 KV & 440 V | 400 or 230 V |