

Instructor: \_\_\_\_\_

Total Marks: 50

Student Details

Name: **khalid khan** \_\_\_\_\_

Student ID: **13880** \_\_\_\_\_

Q1	a) What are the differences between CTs and VTs. b) What are the pros and cons of AC and DC Transmission.	(20 marks)
Q2	a) What are the dangers of working on a line that runs parallel to an energized line. b) Explain the purpose of the documents relating to the following a) The Electricity Act b) OSH Act	(10 marks)
Q3	Describe the arc interruption processes in air blast, SF6, oil and vacuum circuit breakers.	(10 marks)
		(10 marks)

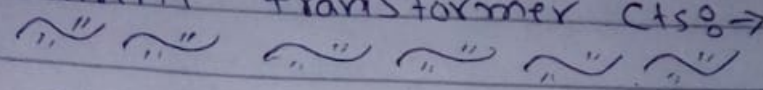
Q4	The Transmission and Distribution section is divided in different categories. Differentiate between the following terms accordingly to your hometown scenario with the help of proper diagram labeling.  ✓ Primary Transmission & Secondary Transmission	
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Q1

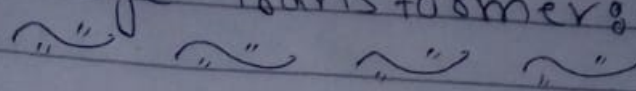
(a) What are the difference between Cts and Vts

Ans:  $\Rightarrow$

Current transformer Cts  $\Rightarrow$

A diagram of a current transformer core. It consists of a rectangular magnetic core. On the left vertical leg, there is a single loop representing the primary winding. On the right vertical leg, there are many closely spaced loops representing the secondary winding.

$\Rightarrow$  Cts are broadly employed in order to measure high magnitude currents such transformer basically step down (lower) the current which is to be measured so that it can be measured with an average range ammeter. A Cts generally possesses one or few primary turns the primary side winding could be simply a conductor positioned in an empty (hollow) core whereas the secondary side possesses a large number of turns which are precisely wound for a particular turn ratio hence the Cts step the voltage up whilst stepping the current down

Voltage transformer  $\Rightarrow$  Cts  


$\Rightarrow$  Transforms high volt into low voltage

$\Rightarrow$  Connected in Parallel with the circuit so full line voltage appears across the winding

$\Rightarrow$  primary current relies on secondary side ckt conditions

$\Rightarrow$  Secondary side can be open circuited without any damage

$\Rightarrow$  using Potential T/F a 120v voltmeter can be used to measure high voltages such as 11 kv

$\Rightarrow$  in PT, Primary has large number of turns

$\Rightarrow$  possesses small number of turns in secondary side

$\Rightarrow$  measuring voltage & operating protective relay in the Substation

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(B)

What are the pros and cons of AC and DC transmission

Ans:  $\rightarrow$  Pros of AC transmission

$\Rightarrow$  The repairing and maintenance of the AC substation is easier and inexpensive than DC substation

$\Rightarrow$  The level of AC voltage may be increased or decreased by using step up and step down transformer

Cons of AC Transmission

$\Rightarrow$  in AC line the size of the conductor is greater than the DC line.

$\Rightarrow$  More losses due to skin effect

$\Rightarrow$  There are some additional line losses due to inductive

P.T.O  $\rightarrow$

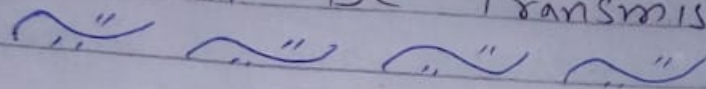
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=> More insulation are required in AC transmission line

=> There are difficulties in controlling the reactive power

Pros of DC Transmission



=> Two conductor used in DC while three conductor required in AC transmission

=> There are no inductance and surges (high voltage waves for very short time) in DC Transmission

=> In DC system there is no interference with other communication line and system

=> In DC line corona losses are very low as compare AC.

⇒ in dc System, the Speed Control range is greater than AC System

⇒ The price of DC cables is low due to low insulation

Cons of DC transmission →

⇒ Due to commutation problem electric power can't be produced at high (DC) voltage.

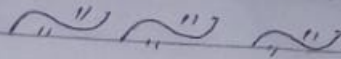
⇒ in high voltage transmission we can't step-up the level of DC voltage

⇒ There is limitation of DC switches and ckt Breaker and they are costly too

⇒ DC Transmission System is more complex and costly as compared to the AC Transmission System.

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=> The motor generator set is used to step down the level of DC voltage and the efficiency is lower than a transformer



Q (2)

(A)

What are the dangers of working on a line that runs parallel to an energized line.

Ans: → Induced voltage on parallel conductive object to an energized transmission line could reach an unsafe condition under fault condition therefore parallel transmission line introduced voltage on each other conductive conductor. which include the overhead earth wire.

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(B)

(a) The electricity Act

(b) OSH Act

Ans The Electricity Act →

⇒ An act to provide for the appointment and function of electricity supply and of consumers committees for the electricity supply industry to make new provision with respect to supply of electricity through electric and transmission of electricity for such supply to abolish the electricity consumer council and the consultative councils established under the electricity Act 1947 to provide for the vesting of the property rights



(b)

⇒ OSH Act ⇒  
" " " " " "

The act created the Occupational Safety and Health Administration (OSHA) an agency of the Department of Labor. OSHA was given the authority both to set and enforce workplace health and safety standards. The Act also created an independent Occupational Safety and Health Review Commission to review enforcement priorities, actions and cases.

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Q.3) Describe the arc interruption processes in air blast, SF<sub>6</sub>, oil and vacuum ckt breaker

Ans:→

Arc interruption in air Blast  
Ckt Breaker:→

The essential features of air blast ckt breaker. They are fixed and moving contact in closed position by spring pressure under normal operating condition. Thus the arc is interrupted and the space b/w the contact is filled with fresh air flowing through. No ZP

Arc interruption in SF<sub>6</sub> Ckt Breaker:→  
in the normal operating condition the contact of the breaker are closed when fault occurs in the system contact are pulled apart and

P.T.O

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and the arc is structure between them. The displacement of moving contact is synchronized with the value which enters the high pressure SF<sub>6</sub> gas in the arc interrupting chamber at a pressure of about 16 kg/cm<sup>2</sup>. These ions increase the dielectric strength of gas and hence the arc is extinguished.

⇒ Arc interrupting in oil  
Ckt Breaker

⇒ oil ckt breaker which is used oil as a dielectric or insulating in oil ckt breaker. The ~~the~~ ~~the~~ contact of the breaker are made to separate within an insulating oil when the fault occur in the system the contact of the ckt breaker is open under insulating oil and they are developed b/w them arc is evaporated in surrounding of oil

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⇒ Arc interruption in vacuum  
Ckt Breaker

⇒ vacuum Ckt Breaker  
where the arc quenching  
takes place in vacuum  
medium the operation  
on and closing current  
carrying contact and interrupted  
arc interruption take  
place in vacuum chamber  
in breaker which is  
called vacuum interrupter

4 Q 4

∴ Primary transmission and Secondary transmission.

∴ Primary Distribution and secondary distribution.

⇒ Primary Transmission: ⇒

⇒ Transfer of large quantity of electric power from electric generating station to substation.

⇒ - the voltage is stepped down at a receiving station to 33 kV or 66 kV

⇒ Secondary Transmission

⇒ Secondary transmission lines emerge from receiving station to connect substation located near load stepped down again to 11 kV at a substation.

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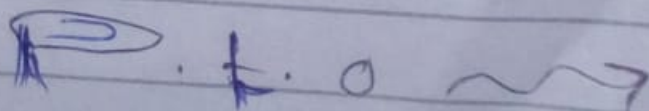
=> Primary Distribution =>

Electricity distribution is the final stage in delivery of electric power. It carries electric power from transmission to individual consumer. Primary distribution lines carry the medium voltage to distribution transformer which is located near the consumer.

Secondary Distribution =>

Secondary distribution is a part of electric power distribution which carries electric energy from distribution transformer to electricity meters at end or last customer.

Diagram of my hometown scenario



# Diagram of my home town

