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Programme

B-Tech (E)

Subject

High Voltage

Submitted

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Nawaz

(a) (a) What are the difference between CTs & VTs

Ans = Current Transformer CTs :-

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=> 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

~~11-11-11-11-11-~~

$\Rightarrow$  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

CIT 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 11kV.

$\Rightarrow$  In PT, primary has large number of turns

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

$\Rightarrow$  measuring voltage in operating protective

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Delay in the Substation.

~~(a)~~ (b)

What are the pros and cons of AC and DC Transmission.

Ans) A Pros of AC Transmission.

=> The repairing and maintenance of the AC Substation is easier and inexpensive than DC Substation.

=> The level of AC voltage may be increased or decreased by using step up and step down Transformer.

Cons of AC Transmission =>

=> In AC Line, the size of the conductor is greater than the DC Line.

=> More losses due to skin effect

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⇒ There are some additional line losses due to inductance

⇒ 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 a 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 lines 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 a limitation of DC switches and circuit breaker and they are costly too

⇒ DC Transmission system is more complex & 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 of motor-generator set 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 and load condition. Therefore, parallel transmission line introduce the risk of induced voltage on each other conductive conductor.

which include the overhead earth wire.

(B) Explain the purpose of the documents relating to the following

- a) The electricity Act
- (b) OSH Act

Ans: The Electricity Act =>  
" " " " " " " " " " " "

=> An act to provide for the appointment and function of Director general of electricity supply and of consumers' committees for the electricity supply industry to make new provision with respect to supply of electricity through electric lines and the generation 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 Acts =

"- "- "- "- ⇒ 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,  
action and cases.

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=> OSHA is responsible for enforcing the provisions of the Occupational Safety and Health Act of 1970 (OSHA Act), which ensures safe and healthful working conditions for working men and women by enforcing standards and providing outreach, education and assistance.

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

Ans → ~~Air~~ BI

Arc interruption in air blast  
Circuit Breaker →

" " " " = The essential

features of air blast circuit 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 finished with fresh air flowing through nozzle.

→ Arc interruption in SF<sub>6</sub> circuit breaker  
" " " " →

In the normal operating condition the contact of the breaker are closed when fault occur in the system. The

Contact are pulled apart 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 is pressure of about 16 kg/cm<sup>2</sup>. These ions increase the dielectric strength of gas and hence the arc is extinguished.

=> Arc interruption in oil

Oil Breaker

" " " " " "

=> oil Oil Breaker

which is used oil as a dielectric or insulating medium for arc extinction in oil oil breaker the contact of the breaker are made to separate within an insulating oil. when the fault occur in the system the

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The contact of the CBT Breaker is open under insulating oil and they are developed b/w them and the heat of the arc is evaporated in surrounding of oil.

=> Arc interruption in Vacuum CBT Breaker

=> Vacuum CBT 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.

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Q. The Transmission and Distribution section is divided in different categories. Differentiate b/w the following terms according to your home town scenario with the help of diagram.

- ✓ Primary Transmission & Secondary Transmission
- ✓ Primary Distribution & Secondary Distribution

Ans. Primary Transmission :-

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

→ The voltage is stepped down at a receiving station to 33 kV or 66 kV.

⇒ Secondary Transmission :-

⇒ Secondary Transmission Lines

D. T. D

emerge from receiving station to connect Substation located near load center (cities etc). The voltage is stepped down again to 11kV at a substation

=> Primary Distribution =>  
 " - " - " - " - " - "

=> Electricity Distribution is the final stage in delivery of electric power it carry electric power from transmission to individual consumer Primary distribution line carry the medium voltage to distribution transformer which located near the consumer

=> Secondary Distribution =>  
 " - " - " - " - " - "

=> Secondary Distribution is a part of electric power distribution which

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Carries electric energy  
From Distribution Transformer  
To electricity meters of  
End Customer.



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Diagram of my hometown Scenario

