

Application of electrical technology

Engineering



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Electrical Technology

Task 1

a) Use of transformers

Step-up power transformers can be installed into grid network to increase voltage in order to enable supply of power by generators to reach far-distance loads. On the other hand, step-down transformers are installed out of a grid network to reduce the high-voltage from power lines to a usable voltage [Jam15].

b) Switchgears and Protection Systems

Switchgears and protection systems are constructed to ensure that damage is not caused to the loads in case faults occur. Switchgears are located on both the low-voltage and the high-voltage sides of power transformers. On the low-voltage side, the switchgears are constructed with medium-voltage circuit breakers, protection equipment, and control and metering. In industrial applications, the switchgears are constructed with high-voltage circuit breakers and they may be lined-up together with the transformers in one unitized substation (USS). Switchgears de-energize loads in order to allow work to be done and also to enable clearing of faults downstream power systems. In construction of protection relays, the current coil of the relay is connected to the secondary current coil of the transformer.

Moreover, the secondary voltage coil of the transformer is connected to the voltage coil of the protection relay. When a fault occurs in the circuit feeder, an increased mmf of current coil of the relay is triggered. The increased mmf closes the normally open contact of the relay that in return closes and

completes the DC Trip Coil Circuit. The mmf of the Trip Coil initiates a tripping mechanical movement on the circuit breaker that causes it to isolate the fault.

Switchgear

c) Cross-Channel Links

Cross-channel links refer to the electricity grid interconnections that are aimed at transmitting power over different locations.

d) Sub-stations, Plant and Equipment

A sub-station refers to a part of electrical generation, distribution and transmission that performs the function of voltage transformation from high to low and vice versa. A power plant refers to an installation that is used for production of electricity while a power equipment refers to any equipment that is powered by electricity.

SubstationPower Plant

Equipment

e) Ring and Radio Feeders

Ring is an electrical wiring technique that enables use of wires of smaller diameter than the ones used in radial circuit, but of equivalent total current. On the other hand, feeders refer to a set of electric conductors that transmit power from the primary distributor centers to secondary distribution centers or branch-circuit distribution centers.

RingFeeder

Task 2

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a) Application of Electrical Technology in Healthcare

Electric technology (electrical power isolation) has been applied in healthcare settings in order to protect patients and staff from electric shocks while operating medical grade equipment.

An isolation transformer is installed between an AC power source and medical grade equipment in order to protect patients and staff from electric shocks in case faults occur due to defectiveness of a medical grade equipment or use of a non-medical grade equipment.

b) Application of Electrical Technology in Transportation

Electric technology has been applied to introduce electric vehicles in the transport sector.

The electric vehicles have rechargeable batteries that are able to be charged from mains power. Electricity has been utilised in the innovation to substitute other fuels that were depended upon in fueling cars. It provides the necessary power that runs the car engines hence making them able to move[Mit15].

References

Jam15: , (Harlow, 2015),

Mit15: , (Mitchell, 2015),