Assignment criteria p5 essay

Design

Assignment Criteria P55. Explain how an isolating transformer works giving an example of where one can be located. What is an isolating transformer and how does it work? Who uses this type of transformer? Power Transformer Inc. (2007) provides a simple definition for Isolation Transformers: these “…have primary and secondary windings that are physically separate from each other.” In certain cases, these are also called ‘ Insulated Transformers’ because each winding is insulated from the other (Power Transformer Inc. 2007).

Meanwhile, the Ministry of Economic Development of New Zealand (2006) describes their basic functionality as a protection from electric shock through the provision of an electric supply that is isolated from the earth or ground while Encyclopedia Britannica Online (n. d.) says that these are “ usually employed for reasons of safety to isolate a piece of equipment from the power source.” Isolation or Isolating Transformers are basically used for power supplies that provide electricity for sensitive equipments like computers or laboratory instruments (Power Transformer Inc. 2007) or even mission critical applications like in circuits for airport lighting for runways to “ isolate the low voltage lamps from high voltage series circuits…” and “ ensure the continuity of the series circuit in case one or more lamps are burnt out (AMA n. d.). Mcilhargey (2009) notes that isolating transformers work as follows: a) In homes, these are built-in safety devices in the electric circuit from the main voltage which can be dangerous to humans.

These make sure that the exact voltage requirement of an electrical device is maintained and prevent power surges or electrical shocks; b) In other applications, these isolate the circuits from the main power source. Since

both coils of the isolating transformer are insulated, one coil touching the other which is connected to the main power source will not result in a deadly shock. Depending on the use, such as in boats (Victron Energy 2006) for instance, higher current applications will require larger and heavier transformers; c) In terms of function, these transformers both protect the people using electrical devices and the circuits of these electrical devices that maybe highly specialized, expensive, or hard to replace. The semiconductor chips and sensitive electronics of these devices will usually require only small voltages and thus, are spared from the electrical shocks that may destroy these components. Meanwhile, the motors, solenoids, relays and other components of these electrical devices that require larger voltages that need to work with the chips and sensitive electronics which only require small voltages will be isolated by the isolating or isolation transformer. One type of industrial user that requires isolating transformers would be boat manufacturers. Since boats may require contact with an alternating current power source from the shore, an isolation transformer eliminates any electrical continuity between the AC power source from the shore and the boat (Victron Energy 2006). These “…eliminate[s] the need for galvanic isolators and polarity alarms” (Victron Energy 2006).

Since galvanic corrosion occurs in the metal parts of a boat, this condition prevents the fuse from blowing or the GFCI from tripping making the connection of the ground wire of the shore power source to the metal part of the boat dangerous in case of an electric shock (Victron Energy 2006). Isolation transformers in boats ensure that in cases of short circuits or current leakages to the ground, fuses will blow or GFCIs (Ground Fault

Current Interrupters) will trip (Victron Energy 2006). Galvanic corrosion occurs as soon as the metal parts of a boat come in contact with the water (Victron Energy 2006). It dissolves the sacrificial anodes and corrodes the shaft, propeller and other metal parts that come in contact with the water (Victron Energy 2006). Diagrams (Victron Energy 2006)Assignment Criteria P5 Questions: 1. Describe with the aid of diagrams the construction of single phase and three phase transformers. 2.

Describe with the aid of diagrams the operating principles of single phase and a three phase transformers. 3. Sketch the core arrangements for each of the following types of single phase transformers: a) core; b) shell; c) torodial4. State the loses that can be found in a transformer. A transformer has a full load copper loss of 185 watts.

What is the copper loss, at: a) two-thirds full load; and b) one-third full load? 5. Explain how an isolating transformer works giving an example of where one can be located. 6.

Give an application of two types of transformer. Single phase and three phase. 7. A current transformer has a primary winding of 2 turns and a secondary winding of 100 turns.

The secondary winding is connected to a ammeter with a resistance of 0. 25 ohms. The resistance of the secondary of the current transformer is 2.

75 ohms. The value of current in the winding is 250A. Calculate: a) the value of the current in the CT secondary; b) the potential difference across the ammeter terminals; c) the total load in the VA on the CT

secondary. ReferencesAMA n. d., Series Isolating Transformer. Available from:

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