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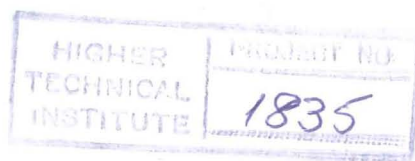
ELECTRICAL ENGINEERING COURSE

DIPLOMA PROJECT

DESIGN AND CONSTRUCTION  
OF A TEMPERATURE  
CONTROLLER FOR AN  
INFANT INCUBATOR

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## B. SUMMARY:

The purpose of this project is to develop, construct and test the heater control circuits that are used in an infant incubator and incorporate the necessary protection alarms that are usually required. Therefore this work is going to study only the problems that are faced with temperature.

The first point which shall be considered is to provide stabilized temperature control. The circuit used for this purpose is using the temperature sensor RS590 which is very accurate. The output of this sensor which is an I.C. is compared with the set value of temperature by the comparator LM319N. If the voltage at the output of the sensor is smaller than the set value of the variable resistor then the output of the comparator goes high and drives a circuit which turns on the heater while if output voltage of the sensor is greater then the comparator output goes low and therefore the heater turns off.

The next thing that must take care of is the case of a fault in the controller circuit. If something goes wrong with the temperature controller then some alarm circuit should<sup>be</sup> activated. This circuit in real applications must use second sensor that the controller uses. This is for better operation and more safety. In this circuit there are two different preset values. The one is for the highest and the other for the lowest temperature limit. If the temperature controller fails to stabilize the temperature at the required set value and therefore it drops below or rises above the limits then visual and audible alarm will activated.

The next alarm that is considered to be needed is the power supply failure. This alarm circuit uses the comparator 741 to compare the voltage between the output of the power supply regulator, 7812, and the output of a 9V chargeable battery. If the voltage across the battery is greater then the alarm should turn on since this would mean that there is no power supply.

The last alarm that was constructed is the fan failure.

In <sup>the</sup> case of the fan (D.C. Fan) failure (short circuit or open circuit of the armature coil) this circuit will detect the change of current that will occur and it will drive on the visual and audible alarms.

The two other circuits that were considered useful to be constructed are for measuring purposes. The one is to detect and display the skin temperature which is very important, since this is actually the quantity that is wanted to be controlled. For this circuit a thermocouple used as the sensor. This was choose due to it's nature since as it can be observe, it can conducts directly with the infant's skin, so it measures the real temperature of the infant.

The other measuring circuit is for the incubator's temperature. This circuit is using the LM35DZ sensor to detect the air temperature. This sensor has an output equal to 10mV/<sup>0</sup>C. Therefore is very easy to measure the temperature.

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