Objectives:

- To design a basic digital clock using ICs and Breadboard and proteus
- To add alarm and manual time setting to the clock
- To add time zone setting and calender to the clock

Hardware/Software required:

Equipment:

     1. Power supply.
     2. Bread Board.
     3. ICs – 7402, 7432, 7408, 7404,4026,7485,7 segment LEDs, push buttons
     4. Trainer Board.
     5. Connecting wires.
     6.Power supply

Software Tool: Proteus
     8.15

Scope:

This clock includes:

Time:

Basic Time is displayed and incremented correctly.

Alarm Functionality:

Alarm is shown in form of LED which lights up when actual time matches the time set for alarm.

Manual time setting:

Push buttons ensure that a user can adjust time according to his needs.

Time zone:

Different time zones can be implemented with time incremented in hours.

Calendar:

A calendar also exists in addition to basic clock.

Methodology:

First, we implemented the circuit on proteus to correctly observe the working of ICs and verify the working of our project. Afterwards, the circuit was implemented on hardware.

Design and Implementation:

Briefly discussing components and their role in this digital clock:

4026 (counter IC):

6 counter ICs were used , each connected to a separate common cathode 7 segment display using resistors.

2 of the counters for seconds, 2 for minutes and 2 for hours. The clock has been made common by cascading each IC's carry out into the next IC's clock.

AND gates:

A whole bunch of AND gates were used to reset the hours back to 00 after 23, minutes after 59 and same for seconds.They were fed into 7 segment displays.

555 Timer:

This was used to make clock to make our clock trigger.
It was a separate module and its output was fed into clocks of 4026 ICs and the clock started working.

7485(Comparator):

These two ICs were used in order to implement alarm functionality. The a,b,c,d,e,f,g of 7 segment displays were fed into these ICs and a couple of 7 segment were used that were connected to the 2 displays of hours on original basic clock module. It was only kept to the hours in order to reduce complexity and cost. When time was same on both modules, an LED lit up that was put in place.
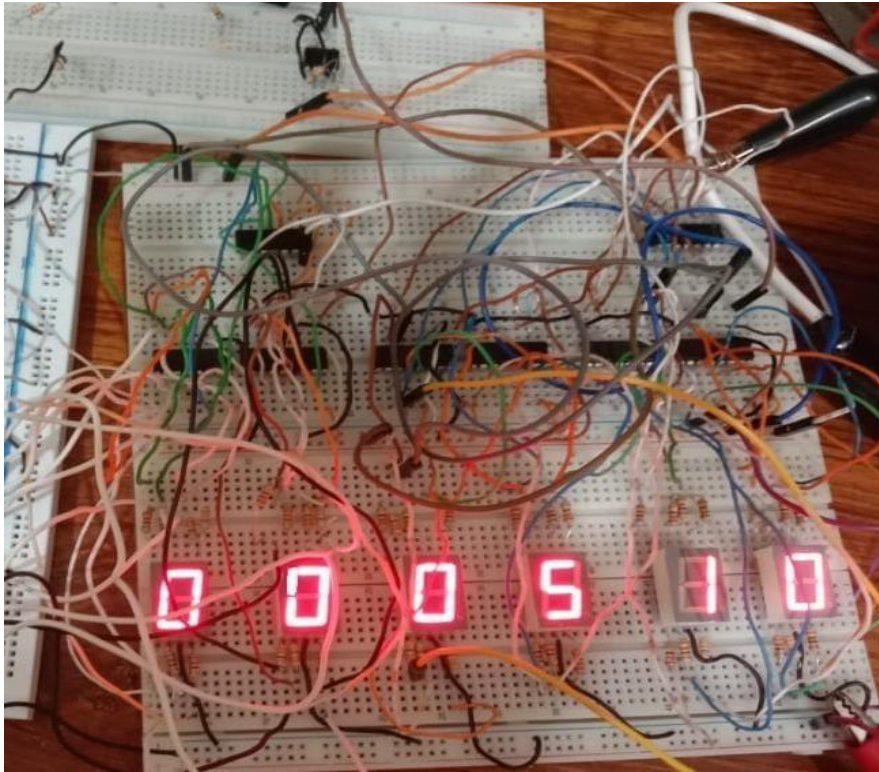
Push buttons:

To provide user with manual time setting facility, couple of buttons were used and user can push them to adjust time according to his choice. These are also used for time zone adjustment.
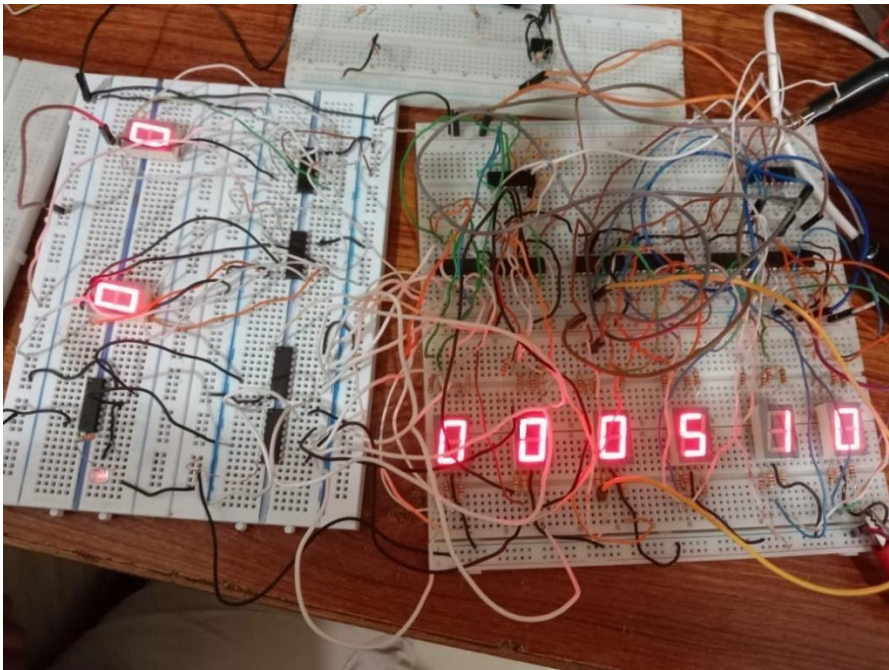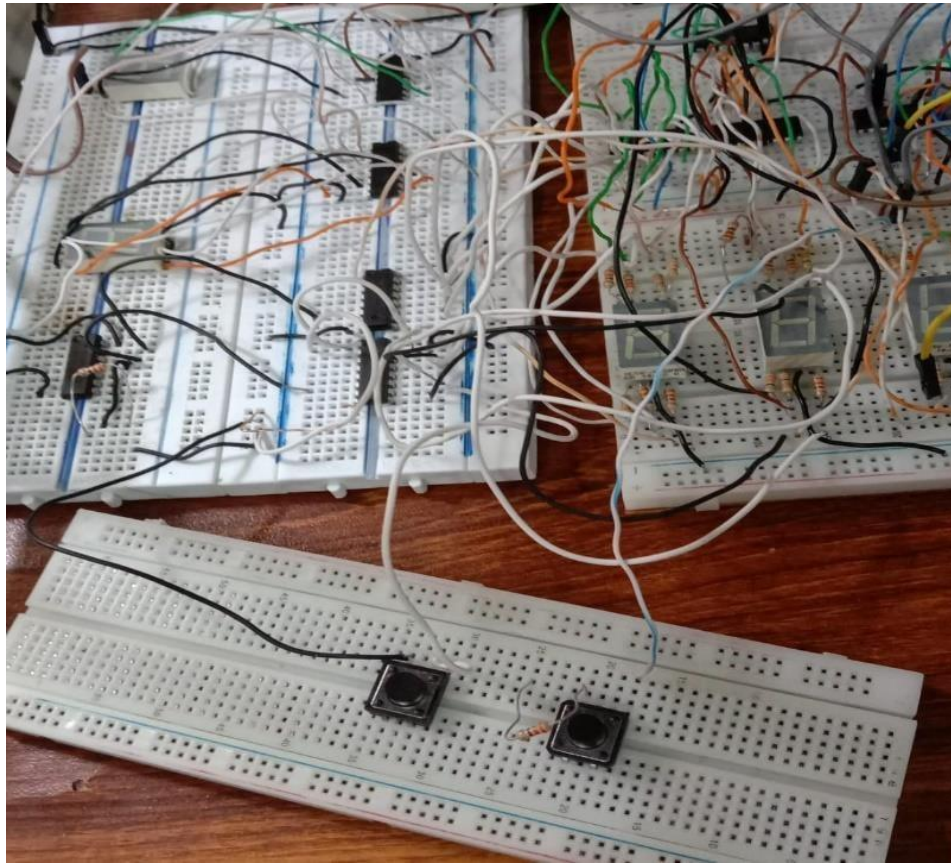
Proteus Circuit:
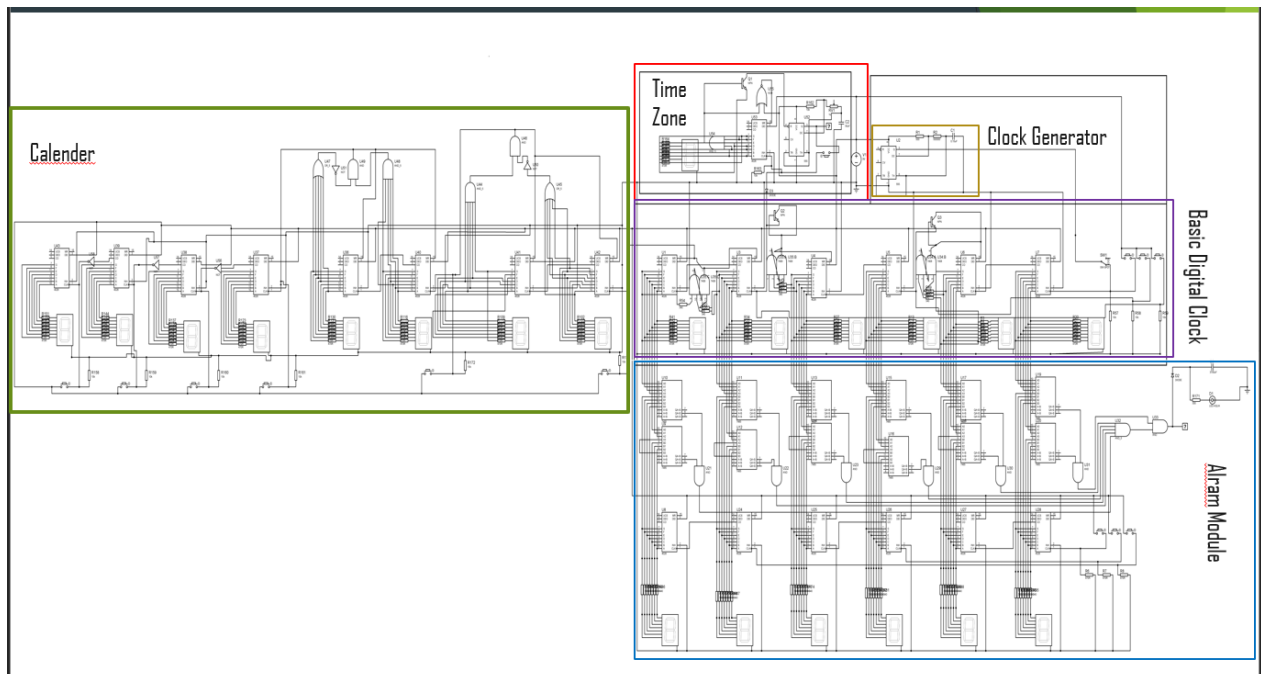
Basic Clock(hardware):

Alarm:

Manual Time Setting + Time zone:

Results:

All the functions were implemented correctly, calender and time zone were implemented on proteus only , because of cost and time constraints.