



4TH NATIONAL ABILITY OLYMPIAD – 2014 CHANDIGARH

VOCATIONAL SKILLS CONTEST

ABOVE 15 YRS.

V16 – ELECTRONIC CIRCUIT CONNECTION & TECHNIQUE

1. OBJECTIVE

To judge competitor's skills in understanding the **functioning** of a given circuit, **assembling** and **ensuring functionality / intended operation** of an electronic gadget.

2. TASK

The task is to understand the functional principle, assemble and then establish functionality of a **Remote-Based Device Control**. The block diagram and complete circuit diagram is in Figure 1 and 2 respectively. Its PCB and component layout is shown in Figure 3 and 4. Figure 5 shows power supply section. Contestant has to demonstrate setting of timer using remote controller for on/off of devices/indicators. Contestant can control the switch off of desired appliances/Indicators by pressing the corresponding keys in the remote controller. Up to 8 devices can be controlled using this task.

This task mainly comprises of six sections; IR detector remote control sensing and decoding unit, real time clock, LCD interface, device switching unit, microcontroller and power supply section. This circuit receives command to set time in timer (display device) by IR signal from remote controller and after the device is switched on, burger will be on along with blinking on the display. Same remote controller can be used to switch off the device by pressing corresponding key of remote controller.

Note: : A demo of working model of task will be displayed for contestants.

3. SPECIAL INSTRUCTIONS

- Contestants should first confirm that the items, quantities, etc., of the provided materials are those specified in Section 5. The contestants should select the required resistors from the kit as per list given in Section 5
- Contestants shall notify the judge when they finish the task.
- When the contest is finished, contestants should clean the worktable following the instructions given by the judge.

4. **WORK ENVIRONMENT**

- Table with electric outlets (220 V AC)
- Electric soldering iron
- Cold solder & soldering flux
- Chair / Stool
- Multimeter capable of measuring voltage, current, resistance and continuity.
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5. **MATERIALS**

- a. Cutting pliers
- b. Nose Plier/ Tweezer
- c. Multi-Stand Electric Wires
- d. PCB
- e. Major Part list as shown below:

Semiconductors:

IC1 - Atmega16 AVR microcontroller

IC2 - DS1307 real time clock

IC3 - TSOP1738 IR receiver module

IC4 - ULN2803 darlington array

IC5 - 7805 5V regulator

IC6 - 78012 12V regulator

T1, T2 - SL100 npn transistor

BR1 - 1A bridge rectifier

- LCD module (16×2)

Resistors (all 1/4-watt, ±5% carbon):

R1, R3, R4,

R6, R10 - 10 kilo-ohm

R2 - 220 ohm

R5,R9 - 120 ohm

R7, R11 - 2.2 kilo-ohm

R8 - 330 ohm

VR1 - 10 kilo-ohm preset

Capacitors:

C1, C2 - 10μF,16V electrolytic

C3, C7, C8 - 0.1μF ceramic disk

C4 - 100μF,25V electrolytic

C5 - 1μF,16V electrolytic

C6 - 1000μF,35V electrolytic

Miscellaneous:

X1 - 230V AC primary to 15V, 500mA secondary transformer

S1 - Push-to-on switch

PZ1 - Piezo buzzer

XTAL - 32.768 KHz crystal

RL1-RL8 - 12V, 1C/O relay

This transformer will be provided to candidates at the time of testing. Testing of gadget will be done by using LED as a device.

6. ALLOCATED TIME

Maximum time : 3 hrs.

7. EVALUATION CRITERIA

| Items to be evaluated | Maximum Marks |
|---------------------------------------|---------------|
| Handling/ sequence of component usage | 20 |
| Neatness of circuit | 20 |
| Soldering Quality | 20 |
| Working Efficiency of the gadget | 40 |
| Total Marks | 100 |

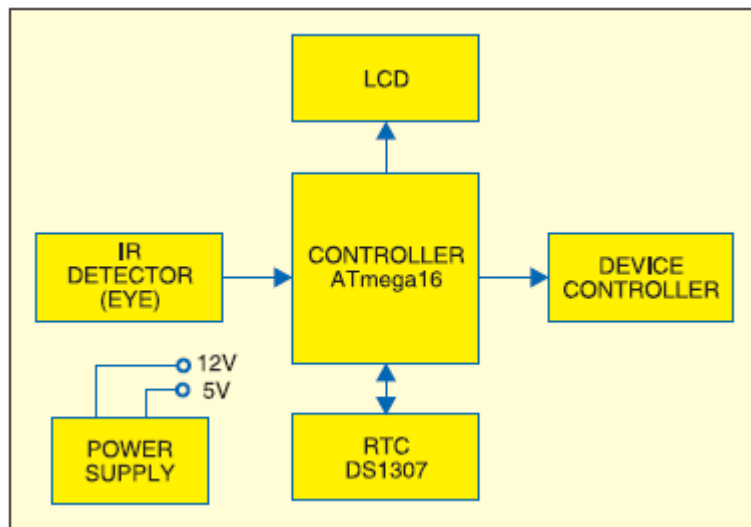


Figure (1): Block diagram

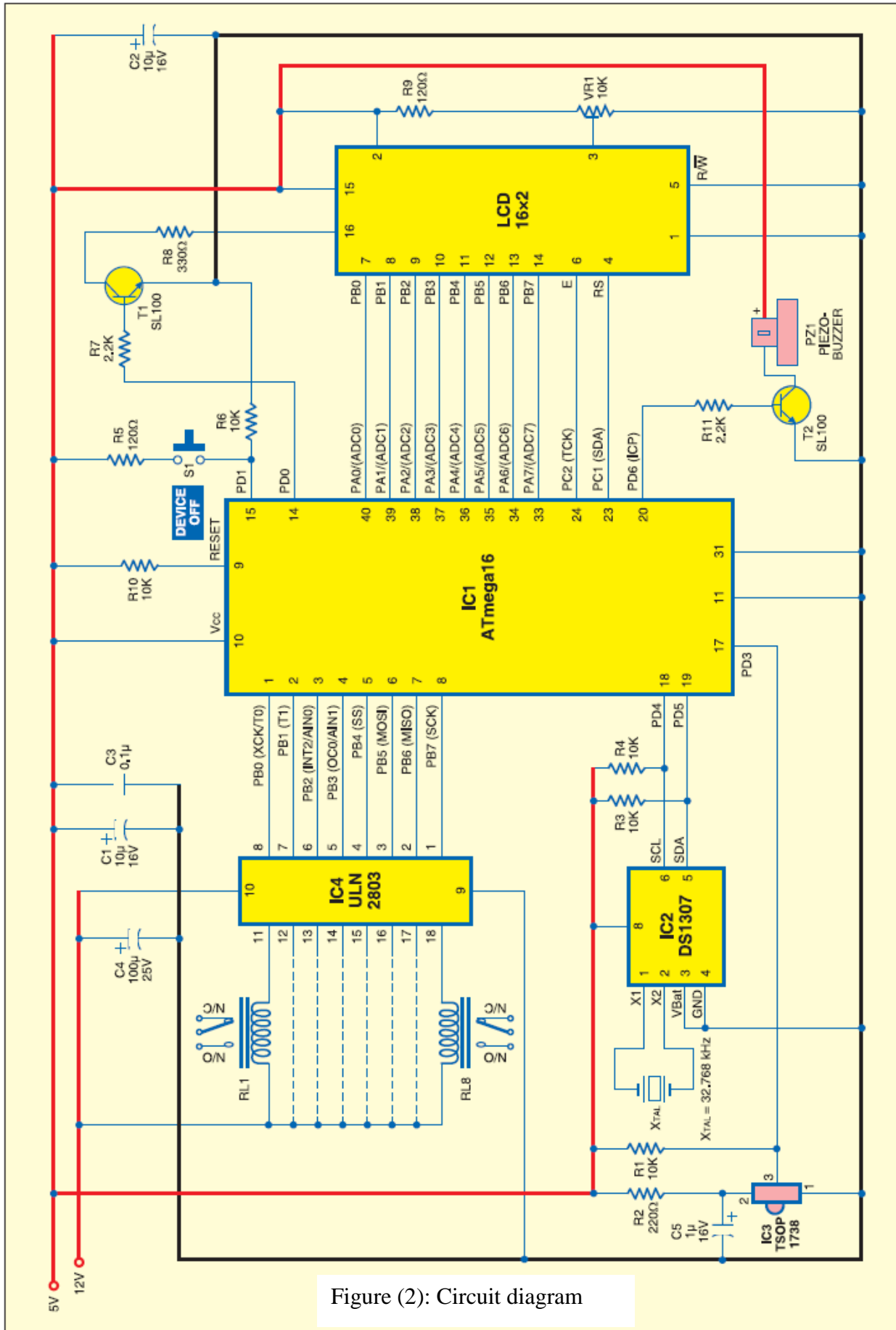


Figure (2): Circuit diagram

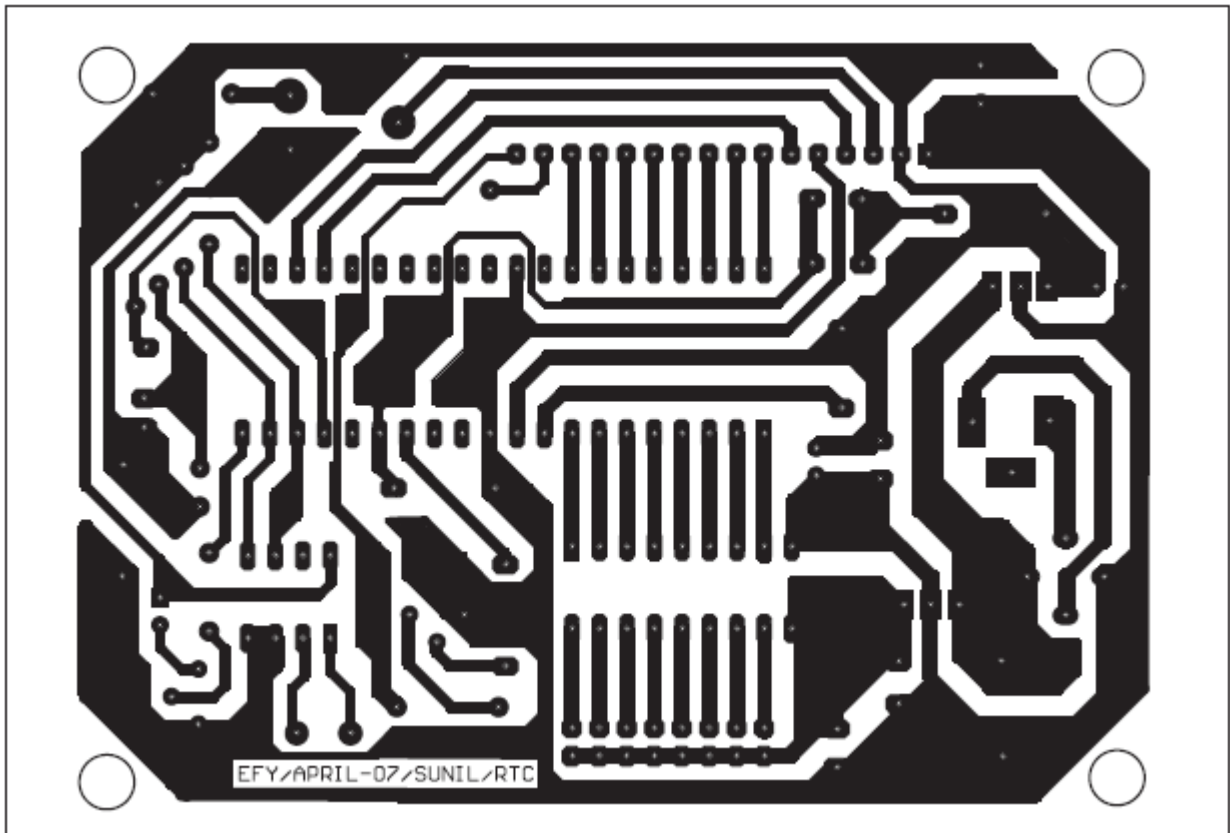


Figure (3): PCB

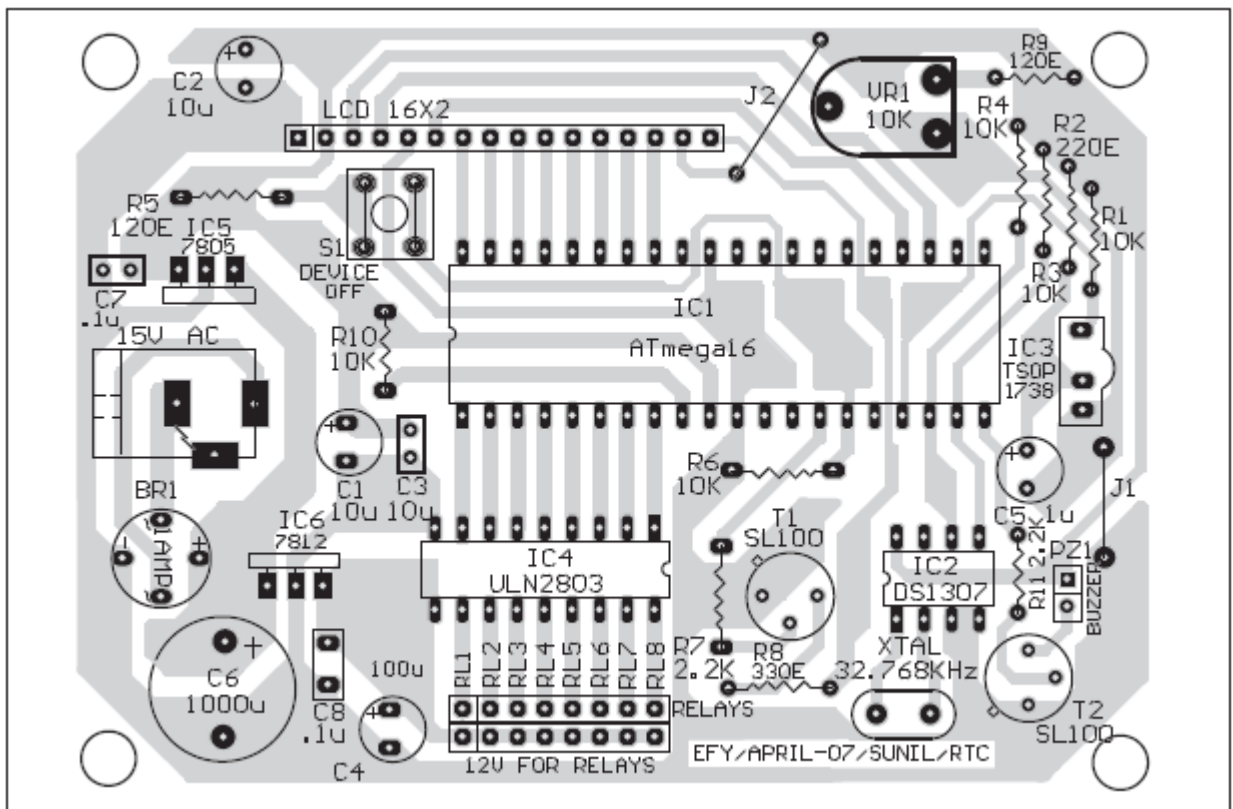


Figure (4): Component layout

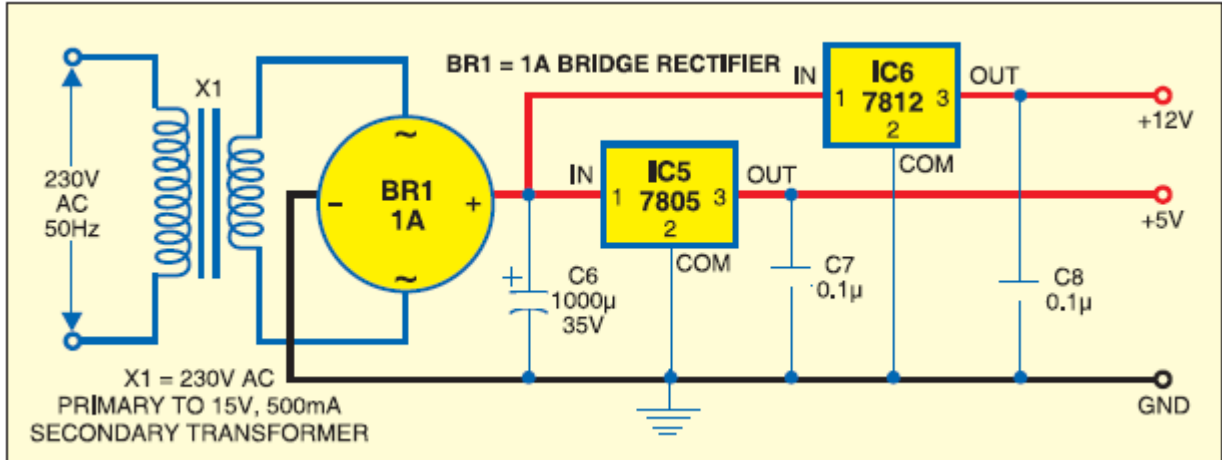


Figure (5): Power supply section