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**Branch:** BE CSE

**Section/Group:** 23 / B

**SubjectName:**

DIGITAL ELECTRONICS

**Aim:**

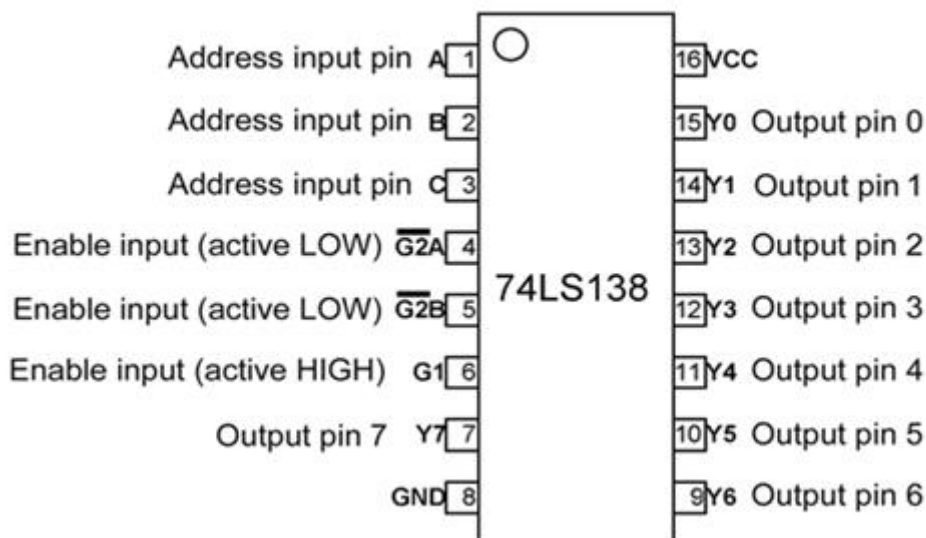
Design a home appliance control system with 3-to-8 decoder.

**Requirements:**

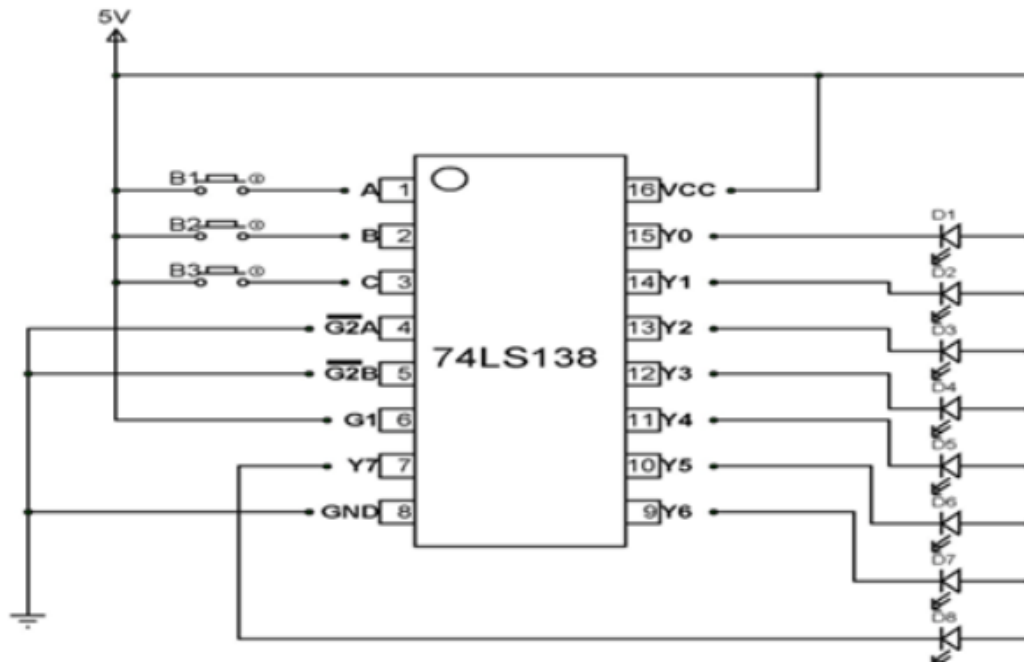
- (i) 74LS138 IC
- (ii) 10K Ohms resistances
- (iii) LED's
- (iv) +5V Power Supply
- (v) Bread Board
- (vi) Connecting Wires

**Circuit diagram/ Block diagram**

**74LS138 Decoder Pinout :**



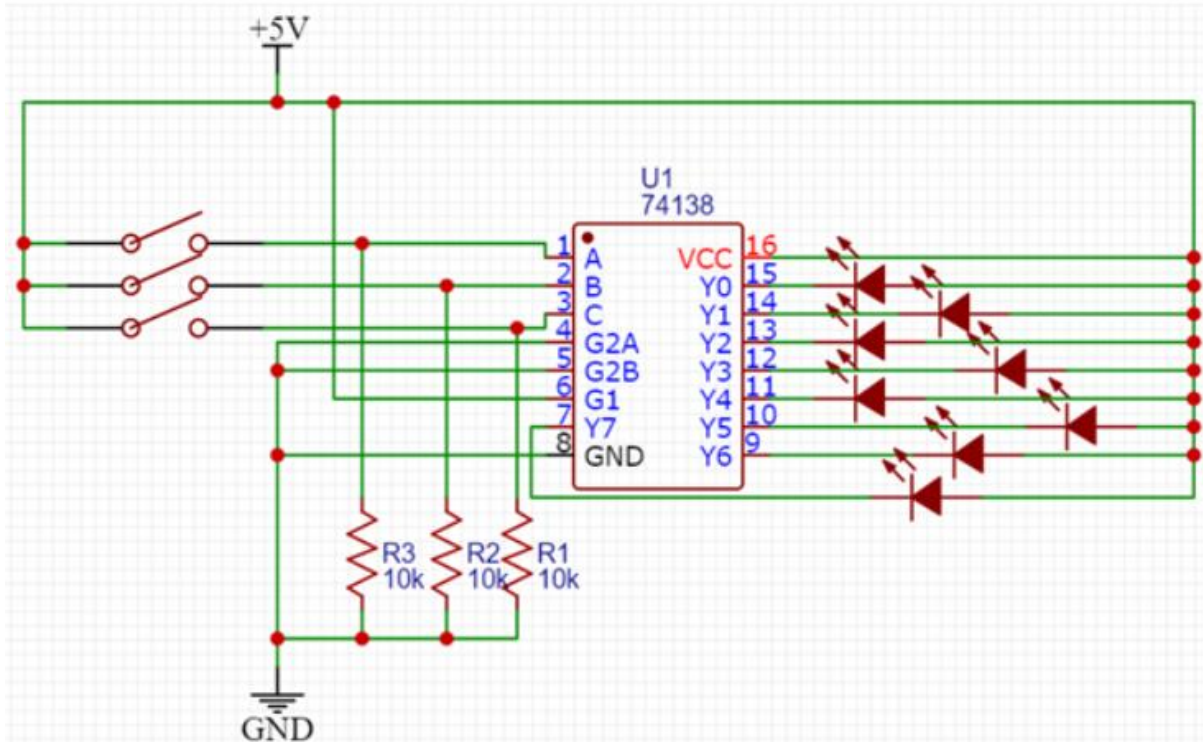
## Home Appliance System Design Using Decoder



## Truth Table Of A Decoder

Input						Output							
E1	E2	E3	A0	A1	A2	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
H	X	X	X	X	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	L	X	X	X	H	H	H	H	H	H	H	H
L	L	H	L	L	L	L	H	H	H	H	H	H	H
L	L	H	H	L	L	H	L	H	H	H	H	H	H
L	L	H	L	H	L	H	H	L	H	H	H	H	H
L	L	H	H	H	L	H	H	H	L	H	H	H	H
L	L	H	L	L	H	H	H	H	H	L	H	H	H
L	L	H	H	L	H	H	H	H	H	H	L	H	H
L	L	H	L	H	H	H	H	H	H	H	H	L	H
L	L	H	H	H	H	H	H	H	H	H	H	H	L

## Simulation Results:



### Concept used:

74LS138 is a member from '74xx' family of TTL logic gates. The chip is designed for decoding or demultiplexing applications and comes with 3 inputs to 8 outputs setup. The design is also made for the chip to be used in high-performance memory-decoding or data-routing applications, requiring very short propagation delaytimes. In high performance memory systems these decoders can be used to minimize the effects of system decoding. The three enable pins of chip (in which Two active-low and one active-high) reduce the need for external gates or inverters when expanding. The memory unit data exchange rate determines the performance of any application and the delays of any kind are not tolerable there. In such applications using 74LS138 line decoder is ideal because the delay times of this device are less than the typical access time of the memory. This means that the effective system delay introduced by the decoder is negligible to affect the performance.

### **Learning/ observation:**

The outputs are connected to LED to show which output pin goes LOW and do remember the outputs of the device are inverted. We are using a single device so we will connect G2A and G2B pin to ground followed by connecting G1 to VCC to enable the chip. The three buttons here represent three input lines for the device.

The enable pins needed to be connected appropriately or irrespective of input lines all outputs will be high. After connecting the enable pins use the input line to get the output.

After powering, if all buttons are not pressed Y0 will be LOW and remaining output will be HIGH

After only B1 is pressed, A0=HIGH and Y1 will become LOW while remaining will be HIGH. Following if only B2 is pressed, A1=HIGH and Y2 will become LOW while remaining will be HIGH. This way we can realize all the truth table by toggling the three buttons B1, B2 and B3 (Three inputs A0, A1 and A2) and with that we have three input to eight output decoder.

### **Result:**

Home appliance control system has been Designed and Implemented using 3 to 8 Decoder.

### **Troubleshooting :**

No problem occurs.