

2015

M.Sc.

2nd Semester Examination

ELECTRONICS

PAPER—ELC-202

Full Marks : 50

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

(Digital Electronics)

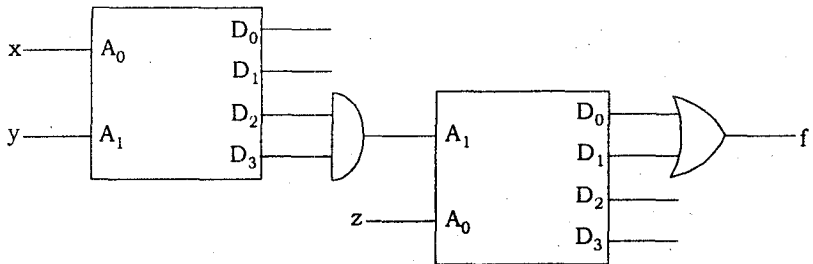
Answer Q. No. 1 and any *three* from the rest.

1. (a) Find out minimized expression for Boolean function given below :

$$f(w, x, y, z) = \Pi m(0, 1, 4, 5, 8, 9, 11) + dc(2, 10)$$

(Turn Over)

(b) A logic circuit consist of two 2×4 decoder as shown below :



The output of decoder are as follows :

$$D_0 = 1 \text{ when } A_0 = 0, A_1 = 0$$

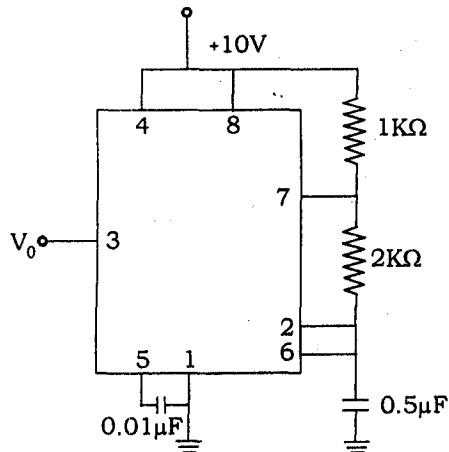
$$D_1 = 1 \text{ when } A_0 = 1, A_1 = 0$$

$$D_2 = 1 \text{ when } A_0 = 0, A_1 = 1$$

$$D_3 = 1 \text{ when } A_0 = 1, A_1 = 1$$

Find out the value of $f(x, y, z)$.

(c) Consider the square wave generator shown below :



Find out output frequency.

(d) The full scale output of a 10 bit DAC is 5V. What is the resolution ?

(e) What is the difference between PROM & EPROM ?

2×5

2. (a) If $f = \overline{B}\overline{C} + (A \oplus B)C$ and $g = A \oplus B \oplus C$, then using Karnaugh map show that $f \oplus g = \overline{A} + C$.

(b) Let $F = \overline{B}\overline{C}D + \overline{A}B\overline{C}\overline{D}$ and $F_1 = \overline{B} + \overline{C}\overline{D} + \overline{A}\overline{C}\overline{D}$. Find F_2 such that $F = F_1.F_2$. Find the simplest solution of F_2 .

5+5

3. (a) Write down the operating principle of a 555 timer in monostable mode with proper circuit diagram.

(b) Implement the following funflow using MOS logic :

$$f = ABC + \overline{(A + B + C)}$$

(c) Implement the function $F(a, b, c) = ab + \overline{bc}$ using a 4:1 MUX.

5+2+3

4. (a) Design BCD to seven segment decoder circuit.

(b) Design a gray code to Binary code converter using ROM structure.

5+5

5. (a) Write short notes on charge-couple device.

(b) What is the difference between SRAM & DRAM ?

(c) What is the function of floating grid in EPROM cell ?

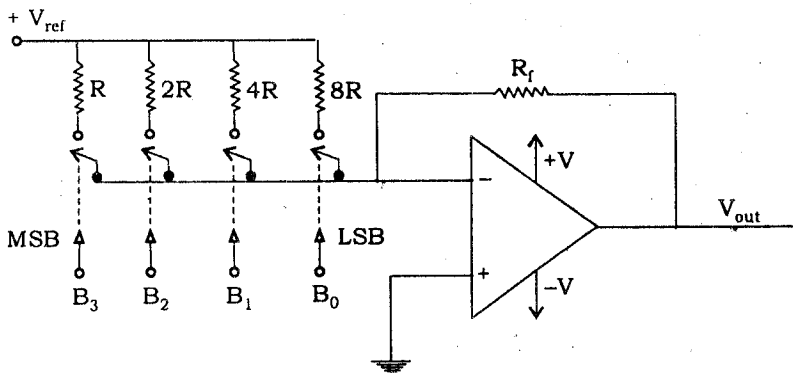
5+2+3

6. (a) For a n -digit number in base r , the decimal equivalent value is N_1 . If the two digits of positions i and j ($j = i - 1$) are interchanged then the value becomes N_2 . If the sum of the two interchanged digit is N_3 then show that the digits

$$a_i = \frac{N_3}{2} + \frac{(N_1 - N_2)}{2(r^i - r^{i-1})}$$

$$\text{and } a_j = \frac{N_3}{2} - \frac{(N_1 - N_2)}{2(r^i - r^{i-1})}$$

- (b) The circuit of DAC is given below. Switch are closed if input bit is 1, otherwise open.



- (i) If $V_{ref} = 5V$, $R = 20\text{ K}\Omega$ & $R_F = 10\text{ K}\Omega$, then what is the full scale voltage?
- (ii) If full scale voltage is to be $V_{out} = -2V$, then find out the value of R_F . 5+5

Internal Assessment — 10