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:

\[ f(w, x, y, z) = \Pi m(0, 1, 4, 5, 8, 9, 11) + \Sigma c(2, 10) \]
(b) A logic circuit consist of two $2 \times 4$ decoder as shown below:

The output of decoder are as follows:

- $D_0 = 1$ when $A_0 = 0$, $A_1 = 0$
- $D_1 = 1$ when $A_0 = 1$, $A_1 = 0$
- $D_2 = 1$ when $A_0 = 0$, $A_1 = 1$
- $D_3 = 1$ 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.

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(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\times 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 \( F = B\overline{C}D + \overline{A}BCD \) and \( F_1 = \overline{B} + \overline{C}D + \overline{A}CD \). Find \( F_2 \) such that \( F = F_1 \cdot F_2 \). 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 change-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

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

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 \( V_{ref} = 5 \text{V} \), \( R = 20 \text{ K}\Omega \) & \( R_F = 10 \text{ K}\Omega \), then what is the full scale voltage?

(ii) If full scale voltage is to be \( V_{out} = -2 \text{V} \), then find out the value of \( R_F \).

**Internal Assessment — 10**

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TB—75