2016

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.

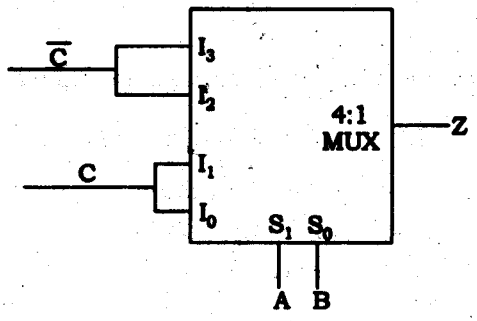
Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

(*Digital Electronics*)

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

1. (a) The MUX shown below is a 4×1 MUX. What is the output of the MUX?

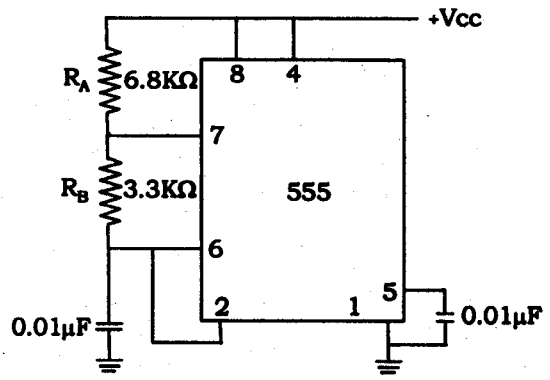


(b) What is the minimized expression for Boolean function $f(w, x, y, z) = \Sigma m(0, 1, 4, 5, 8, 9, 11) + dc(2, 10)$?

(c) What is the difference between static RAM and dynamic RAM ?

(d) An 8-bit D/A converter has an output of voltage range 0 to 255V. Find the resolution of the system.

(e) From the following figure, calculate free running frequency and duty cycle :



5×2

2. (a) Obtained the simplified expression using K-map :

$$F = ABD + \bar{A}\bar{C}\bar{D} + \bar{A}B + \bar{A}C\bar{D} + A\bar{B}D.$$

(b) Implement the Boolean function

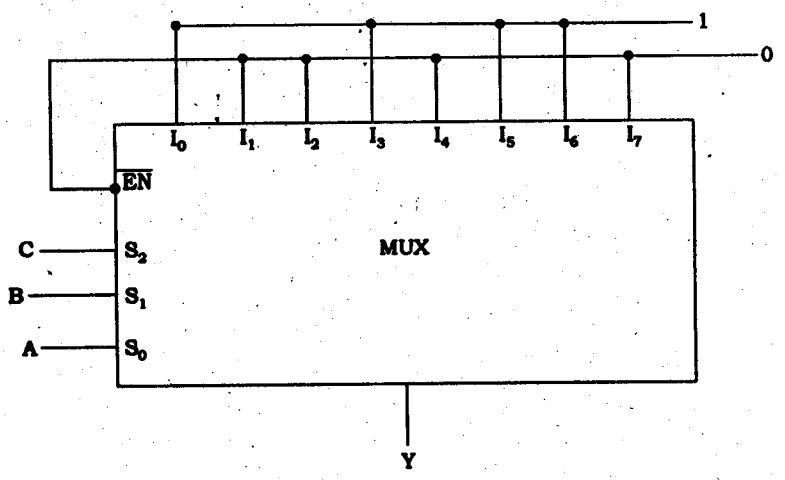
$$f = A(B + C) + DE$$

using MOS transistor.

5+5

3. (a) Implement NAND gate using diode and transistor only.

(b) For the logic circuit shown below, what is its output ?



(c) Draw the schematic diagram of an Astable multivibrator using 555 timer and explain its working principle.

2+3+(2+3)

4. (a) A 4-bit R-2R ladder type D/A converter having resistor values of R = 10kΩ and 2R = 20kΩ, uses V_k of 10V.

Find :

(i) the resolution of D/A converter ;

(ii) I_O for a digital input of 1101.

(b) Write short note on successive approximation type A/D converter.

(c) What is the difference between PROM and EPROM?

$\left(1\frac{1}{2}+1\frac{1}{2}\right)+5+2$

5. (a) Design a combinational circuit that accepts a 3-bit number as input and generates an output binary number equal to the square of the input number using ROM.

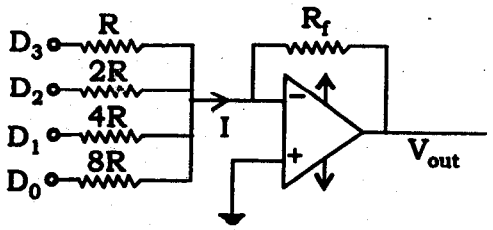
(b) Write short note on charge coupled device.

5+5

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

(b) For a 4-bit weighted resistor DAC shown in figure below. Determine (i) the weight of each input bit if the inputs are 0V & 5V, (ii) the full scale output, if R_f/R = 1kΩ.

And also the full scale output if R_f is changed to 500Ω.



$5+\left(1+1+1\frac{1}{2}+1\frac{1}{2}\right)$

[Internal Assessment — 10 Marks]