

2013

Time : 3 hours

Full Marks : 80

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

The questions are of equal value.

*Answer **five** questions in which Q. No. 1 is compulsory.*

1. Choose the correct alternative for the following :

   (a) The 2's complement of a binary number can be obtained by :

   (A) Finding its 1's complement and adding 1 to it

   (B) Substracting the given N bit binary number from 2^N

   (C) Copying down, starting from the LSB are bits upto and including the first 1 and then complementing the remaining bits.

Which of the following is true ?

(i) Only A

(ii) A, B and C

(iii) Both A and B

(iv) None of these

(b) In a digital computer, binary substraction is performed :

(i) In the same way as we perform substraction in decimal system

(ii) Using 2's complement method

(iii) Using 9's complement method

(iv) Using 10's complement method

(c) In which of the following is not a type of ROM ?

(i) Digital Programmable Read Only Memories (DPROMs)

(ii) Mask Programmed PROMs (MROMs)

(iii) Eresable Programmable ROMs (EPROMs)

(iv) Electrically Eresable Programmable ROMs (EEPROMs)

(d) The race around condition occurs in a J – K flip-flop when :

(i) Both inputs are 0

(ii) Both inputs are 1

(iii) The inputs are complementary

(iv) Any one of the above input combinations is present

(e) The basic modes in which the 555 timer operates ?

(i) Astable

(ii) Bi-stable

(iii) Monostable

(iv) Both (i) and (iii)

(f) A serial adder can be designed :

(i) Using only gates

(ii) Using only flip-flops

(iii) As a sequential circuit

(iv) As a combinational circuit

(g) The code used for labelling the cells of a K-map is :

(i) 8 – 4 – 2 – 1 binary

(ii) Hexadecimal

(iii) Gray

(iv) Octal

(h) Name the CMOS version of 555 :

(i) 1555

(ii) 3555

(iii) 5555

(iv) 7555

2. Minimize the following boolean function using K-map in SOP form and implement the logic circuit using universal gate :

$E(A, B, C, D) = \Pi M (0, 3, 7, 8, 9, 10, 11, 15)$, $D(2, 4)$

3. Describe the basic structure and working of P – N junction and describe the V – I characteristics of it.

4. What are the advantages of integrating type A/D convertors over the non-integration type ? Also explain 3-bit parallel A/D convertor.

5. Explain any **one** of the following with proper diagram and working principle :

   (a) Schmitt Trigger

   (b) Multivibrators and their types

6. (a) Write down the characteristics, merits and demerits of ECL.

   (b) How many eight TTL subfamilies are there ? Name them and explain.

7. What do you mean by race-around condition in flip-flop ? Also write the applications of flip-flops.

8. What are the advantages and disadvantages of using a PROM as a PLD ? Also compare the three combinational PLDs – PROM, PLA and PAL.

9. How is BCD addition and substraction performed ? Add and multiply the following numbers without converting to decimal :

   $(367)_8$ and $(715)_8$, $(15F)_{16}$ and $(A7)_{16}$, $(110110)_2$ and $(110101)_2$