2022

COMPUTER SCIENCE — GENERAL

Paper : GE/CC-1

(Computer Fundamentals and Digital Logic Design)

Full Marks : 50

The figures in the margin indicate full marks.

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

Answer ***question no.* 1** and ***any four*** questions from the rest.

1. Answer ***any five*** questions from the following : 2×5

(a) Define BIOS.

(b) Perform the following conversions :

(i) $(10011011)_2 = (?)_{16}$

(ii) $(236)_8 = (?)_2$

(c) What is the advantage of using cache memory?

(d) Draw the truth table of a half-adder and draw its logic diagram.

(e) Write any two advantages of high level language.

(f) Find the 2's complement of the number $(101101)_2$.

(g) State any two characteristics of a multimedia software.

(h) Draw a right shift register with a suitable illustration.

2. Simplify the following functions using Karnaugh map method and implement the resultant simplified function using basic gates only.

(a) $F(A,B,C,D) = \sum(0,2,3,4,8,12,15)$

(b) $F(A,B,C,D) = \prod(1,3,4,5,7,11,12,15)$ (3+2)+(3+2)

3. (a) Design a 3-to-8 decoder circuit.

(i) Draw the truth table.

(ii) Draw the logic diagram.

(b) Design a 3 bit binary subtractor circuit (Draw only the truth table and logic diagram). (3+3)+4

4. (a) Design an even parity generator (Draw the truth table and logic diagram).
   (b) Draw the logic diagram of a T flip-flop, and write its characteristic table. (2+2)+(3+3)

5. (a) State the two variable De Morgan's Laws. Prove these using truth tables.
   (b) What is a universal gate? Prove that NAND is a universal gate. (2+4)+(1+3)

6. (a) Draw the logic diagram of an edge triggered RS flip-flop and draw its excitation table.
   (b) Draw the logic diagram of a 4 bit ring counter. (4+2)+4

7. Design a 4 bit asynchronous up-counter.
   (a) Draw the logic diagram.
   (b) Draw the truth table.
   (c) Draw the timing diagram. 3+3+4

8. Write short notes on ***any two*** of the following : 5×2
   (a) System software
   (b) Computer virus
   (c) Compilers and Interpreters
   (d) Seven Segment Display.