1970

April 2025

<u>Time – Three hours</u>
(Maximum Marks: 100)

[**N.B.** Answer all the questions, choosing any two subdivision from each question. Each subdivision carries 10 marks.]

1. (a) Write about the following special codes:
    (i) BCD. (5)
    (ii) ASCII. (5)

    (b) (i) Explain about 1's and 2's complement with an example. (5)
    (ii) State Demorgan's theorem. (5)

    (c) Simplify F (a,b,c,d) = $\sum(2,3,6,7,8,9,10,11)$ using K-map.

    (d) Convert the hexadecimal number $(4A)_{16}$ into its equivalent binary and decimal number format.

2. (a) Write the logical expression, symbol and truth table for AND, OR and NOT gates.

    (b) Implement the following Boolean expression using logic gates:
    F=X'YZ + XY'Z + X'Y'Z' + XYZ'

    (c) What are universal gates? Also write the logical expression, symbol and truth table for universal gates.

    (d) Realize EX-OR and EX-NOR gates by only using NOR gates.

[Turn over.....

3.   (a)   Explain the following with logic diagram and truth table:
      (i) Half adder (5)
      (ii) Half subtractor (5)

    (b)   Write a note on parity generator and checker.

    (c)   Describe the operation of 3 to 8 decoder with logic diagram and truth table.

    (d)   Explain the operation of 1 to 4 demultiplexer with logic diagram and truth table.

4.   (a)   Explain the operation of clocked SR flip-flop using NAND gates.

    (b)   (i) Define flip-flop. Mention its types. (5)
      (ii) List the applications of flip-flops. (5)

    (c)   Discuss the operation of 4-bit asynchronous counters with logic diagram and truth table.

    (d)   (i) Compare synchronous and asynchronous counters. (5)
      (ii) List the applications of counters. (5)

5.   (a)   Explain the operation of Serial In Serial Out (SISO) shift registers with necessary diagrams.

    (b)   (i) What is shift registers? Mention its types. (5)
      (ii) List the applications of shift registers. (5)

    (c)   Describe the simple structure of SRAM and DRAM with necessary diagrams.

    (d)   (i) Compare RAM and ROM. (5)
      (ii) Write short note on cache memory. (5)