SECTION – V

9. (a) Build a BCD-to-Seven segment decoder circuit with truth-table. 10

    (b) (i) Explain the working of 4-line to 2-line Encoder. 5

         (ii) Mention any 5 applications of Decoder. 5

10. (a) Show what would be the output condition for a two input TTL NAND gate for all the input conditions. 10

     (b) (i) List the applications of Integrated Circuits. 5

          (ii) Define the following parameters of Logic families : 5

               (1) Speed (2) Fan in (3) Fan out (4) Power dissipation (5) Noise Margin

———

(b) (i) Minimize the following Boolean function using K-map :   5

$$Y = \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C} + A\bar{B}C + AB\bar{C} + ABC$$

(ii) Minimize the following Boolean function using K-map :

$$F(A, B, C, D) = \sum_1 m\ (0, 1, 3, 5, 7, 8, 9, 11, 13, 15)$$ 5

SECTION – III

(a) (i) Explain half-adder with truth-table.   5

(ii) Explain two bit magnitude comparator with truth-table.   5

(b) Explain working of a full-subtractor with logic diagram and truth-table.   10

(a) (i) Give the comparison between serial and parallel adder.   5

(ii) Mention any 5 applications of comparators.   5

(b) Explain working of serial binary adder.   10

SECTION – IV

(a) Explain the working of 4 : 1 multiplexer with logic circuit, symbol and truth-table.   10

(b) (i) List the applications of demultiplexer.   5

(ii) Explain the operation of 1 : 2 demultiplexer.   5

(a) Implement AND and OR Gates using 2 : 1 Multiplexer.   10

(b) Describe what input conditions would be required to generate the code for the following decimal number in decimal to BCD encoder :   10

     (i)   2

     (ii)   4

     (iii)   8

     (iv)   3

     (v)   7

DIGITAL ELECTRONICS

Time : 3 Hours]   **[Max. Marks : 100**

Instructions :   (1)   Answer **one** full question from each section.

              (2)   **One** full question carries 20 marks.

SECTION – I

1.   (a)   (i)   Compare analog and digital signals.   **5**

               (ii) $(10101)_2 - (10111)_2$, calculate using 2's complement method.   **5**

      (b)   Perform the following operations :   **10**

               (i)   Convert the binary number $(11110101011.0011)_2$ to octal.

               (ii)   Convert the hexadecimal number $(152A.25)_{16}$ to decimal.

               (iii)   Convert Gray Code 100111 into Binary number.

2.   (a)   (i)   Give the BCD equivalent for the decimal number 589.   **10**

               (ii)   Give the decimal equivalent for the Excess-3 number 010110001001.

               (iii)   Find the BCD addition between two BCD numbers 0101 and 0110.

      (b)   (i)   State and explain De Morgan's theorem.   **5**

               (ii)   Simplify the logical expression using Boolean laws $(A + B)(A + C)$.   **5**

SECTION – II

3.   (a)   Define logic gate. Write Symbol, Truth-table and Logic Expression of OR and NAND gates.   **10**

      (b)   Realise AND, NOT, OR, NAND gates using only NOR gates.   **10**

4.   (a)   (i)   Find the SOP minterm expression for canonical form $f = \Sigma_1 (m_1, m_2, m_3, m_5)$ and write the truth-table.   **5**

               (ii)   For the following POS expression, write the truth-table :

                     $Y = \bar{A}\bar{B}C + \bar{A}BC + AB\bar{C}$ **5**