H Roll No. .....

TCS–301

B. TECH. (CSE) (THIRD SEMESTER)
MID SEMESTER EXAMINATION, 2021

LOGIC DESIGN

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each question carries 10 marks.

1. (a) (i) Differentiate between SOP and POS.

(ii) Differentiate between combinational and sequential circuit.

(iii) Implement XOR gate using NAND gate only.

(iv) Find the value of r for which $\left(\frac{246}{3}\right)_r = 8_r$.

10 Marks (CO2)

P. T. O.

OR

(b) (i) $-(43)-(11)$, find the result using 2's complement.

(ii) $(1101010101111010)_{BINARY} =$ $(\ldots\ldots\ldots\ldots\ldots)_{GRAY}$

(iii) Difference between mux and demux.

(iv) $(8B2D.56)_8 - (3CD.58)_8$ equals to $(\ )_{16}$.

10 Marks (CO1)

2. (a) (i) With the help of Boolean algebra, state and prove Consensus theorem and De Morgan's theorem.

(ii) With the help of a suitable example, explain the difference between canonical and standard form.

10 Marks (CO1)

OR

(b) (i) Represent the unsigned decimal numbers 842 and 535 in BCD and then show the steps necessary to form their sum.

(ii) Explain Hamming code technique for error detection and correction.

10 Marks (CO2)

3. (a) Simplify the following Boolean expression using Quine-McClusky (QM) technique :

$$F(A, B, C, D) = \Sigma m (0, 3, 5, 7, 8, 11, 12, 13, 15)$$

10 Marks (CO2)

OR

(b) (i) What is the advantages of 2's complement over 1's complement ?

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

$$F = A'B'C' + A'BC' + A'B'C + A'BC + AB'C'$$

10 Marks (CO1)

4. (a) Express the Boolean function $F = A + B'C$ as a sum of minterms.

10 Marks (CO2)

OR

(b) Using Boolean algebra, simplify the following functions to a minimum number of literals :

(i) $X'Y'Z + X'YZ + XY'$

(ii) $XY + X'Z + YZ$

10 Marks (CO2)

P. T. O.

5. (a) Simplify the following using binary arithmetic rules :

(i) $110 + 100$

(ii) $101 - 011$

(iii) 101×111

(iv) $110 \div 11$

10 Marks (CO1)

OR

(b) Show how 16-input MUX is used to generate the function :

$$Y(A, B, C, D) = \overline{A}\overline{B}D + BCD + A\overline{B}\overline{C} + A\overline{B}\overline{C}D$$

10 Marks (CO2)