D21

B. Tech. EXAMINATION, 2020

(Fourth Semester)

(B Scheme)

(Re-appear Only)

ECE

ECE204B

DIGITAL CIRCUIT AND SYSTEM

Time : 3 *Hours*]   [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Write down Boolean equation, logic symbol and truth table for AND, OR and NOT, NAND, NOR, ExOR and ExNor gates.   **4**

    (b) What is the largest decimal number that can be represented in binary with 16 bits ?   **5**

    (c) Explain partition and lattice in details.   **6**

2. Simplify and draw logic circuit for the following equation using K-maps.   **15**

    F (A, B, C, D, E) = Σm (0, 5, 6, 8, 9, 10, 11, 16, 20, 24, 25, 26, 27, 29, 31).

Unit II

3. (a) What is Multiplexer ? Explain with an example, how multiplexer can be used to design an adder circuit. **10**

    (b) What is symmetric network ? **5**

4. (a) Show that there is a decomposition of function : **7**
    $$f(w, x, y, z) = xyz + xy'z' + x'yz' + x'y'z$$
    with a total of only eight literals.

    (b) For function $f(w, x, y, z) = \Sigma\,(1, 3, 5, 7, 8, 11, 13, 15)$, find the functions G and H for the Decomposition $f(w, x, y, z) = G\,(H(x, y), w, z)$. **8**

Unit III

5. A long input sequence enters a one-input one-output synchronous sequential circuit, that is required to produce an output symbol $z = 1$ whenever the sequence 1111 occurs. Overlapping sequences are accepted; for example, if the input sequence is 01011111....., the required output sequence is 00000011...... **15**

    (a) Draw a state diagram.

    (b) Select an assignment and show the excitation and output tables

    (c) Write down the excitation functions for SR flip-flops, and draw the corresponding logic diagram.

6. Analyze the given circuit (clock is not shown but is implicit) : **15**

    (a) Write down the excitation and output functions

    (b) Form the excitation and state tables.

    (c) Give a word description of the circuit operation.
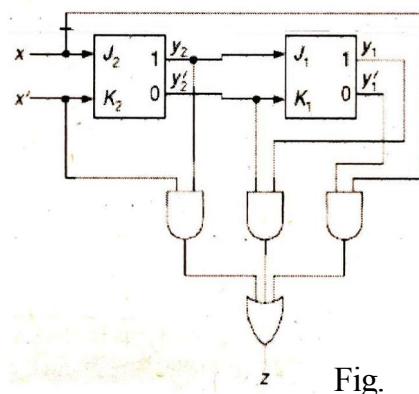

Fig.

Unit IV

7. A sequential circuit has two pulse inputs X_1 and X_2. The output of circuit becomes 1 when one or more consecutive X, pulses are followed by two X_2 pulses. The output then remains 1 for all subsequent X_2 pulses until an X1 pulse occurs.

    (a) Derive a minimal state table describing the circuit operation.

    (b) Synthesize circuit using S-R flip flop.   **15**

8. Give detailed discussion about state assignments using partitions.   **15**