SUPPLEMENTARY EXAMINATION   Feb- *2019*

CEE-201 DIGITAL CIRCUITS AND SYTEMS

Time:3:00 Hours   *Max. Marks :40*

> **Note:** Attempt any FIVE questions. All questions carry equal marks.
> Assume suitable missing data, if any.

1. [a] Express the following functions in a sum of minterms and a product
   of maxterms.   4+4

   $F(A, B, C, D) = D(\bar{A} + B) + \bar{B}D$

   [b] Implement the following Boolean function with two and three level
   NOR Gates.

   $F(x, y, z) = \sum(0,6)$

2. [a] Design a Half adder circuit. Draw its logic diagram also.   4+4

   [b] Obtain the simplified expressions in sum of products for the following
   Boolean functions:

   (i) $F(A, B, C, D) = \sum(7, 13, 14, 15)$

   (ii) $F(x, y, z) = \bar{x}yz + x\bar{y}\bar{z} + xyz + xy\bar{z}$

3. [a] Implement the following functions using the don't-care conditions.
   Assume that both the normal and complement inputs are available.   4+4

   $F(A, B, C, D) = A'B'C' + AB'D + A'B'CD'$

   $d(A, B, C, D) = ABC + AB'D'$

   With no more than two NOR gates.

   [b] Design a Half subtractor circuit. Draw its logic diagram also?

4. [a] Explain the Exclusive-OR and equivalence function for two variables
   using truth-table and karnaugh maps.   4+4

   [b] A combinational circuit has four inputs and one output. The output is
   equal to 1 when (1) all the inputs are equal to 1 or (2) none of the inputs
   are equal to 1 or (3) an odd number of inputs are equal to 1.

   (i) Obtain the truth table.

   (ii) Find the simplified output function in sum of products.

(iii) Find the simplified output function in product of sums.

(iv) Draw the two logic diagrams.

5. [a] A combinational circuit is defined by the following three functions: $\qquad$ 4+4

$$F_1 = \bar{x}\bar{y} + xy\bar{z}$$
$$F_2 = \bar{x} + y$$
$$F_3 = xy + \bar{x}\bar{y}$$

Design the circuit with a decoder and external gates.

[b] Implement the Boolean function $F(A, B, C) = \Sigma(1,3,5,6)$ with 4×1 multiplexer. Choose A and B as select lines.

6. Write short notes on any two of the following. 4+4

[a] Clocked RS flip flop

[b] Postulates of Ordinary algebra and Boolean algebra. Compare the Boolean algebra with arithmetic and ordinary algebra.

[c] Combinational and Sequential Circuits