Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

THIRD SEMESTER B.Tech. (E & C) DEGREE END SEMESTER EXAMINATION
NOV/DEC 2017
SUBJECT: LOGIC DESIGN (ECE - 2105)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates
- Answer **ALL** questions.
- Missing data may be suitably assumed.

1A. Design a synchronous counter using T flip-flops to count the sequence 0, 1, 2, 5, 7 and repeat. All unused states must go to 2.

1B. Find the minimal product(POS) expression for the function

F(a, b,c,d)=∑m(0,1,2,3,4,6,9,12,14)+d(5,7,15)

1C. Simplify the Boolean expression and implement using NOR gates.

$$F = A + B[AC + (B + \overline{C})D]$$

(5+3+2)

2A. Design a Mealy type sequence detector using T flip-flops to detect an overlapping sequence 1010 using D flip-flop.

2B. Find minimal sum(SOP) expression for the function F(w,x,y,z)=∑m(0,5,6,7,9,13,14,15) using Quine Mc-Cluskey method.

2C. Implement a full adder using a 4:1 MUX.

(5+3+2)

3A. Design Excess-3 to 8421 code converter using active low 4 to 16 decoder.

3B. Design a positive edge triggered asynchronous decade counter using JK flip-flop.

3C. An n bit shift register is fed with an n bit data. Write the number of clock pulses required to shift n bit data out of the shift register if it is a (i) SISO (ii) PISO shift register.

(5+3+2)

4A. Design a 3-bit odd parity generator/checker.

4B. Draw the ASM chart for a mod-6 up-down counter.

4C. Convert the D flip-flop to T flip-flop

(5+3+2)

5A. Write Excitation table, Transition Table, State table, Flow table and Flow diagram for the following asynchronous sequential circuit which has two inputs x, y, two SR flip-flops and one output Z.

$S_1 = x\overline{Q}_2$

$R_1 = xQ_2$

$S_2 = xyQ_1$

$R_2 = \overline{x}\,\overline{y} + \overline{x}\overline{Q}_1$

$Z = x\overline{Q}_2 + Q_1\overline{Q}_2$

5B. Define the following i) Fan out ii) Noise Margin iii) Propagation Delay.

5C. Draw the circuit of a 4-bit Johnson counter and write its truth table.

(5+3+2)