ST. JOSEPH'S COLLEGE (AUTONOMOUS), BANGALORE-27
B.Sc. ELECTRONICS – III SEMESTER
SEMESTER EXAMINATION: OCTOBER 2019
EL 318: DIGITAL ELECTRONICS

Time- 2 ½ hrs   **Max Marks-70**

This paper contains <u>two</u> printed pages and <u>three</u> parts

PART-A

Answer any FIVE questions.   **5 × 8 = 40**

1   a) Explain the 8421 and EXCESS-3 digital codes with examples.
    b) Describe the procedure to convert grey code to binary code and vice versa.   (4+4)

2   a) Draw the circuits of AND and NOT gates using discrete components and explain the working.
    b) State and prove De Morgan's theorems using truth tables.   (4+4)

3   a) State and explain the Duality theorem.
    b) Explain NAND as universal gate.   (4+4)

4   a) With the help of a diagram explain current sourcing in a standard TTL NAND gate.
    b) Write a note on pulse characteristics and pulse duration in non ideal pulses.   (4+4)

5   a) Write the truth table for FULL ADDER. Show how a FULL ADDER can be constructed using 2 Half Adders and an OR gate.
    b) Construct 8:1 Multiplexer and describe it's working.   (4+4)

6   a) What is a decoder? Draw the logic diagram of a 3 to 8 decoder and write its truth table.
    b) Write the logic diagram of a decimal to BCD encoder.   (4+4)

7   a) Explain the working of a RS flip flop with a necessary circuit. What are the limitations of RS flip flop?
    b) Differentiate between asynchronous and synchronous counters.
    c) Draw the circuit of an asynchronous decade counter.   (4+2+2)

PART-B

Answer any FIVE questions.   **5 × 4 = 20**

8   a) Convert the DECIMAL number 6529_{10} into equivalent OCTAL number.
    b) Subtract the number $79_{(10)}$ from $25_{(10)}$ using two's complement method.   (2+2)
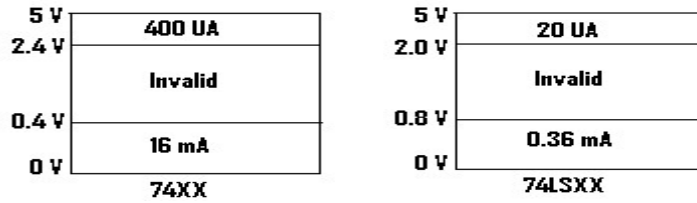
9   Simplify the following Boolean function

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

10 Simplify using K map technique and realize the logic circuit using basic gates.
$F(A,B,C,D) = \sum m\ (0,1,3,9,11,12,13,15) + \sum d(2,8)$

11 a) Determine the fan-out when 74XX drives 74LSXX.

5 V 2.4 V	400 UA
0.4 V	Invalid
0 V	16 mA
74XX

5 V 2.0 V	20 UA
0.8 V	Invalid
0 V	0.36 mA
74LSXX

b) The propagation delay time for a gate is 10 ns and power dissipation of 2mW. If 6 such gates are connected in series what is the total time delay and power dissipation of the circuit.   (2+2)

12 What will be the outputs at Y and Y_0, Y_1, Y_2 and Y_3. Initially all reset.
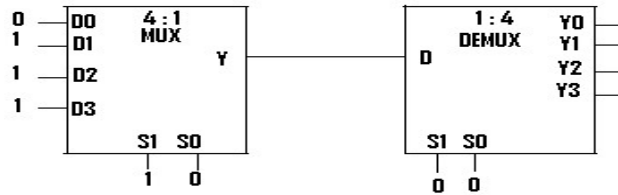
13 Draw the circuit of a 4 bit Johnson Counter and explain its working.

14 Construct a modulo 9 ripple counter and draw its timing diagrams.

PART-C

Answer any FIVE questions.   **5 × 2 = 10**

15 Simplify the following Boolean expression.
     Y=AC+C(A+A'B)
16 Write the Canonical form of the following
     F(A,B,C,D) = A'BC+AD+BD'+CD'+AC'+A'B'
17 What is a priority encoder?
18 Draw the circuit of a two bit magnitude Comparator equality only.
19 What is the need for preset and clear inputs in a flip flop? Write their functions.
20 Draw the circuit of a CMOS inverter.
21 Identify the following ICs
     IC7476, IC74150, IC7490, IC7447

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