**Register Number:** 

DATE:

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

Time- 2 <sup>1</sup>/<sub>2</sub> hrs

# This paper contains two printed pages and three parts

### **PART-A**

5×8=40

- 1 a) What is radix? Explain how BCD addition is performed on two numbers. b) Explain the gray and EXCESS-3 digital codes with examples. (4+4)
- 2 a) Draw the circuit diagram of a two input NAND gate using diodes, transistor and resistors. Explain its operation with truth table.
  - b) What is a Universal gate? Prove that NOR is a universal gate. (4+4)
- 3 a) State and explain the Duality theorem.

Answer any FIVE questions.

- b) With the help of a diagram explain current sourcing and sinking in a standard TTL NAND gate.
- c) Draw three continuous negative ideal pulses and describe duty cycle. (2+4+2)
- 4 a) Draw the circuit diagram of a two input TTL NAND gate and explain its operation. What is the significance of Totem pole output.
  - b) Draw and explain a typical transfer characteristics of a CMOS inverter. Also discuss its improvement over TTL devices. (4+4)
- 5 a) Write the truth table for FULL Subtractor. Show how a FULL Subtractor can be constructed using 2 Half Subtractors and an OR gate. b)Construct 8:1 Multiplexer and describe it's working. Mention the need for strobe line. (4+4)
- 6 a) What is an encoder? Draw the logic diagram of a decimal to BCD encoder and write its truth table. What is priority encoder?
  - b) Write the logic diagram of a BCD to SEVEN segment decoder using IC 7447, along with the functional table. (4+4)
- 7 a) Explain the working of a JK flip flop with a necessary circuit. What is race around condition.
  - b) What are synchronous inputs? Explain the asynchronous inputs of a flip flop with a truth table. (4+4)



Max Marks-70

#### PART-B

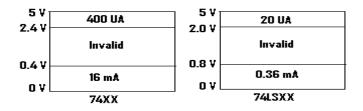
### Answer any FIVE questions.

8 a) Convert the OCTAL number 463 into binary and then to HEXA decimal. b) Add the decimal numbers 25 and 13 in 8421 code.

9. Expand the following POS expression to minterms and maxterms. A (  $\overline{A}$  + B ) (  $\overline{A}$  + B +  $\overline{C}$  )

10. Simplify F (A,B,C,D) =  $\Sigma$  m (2,3,4,6,8,11,14,15) + d (0,10,12) using K-map and draw the circuit diagram for the simplified expression using basic gates.

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

12. The ABCD inputs to seven segment decoder/driver contains the logic for activating each segment for the appropriate BCD inputs. Design the logic for activating the "e" segment.

13. Draw the circuit for a serial in- parallel out shift register and explain its working for a given data=1011.

14. Design an asynchronous decade counter. Give its truth table and draw its timing diagram.

### PART-C

### Answer any FIVE questions.

15. Give signed number representation of +13 and -13 in 2"s complement system using 8 - bits.

- 16. Design the XOR gate using basic gates.
- 17. Write the algebraic terms of a 4 -variable expression having a minterm m<sub>5</sub> and m<sub>7</sub>.
- 18. A De multiplexer can switch from 64 data input to its one output line, how many selection lines are required ? Explain.
- 19. Realize a full adder by using one XOR gate, one OR gate and three AND gates.
- 20. With a schematic diagram show how an RS flip flop converted into D flip flop.
- 21. Draw the 4 bit Ring Counter and give its truth table.

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## 5×2=10

5×4=20

(2+2)

(2+2)