



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 ½ hrs

Max Marks-70

This paper contains two printed pages and three parts

PART-A

Answer any FIVE questions.

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.
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)

PART-B

Answer any FIVE questions.

5×4=20

- 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. (2+2)

9. Expand the following POS expression to minterms and maxterms.

$$A(\bar{A} + B)(\bar{A} + B + \bar{C})$$

10. Simplify $F(A,B,C,D) = \sum m(2,3,4,6,8,11,14,15) + d(0,10,12)$ 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. (2+2)

5 V	400 μ A	5 V	20 μ A
2.4 V	Invalid	2.0 V	Invalid
0.4 V	16 mA	0.8 V	0.36 mA
0 V	74XX	0 V	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.

5×2=10

- 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_5 and m_7 .
- 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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