Code: A-E616123-A

I SEMESTER EXAM - 2025-26

2 x 55

Std.: XII | Sub: Digital Electronics - Paper II | Marks: 50

Date: | Roll No.: _____ | Time:2½ hrs

Q.1 A) Select correct alternative and rewrite the following sub question : (4)

a) The equivalent decimal number of a maximum highest binary number of length one byte is _____.

i) 128 ii) 127 iii) 255 iv) 256

b) An AND gate in positive logic becomes _____ gate in negative logic.

i) OR ii) NOR iii) NOT iv) NAND

c) Shift Register belongs to the class of _____

i) Combinational logic circuit ii) Sequential logic circuit

iii) Both i) and ii) iv) None of the above

d) In a priority encoder, if decimal inputs 3 and 6 are activated at same time, the BCD output corresponds to _____

i) 6 ii) 3 iii) 6 and 3 alternately

iv) None of these

B) Attempt any TWO of the following : (6)

a) Subtract the following numbers by using 2s complement method :

i) $(11011)_2 - (011)_2$ ii) $(10111)_2 - (110001)_2$

b) Convert the following :

i) $(11011)_2 = (?)_{10}$ ii) $(F6.C9)_{16} = (?)_2$

iii) $(110\ 110\ 110.\ 110)_2 = (?)_{16}$

Q.2 A) Attempt any TWO of the following : (6)

a) What are Universal Building Blocks ? How the basic gates are constructed using NOR gates only?

b) Simplify the following: Y = ABC + ABC + ABC, Draw the logic diagram for simplified expression.

c) Explain the working of clocked SR flip-flop using NAND gates.

B) Attempt any ONE of the following : (4)

a) Define radix or base of a number system. Explain with suitable example Hex-dabble method used for converting decimal number to hexadecimal number.

b) What are the various codes used in digital system? What is their necessity? How many possible combinations are there in each code?

Q.3 A) Attempt any TWO of the following : (6)

a) Explain the method of converting a binary number into decimal with one example.

b) Draw the logic diagram of a full adder and explain its working with truth table.

c) Explain the working 1: 4 demultiplexer using logic gates.

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B) Attempt any ONE of the following : **(4)**

a) State and prove Ex-OR gate with basic gate.

b) Define full adder. Draw a logic diagram of full adder, Write its Boolean equations and truth table

Q.4 A) Attempt any TWO of the following : **(6)**

a) What is a Multiplexer? Design a 4 : 1 multiplexer using 2 : 1 multiplexers.

b) What is a Decoder? Explain BCD to Decimal decoder using appropriate logic gate.

c) Explain the need of Multiplexing and Demultiplexing.

B) Attempt any ONE of the following : **(4)**

a) With neat circuit diagram, explain the working of a BCD-to-7 segment decoder .

b) Explain the working of Decimal of BCD encoder using OR gates.

Q.5 A) Attempt any TWO of the following : **(6)**

a) Explain J-K flip-flop with the help of logic diagram.

b) Simplify the following expression using Boolean Laws :

i) $Y = (A + B)(A + C)$ ii) $Y = AB + A(B + C) + B(B + C)$

c) Explain working of T flip-flop with suitable diagram.

B) Attempt any ONE of the following : **(4)**

a) State and prove De Morgan's theorems.

b) Implement the following multi-output combinational logic circuit using a 4 : 16 line decoder circuit.

$F_1 =$

$m(1, 2, 4, 7, 8, 11, 12, 13$

$) F_2 = m(2, 3, 9, 11)$

$F_3 = m(10, 12, 13, 14)$