17592

BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(CSE)-DS-2024/B.Tech.(CSE)-CYS-2024
Course Name – Applied Digital Logic Design
Course Code - BES00018
(Semester II)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Select the binary equivalent of the decimal number 368

a) 101110000 b) 110110000
c) 111010000 d) 111100000

(ii) Select hexadecimal equivalent number of octal number 734

a) C 1 D b) D C 1
c) 1 C D d) 1 D C

(iii) Select the decimal equivalent of hex number 1A53

a) 6793 b) 6739
c) 6973 d) 6379

(iv) Identify which one of the following is a major difference between a half adder and a full adder

a) Full-adders are made up of two half-adders b) Full adders can handle double-digit numbers
c) Full adders have a carry input capability d) Half adders can handle only single-digit numbers

(v) Estimate how many basic binary subtraction operations are possible?

a) 1 b) 4
c) 3 d) 2

(vi) Relate the statement "When performing subtraction by addition in the 2's-complement system _____"

a) The minuend and the subtrahend are both changed to the 2's-complement b) The minuend is changed to 2's-complement and the subtrahend is left in its original form

c) The minuend is left in its original form and the subtrahend is changed to its 2's-complement

d) The minuend and subtrahend are both left in their original form

(vii) Choose the correct option which is a type of digital logic circuit

a) Combinational logic circuits
b) Sequential logic circuits
c) Both a & b
d) None of the mentioned

(viii) Choose digital logic circuits can be used to add more than 1 – bit simultaneously

a) Full – adder
b) Ripple – carry adder
c) Half – adder
d) Serial adder

(ix) Choose the following is true for a full-subtractor circuit

a) It has two inputs and one output.
b) It performs subtraction considering borrow from the previous stage.
c) It performs subtraction without borrow.
d) It is used only for multi-bit subtraction.

(x) Choose the main function of a latch

a) Store multiple bits of data
b) Perform arithmetic operations
c) Temporarily store a single bit of data
d) Act as a power amplifier

(xi) Choose the output from a D flip-flop if D = 1 and the clock is low

a) No change
b) Toggle between 0 and 1
c) 0
d) 1

(xii) Choose the gate which is placed between clock input and the input of AND gate to convert a positive level triggered flip – flop to a negative level triggered flip – flop

a) NOR gate
b) NOT gate
c) Buffer
d) NAND gate

(xiii) Identify the output of an even parity checker if the total number of 1s in the input data is odd

a) High (1)
b) Low (0)
c) Undefined
d) Depends on the circuit design

(xiv) Identify the output of a demultiplexer when the select lines are set to a specific binary value.

a) All outputs are activated.
b) Only the corresponding output line is activated.
c) The output is always high.
d) The output depends on the enable signal only.

(xv) Identify the IC can be used as a 3-to-8 decoder

a) 74138
b) 74151
c) 74154
d) 7404

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Apply Boolean algebra to simplify the expression (3)

$$Y = \overline{A} \cdot B + A \cdot B + \overline{A} \cdot \overline{B}$$

3. Illustrate the difference between asynchronous and synchronous counter (3)

4. Convert the Octal number 237677 to a Hexadecimal Number (3)
5. Construct 1 line to 4 line demultiplexer. (3)

6. Compare volatile and Non-Volatile memory. (3)

OR

Explain SISO register. (3)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. Identify the simplified boolean expression of the following function using K-Map (5)

   $F=\Sigma m(2,3,4,5,6,7,9,12,13,14,15)$

8. **Represent the following Boolean expression using basic gates** (5)

   Y = AB + BC + AC

9. Describe decimal number 3.248 * 10^4 to a single-precision floating-point binary number. (5)

10. Explain the conversion technique of JK flip-flop to D flip-flop. (5)

11. Explain the fundamental principles of Read-Only Memory (ROM), and illustrate how data is stored and retrieved from ROM cells. Write about a specific application where ROM is commonly used. (5)
12. Construct 4:1 Multiplexer using 2:1 Multiplexer and one OR gate (5)

OR

Construct 8:1 multiplexer using 4:1 multiplexer and OR gate. (5)

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