BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – Dip.CSE-2022
Course Name – Digital Electronics
Course Code - DCSE-PC302
(Semester III)

Time : 2:30 Hours

Full Marks : 60

[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)   Identify the Universal Gate

a) AND

b) OR

c) NAND

d) XOR

(ii) Memorize that each decimal digit is represented by ___ bits binary number

a) 1

b) 2

c) 3

d) 4

(iii) Identify the Derived Gate

a) AND

b) OR

c) NAND

d) XOR

(iv) Select the correct base of Octal number system

a) 2

b) 8

c) 10

d) 16

(v)   In K-Map, individual cells are observed as

a) Binary code

b) Grey Code

c) BCD Code

d) None of these

(vi) Discover the primary purpose of the JK flip-flop\'s J and K inputs

a) Toggling the output

b) Setting the output

c) Clearing the output

d) Inverting the output

(vii) Select the correct option for full adder

a) 1 imput and one output

b) 2 input and one output

c) 3 input and 2 outputs

d) 2 inputs and three outputs

(viii) What happens when the clock input of an SR flip-flop is high and the S and R inputs are both low? Choose the correct option

a) The Q output is set to 1

b) The Q output is set to 0

c) The flip-flop enters an undefined state

d) The flip-flop toggles

(ix) What are the two types of basic adder circuits? Select the correct alternative

a) Sum and carry
b) Half-adder and full-adder
c) Asynchronous and synchronous
d) One and two's-complement

(x) Choose: Which flip-flop type is known for its ability to toggle its output on each clock edge when both J and K inputs are high?

a) JK flip-flop
b) T flip-flop
c) D flip-flop
d) SR flip-flop

(xi) BCD adder can be constructed with 3 IC packages each of _____. Select the correct alternative

a) 2-bits
b) 3-bits
c) 4-bits
d) 5-bits

(xii) Discover the primary role of a Master/Slave flip-flop in sequential circuits

a) Storing binary data
b) Counting clock pulses
c) Generating clock signals
d) Multiplexing inputs

(xiii) Identify which combinational circuit is renowned for selecting a single input from multiple inputs & directing the binary information to output line?

a) Data Selector
b) Data distributor
c) Both data selector and data distributor
d) DeMultiplexer

(xiv) What is the primary function of a clock signal in a sequential circuit? Choose the correct option

a) Synchronizing the operations
b) Controlling the power supply
c) Clearing the flip-flops
d) Generating random numbers

(xv) If the number of n selected input lines is equal to 2^m then it requires _____ select lines. Estimate and select the correct alternative

a) 2
b) m
c) n
d) 2n

Group-B
(Short Answer Type Questions)   3 x 5=15

2. Define the decimal number system. (3)
3. Describe the key difference between a Half Adder and a Full Adder. (3)
4. Explain why Input clock of RS flip-flop is given to Pulser (3)
5. Describe universal shift register. (3)
6. Analyze the key characteristics of a double-digit counter. (3)

OR

Explain the principle behind a synchronous counter. (3)

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

7. Explain the operation of a Master/Slave Flip-Flop and its advantages in sequential circuit design. Apply this knowledge to design a Master/Slave JK flip-flop circuit for a toggle function and write down the truth table. (5)

8. Explain the significance of reprogrammability in memory devices, focusing on EEPROM and EPROM, and evaluate the implications of their reprogrammable nature for system flexibility and reliability. (5)

9. Evaluate the role of memory hierarchy in modern computer architectures, considering the use of both RAM and ROM components. Explain how this hierarchy optimizes data storage and access in computer systems. (5)

10. Explain Full Subtractor with proper diagram (5)

11. Describe minimize the boolean expression Y = ABC'D + ABC'D' + ABCD + A'BCD + ABCD' + A'BCD'. (5)

12. Assess the economic and environmental implications of using EPROM and EEPROM in consumer electronics and assess the reasons behind the shift towards more environmentally friendly memory solutions. (5)

OR

Evaluate the role of RAM in improving the overall performance of a computer system. Assess the impact of factors like cache memory size, data bus width, and memory access speed on system efficiency. (5)

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