PRESIDENCY UNIVERSITY
BENGALURU   **SET B**

SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2024

Semester : Semester III -2022

Course Code : ECE2007

Course Name : Digital Design

Program : B.Tech.

Date : 05-JAN-2024

Time : 9:30AM - 12:30 PM

Max Marks : 100

Weightage : 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS   **5 X 2M = 10M**

1. A Half adder is an arithmatic circuits that adds two binary digits.It uses _____gate &_____gate .Its ouput are SUM & CARRY

   (CO2) [Knowledge]

2. List the differences between Latch and Flipflop

   (CO3) [Knowledge]

3. A flip-flop is a device which stores a single bit (binary digit) of data; one of its two states represents a "one" and the other represents a "zero". Such data storage can be used for storage of state.
   In JK flipflop which input combinations produce RESET state?

   (CO3) [Knowledge]

4. Flip flops can divide the frequency of periodic waveform. When a pulse wave is used to toggle an flip flop, the output frequency becomes one half the input frequency.
   In JK flipflop, which input combinations produce toggle of present state?

   (CO2,CO3) [Knowledge]

5. In UP counter a counter increases count for every rising edge of clock. Not only counting, a counter can follow the certain sequence based on our design like any random sequence 0,1,3,2… . They can also be designed with the help of flip flops.
   For designing a 4 bit synchronous counter we need how many JK flipflop?

   (CO2,CO3) [Knowledge]

ANSWER ALL THE QUESTIONS   **5 X 10M = 50M**

6. A decoder is a device that generates the original signal as output from the coded input signal and converts n lines of input into 2^n lines of output. Interpret full adder using 3 to 8 decoder

(CO2) [Comprehension]

7. D flip-flops can be used to store temporary data in digital systems. They are often used in conjunction with other memory elements to create more complex storage systems. Construct synchronous Random counter thats counts 0-1-3-5-6-0 using D FF with the help of excitation table.

(CO3) [Comprehension]

8. The JK Flip-Flop, named after its inventors Jack Kilby and Jerry Kelly, is a fundamental component in digital circuits and computer memory systems. The flip-flop is a type of bi-stable multivibrator, meaning it has two stable states which it can flip (or toggle) between under the right conditions.Construct synchronous Random counter thats counts 0-2-4-6-0 using JK FF with the help of excitation table..

(CO3) [Comprehension]

9. T flip-flop does not have any invalid states, which helps to avoid unpredictable behavior in digital systems. Reduced power consumption: The T flip-flop consumes less power than other types of flip-flops, making it more energy-efficient.Write block diagram, truth table , logical diagram using NAND gate for T Flip flop ,along with characteristic table,excitation table and excitation equation .

(CO1,CO3) [Comprehension]

10. The multiplexer is a combinational logic circuit designed to switch one of several input lines to a single common output line by the application of a control logic. The input has a maximum of 2^N data inputs (where N = selection or control lines) and single output line.Implement F(A,B,C,D)=∑m(0,3,5,7,9,12,13)+d(2,6,8)
i) Implement using 8:1 MUX.
ii)Implement using logic gates.

(CO2,CO1) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS   **2 X 20M = 40M**

11. On the occasion of New Year Celebration you bought LED lights to decorate your homes. These LEDs will drive the hanging Lantern which glows when the LEDs will blink in the following manner:
• LED 1, 2, 3 are on.
• LED 1 and 2 are on but LED 3 is off.
• LED 1 and 3 are on but LED 2 is off.
• LED 3 and 2 are on but LED 1 is off.
Draw a truth table for this situation and obtain a Boolean expression for it. i)Design and implement the simplified logic using LOGICAL GATES.
ii) Design and implement the simplified logic using 4:1 MUX.

(CO3,CO1) [Application]

12. Consider a case where the Mr Raj has only D flipflop(transparent Flip Flop) available with him and he is assigned a task to design a JK flipflop using D flipflop. Explain the conversion from D to JK flipflop using Excitation tables. .

(CO2,CO3) [Application]