



End Term (Odd) Semester Examination December 2024

Roll no. 2319153

Name of the Course and semester: B.Tech (III)

Name of the Paper: Logic Design and Computer Organization

Paper Code: TCS 308

Time: 3 hour

Maximum Marks: 100

Note:

- (i) All the questions are compulsory.
- (ii) Answer any two sub questions from a, b and c in each main question.
- (iii) Total marks for each question is 20 (twenty). Each sub-question carries 10 marks

Q1. (2X10=20 Marks) (CO1)

- a. For the given Boolean function: $f(w,x,y,z) = \sum(0,5,7,8,9,10,14,15)$
find the prime implicants and essential prime implicants using Quine- McClusky method.
- b. Design a combinational circuit that compares two 4-bit numbers, A and B, to check if they are equal.
The circuit has one output Y, so that $Y = 1$ if $A = B$, and $Y = 0$ if $A \neq B$
- c. Design a 2 bit-magnitude comparator and draw its logic diagram.

Q2. (2X10=20 Marks) (CO2, CO1)

- a. Perform following flip-flop conversion
 - (i) D to SR
 - (ii) T to JK
- b. Design and explain Universal Shift register.
- c. Design and explain 4 bit Binary Adder- Subtractor.

Q3. (2X10=20 Marks) (CO3)

- a. A clocked sequential circuit with two D flip flops A and B, an input x and output y. The next State equations for a sequential circuit is given as
 $A(t+1) = Ax + Bx$
 $B(t+1) = A'x$
and the present state output are given as,
 $y = (A+B) x'$
If x is an external input to the sequential circuit
 - (i) Draw the circuit diagram of the sequential circuit.
 - (ii) Obtain state diagram of the sequential circuit.
- b. Design mod-10 synchronous counter using JK-flip flop.
- c. Draw and explain 4 bit Binary ripple Up- Down Counter

Q4. (2X10=20 Marks) (CO4, CO5)

- a. Differentiate between
 - i) RISC and CISC processors
 - ii) Von Neuman and Harvard Architecture
- b. Discuss Booth algorithm for multiplication with flowchart.
- c. Explain floating point arithmetic operations addition and subtraction with a flowcharts also discuss its hardware implementation.

Q5. (2X10=20 Marks) (CO6)

- a. Explain the following with flow chart approach
 - i) Interrupt driven I/O
 - ii) Programmed I/O
- b. Discuss memory hierarchy design and its characteristics.
- c. What is DMA? How it works? Explain.