Graphic Era
HILL UNIVERSITY
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University under section 2(f) of UGC Act, 1956

End Term (Odd) Semester Examination December 2024

Roll no. 2319126

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 ≠ 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.