B. Tech Examination 2021-22
Computer Science and Engineering
(Odd Semester Regular & Supplementary)
Digital Logic (CSEUGPC02)

Full Marks: 80 **Time : 3.00 Hrs**

(Answer any 8 questions.)
Symbols have their usual meaning.

1. How do you compare the following numbers? **2x5=10**
a) $(1.10)_2$,
b) $(1.10)_5$,
c) $(1.10)_8$,
d) $(1.10)_{10}$,
e) $(1.10)_{16}$

2. Represent the decimal number $(-25)_{10}$ into **10**
a) 8-bits signed magnitude form,
b) 8-bits signed 1's complement form,
c) 8-bits signed 2's complement form.

3. Perform the addition in BCD code of the two numbers 875 and 653. **10**

4. Prove the equality, $a.b + \bar{a}c = (a + c)(\bar{a} + b)$ **10**

5. Draw the K-MAP, solve and implement a optimum circuit of the following function **10**
$G = \sum_m (2, 3, 4, 5, 6, 8, 9) + \sum_d (10, 11, 12, 13, 14, 15)$

6. Perform the subtraction (P - Q) in 2's complement form, where P =11100101 and Q=11101101 **10**

7. Design a full-subtracter using two 4:1 multiplexers. **10**

8. Design a full-adder using one 3:8 decoder. **10**

9. Solve the prime implicants using KMAP and draw essential prime implicants table of the following function **10**
$G = \sum_m (1, 2, 3, 5, 6, 11, 12) + \sum_d (7, 8, 10, 14)$

10. Design a up-counter using DFF that repeats the sequence 000, 001, 010, 011, 100 in infinite loop. **10**

11. Design a state machine using TFF that implements a 2-bit down-counter when input x=1, otherwise holds its current state. **10**