

U.G. 2nd Semester Examination - 2021**BCA****[HONOURS]****Course Code : BBCACCHC201****Course Title: Digital Logic**

Full Marks : 30

Time : 2 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*

1. Answer any **ten** questions: 1×10=10
- Define Register.
 - What is the use of don't care conditions?
 - How many flipflops are required to design a decade counter?
 - Why NAND gate is called universal gate?
 - Subtract 37 from 29 using 2's complement.
 - Find the gray code of $(1100101)_2$.
 - Write the excitation table and characteristics table of JK flip flop.
 - What is PLA?

- Show that dual of Ex-NOR is equal to its complement.
- How many flip-flop are required for Mod-10 counter?
- Prove the given Boolean expression:
 $(A+C).(A+D).(B+C).(B+D) = AB + CD$
- Calculate the logical EX-OR operation of $(4BA2)_{16}$ and $(BCA1)_{16}$.
- Demonstrate DeMorgan's theorem by means of truth tables for three variables.
- Express the decimal number $(2563)_{10}$ in Excess-3 code.
- Why demultiplexer is also known as data selector?

2. Answer any **five** questions: 2×5=10
- Implement full adder using a decoder and OR gates.
 - Simplify the following expression using K-Map - $F(A, B, C, D) = \Sigma(1, 3, 7, 11, 15)$
 - Simplify using K-Map:
 $\Sigma m(0, 3, 5, 7, 10) + \Sigma d(12, 13, 14, 15)$

- d) State and prove idempotent law of Boolean Algebra.
- e) Find the maxterms from the given Boolean function: $F = xz + wy'$
- f) Convert $(46F.AB)_{16}$ to octal number.
- g) Design T flip-flop using D flip-flop.
- h) Implement a full adder using two half-adder.

3. Answer any **two** questions: $5 \times 2 = 10$

a) i) Subtract $(491)_{10}$ from $(835)_{10}$ using BCD subtraction method.

ii) Implement a full adder circuit with multiplexer. $2+3=5$

b) i) Compare between 1's and 2's complement.

ii) Design a combinational circuit that convert a decimal digit from the 8,4,-2,1 code to BCD. $1+4=5$

c) i) Simplify the following expression using boolean algebra:

$$\bar{A}BC + \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}C + ABC$$

ii) Simplify the following function using K-Map:

$$F(A, B, C, D) = \Sigma(2, 3, 12, 13, 14, 15) + d(0, 4, 9)$$

$$2+3=5$$