Roll No. Total No. of Pages : 02

Total No. of Questions : 07

B.Sc.(IT) (2015 & Onward) (Sem.–2)

DIGITAL CIRCUITS & LOGIC DESIGNS

Subject Code : BSIT-204

Paper ID : [72727]

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1) Answer briefly :

a) Convert the following Hex numbers into equivalent decimal, binary, and octal numbers: F0F0 and 1BBB.

b) Write the steps to find 2's complement of a number.

c) What are universal gates? Why are they called universal gates?

d) Differentiate between combinational and sequential circuits.

e) What is the use of De-multiplexer?

f) What is a Decoder?

g) What is a Priority encoder?

h) What is the difference between synchronous and asynchronous counters?

i) What is the use of Monostable Multivibrator?

j) What is a binary ripple counter?

SECTION-B

2) What is a Number system? What is the need for a number system? What are the different types of number systems? Discuss the characteristics of each.

3) a) Simplify the following using a 4-variable K-Map and draw the simplified logic diagram: $F(A, B, C, D) = \Sigma m(1, 3, 4, 5, 10, 11, 12, 13, 14, 15)$.

b) What are De Morgan's theorems? Explain them in your own words.

4) Given the Boolean function: $F = xy'z + x'y'z + xyz$

a) List the truth table of the function.

b) Draw the logic diagram using the original Boolean expression.

c) Simplify the algebraic expression using Boolean algebra.

d) List the truth table of the simplified expression and draw the logic diagram for the same.

5) Explain the following :

a) Half Adder

b) Parallel Binary adder

c) Full Subtractor

6) a) With the help of a block diagram, explain the operation of a J-K Master-Slave Flip flop.

b) Draw the logic diagram of a D Flip-flop using NAND gates and derive its characteristic table.

7) Design MOD-9 synchronous counter using JK flip-flops. Explain your circuit with necessary truth table and timing diagram. Explain any one application of such MOD counting.