

**MCA(INTEGRATED)**  
**(SEM II) THEORY EXAMINATION 2017-18**  
**DIGITAL ELECTRONICS**

**Time: 3 Hours****Total Marks: 70****Note:** Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

**1. Attempt all questions in brief. 2 x 7 = 14**

- a. Explain method to convert a binary number to octal number with example.
- b. What do you mean by minterms?
- c. State De Morgan's theorems of Boolean Algebra.
- d. What is truth table ?
- e. Define flip-flop.
- f. What is "Data selector"?
- g. Convert the number  $(99)_{10} = ( )_8$  and  $(11010011)_2 = ( )_{16}$

**SECTION B**

**2. Attempt any three of the following: 7 x 3 = 21**

- a. Construct a logic circuit for the Boolean expression  
 $(x + y + z). (x + y'). (x' + y')$
- b. Prove NAND and NOR gates as universal gates.
- c. Simplify the following Boolean function using K-map method –  
 $F(w, x, y, z) = \sum(0, 1, 2, 5, 8, 9, 10)$
- d. Draw the block diagram of a digital multiplexer and explain its function.
- e. Explain the functionality of D-flip-flops. Give its characteristics equation and excitation table.

**SECTION C**

**3. Attempt any one part of the following: 7 x 1 = 7**

- (a) Construct a logic circuit for the Boolean expression  
 $A.B' + C.(A + B.D)$  using NAND gates only.
- (b) Represent the decimal number 27 in
  - i) BCD code
  - ii) Octal code
  - iii) Gray Code

**4. Attempt any one part of the following: 7 x 1 = 7**

- (a) What do you mean by Boolean Algebra? Prove the following logical equation  
 $(A + BC).(B + AC') = BC + AC'$
- (b) Expand  $\bar{A} + \bar{B}$  to minterms and maxterms.

**5. Attempt any one part of the following: 7 x 1 = 7**

- (a) Simplify the following function using tabulation method –  
 $F = \sum(0, 1, 2, 8, 10, 11, 14, 15)$
- (b) With the help of truth table, explain functions of NOR-gate and also realize all

basic logic gates from it.

**6. Attempt any *one* part of the following:**

**7 x 1 = 7**

- (a) Design a BCD to Excess-3 Code converter.
- (b) What is full subtractor? Explain its basic structure with proper logic diagrams & truth tables.

**7. Attempt any *one* part of the following:**

**7 x 1 = 7**

- (a) What do you mean by race condition in flip-flop ? Design a J-K flip-flop and discuss its operation.
- (b) Write short notes on Shift Register and Ripple Counter.

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