

Total No. of printed pages = 4

3 (Sem 3) ELE M2

2015

ELECTRONICS

(Major)

Paper : 3.2

(Digital System)

Full Marks - 60

Time - Three hours

The figures in the margin indicate full marks
for the questions.

1. Choose the correct answer : $1 \times 5 = 5$
- (a) A 16 : 1 MUX has
- (i) 2 select lines
 - (ii) 4 select lines
 - (iii) 8 select lines
 - (iv) None of the above

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(b) Unused signal input lines of TTL gate should be

- (i) Short to ground
- (ii) Shorted to supply voltage line
- (iii) Both (i) & (ii) are true
- (iv) None of the above

(c) Negative equivalent of a positive binary number can be obtained by

- (i) 2's complement of the positive number
- (ii) 1's complement of the positive number
- (iii) 2's complement + 1's complement of the number
- (iv) None of the above

(d) A Boolean function of 'n' variables can be implemented by using a

- (i) $2^{n-1} : 1$ MUX
- (ii) $n : 1$ MUX
- (iii) $(n-1) : 1$ MUX
- (iv) None of the above

(e) Boolean addition $C + \bar{C}$ has the result

- (i) C
- (ii) \bar{C}
- (iii) 0
- (iv) 1

2. Answer any five questions : $5 \times 5 = 25$

(i) Design half and full adder circuits by using 4 : 1 multiplexers.

(ii) Draw TTL NAND gate circuit and explain its operation.

(iii) Explain the working of Master-Slave JK flip-flop with a proper circuit and its timing diagram.

(iv) Design 2 : 1 multiplexer with basic logic gates. Implement the design with universal logic gates.

(v) Design OR, AND, NOT gates with diodes, transistor and resistors.

(vi) Convert $(111101)_2$ to decimal. Mention applications of ASCII codes and Hexadecimal data format.

(vii) Explain briefly about D flip-flop and SR flip-flop.

3. Answer any *three* questions : $10 \times 3 = 30$

- (i) Describe the basic postulates and theorems of Boolean logic algebra.
- (ii) Mention the characteristics of logic gates and explain them briefly with suitable illustrations.
- (iii) Describe the classification of digital memories and their applications.
- (iv) Design a 3-bit synchronous counter. Illustrate its state table and state equations.