

Code : 9EC-02-E

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I Semester Diploma Examination, November 2009

E & C BOARD

DIGITAL ELECTRONICS-I

[Time : 3 Hours]

[Max. Marks : 100

- Instructions : (1) Section - A is compulsory.
(2) Answer any two main questions from each of the remaining Sections - B, C & D.

SECTION - A

(a) Fill in the blanks :

5 × 1 = 5

(i) A 2 input XOR gate has an output 'O' when both its inputs are Same.

(ii) The radix of hexadecimal number system is 16.

(iii) Multiplexer circuit converts parallel data to serial data.

(iv) D flip flop is formed by adding an inverter between the two inputs of SR flip flop.

(v) ECL is the fastest logic family.

(b) Explain the three laws of Boolean Algebra.

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SECTION - B

(a) Perform the following conversions :

5 × 2 = 10

(i) Hexadecimal number F37E into decimal.

(ii) Decimal number 563.24 into binary.

(iii) Octal number 345.67 into hexadecimal.

(iv) Binary number 10110 into Gray Code.

(v) Binary number 11010.11 into decimal.

(b) Multiply $(1101.11)_2 \times (110)_2$

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(c) What is ASCII code ? Mention its one application.

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[Turn over

3. (a) Write the logic symbol, expression and truth table for the following logic gates :
- (i) EX-OR (ii) NOR
- (b) Subtract $(1011)_2$ from $(1100)_2$ using 2's complement method.
- (c) Differentiate analog & digital signals.
- (d) Realise : (i) AND gate (ii) NOR gate using only NAND gates.

4. (a) Define the following terms with reference to logic families :
- (i) Fan-out
(ii) Noise margin
(iii) Propagation delay
- (b) Simplify the following expression using K-map and draw the logic circuit for the reduced expression :
- $$Y = \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}C\bar{D} + \bar{A}B\bar{C}\bar{D} + \bar{A}BC\bar{D} + A\bar{B}\bar{C}\bar{D} + A\bar{B}C\bar{D} + AB\bar{C}\bar{D} + ABC\bar{D}$$
- (c) Simplify the expression :
- $$Y = (A + B)(A + \bar{B})(\bar{A} + C)$$
- using Boolean algebra.

SECTION - C

5. (a) Explain the working of a half subtractor circuit with logic diagram and truth table.
- (b) Explain decimal to BCD encoder with logic symbol and truth table.

6. (a) What is a multiplexer ? Explain 4 : 1 multiplexer using gate level circuit and truth table.
- (b) Explain a 2-bit magnitude comparator with gate level circuit and truth table.
- (c) Define priority encoder.

7. (a) Explain BCD to 7-segment decoder with a neat logic diagram.
- (b) Explain the functioning of 1 : 8 demultiplexer with block diagram and truth table.
- (c) What are universal gates ? Give examples.

SECTION - D

- (a) Explain the operation of JK flip flop with a neat logic circuit and truth table. 7
- (b) What is racing ? How can it be overcome ? 4
- (c) Realise a D flip flop and T flip flop using JK flip flop. 4
- (a) What is a counter ? Differentiate Synchronous and Asynchronous counters. 5
- (b) Explain the working of a 4-bit ripple counter with truth table. 8
- (c) Define propagation delay in ripple counters. 2
- (a) Explain the working of 4-bit PISO shift register with logic diagram and truth table. 8
- (b) Explain the operation of 4-bit ring counter. 5
- (c) Mention any 2 applications of shift registers. 2
