

**Code : 041302**

**B.Tech 3rd Semester Examination, 2016**

**Digital Electronics**

*Time : 3 hours*

*Full Marks : 70*

**Instructions :**

- (i) *There are Nine Questions in this Paper.*
- (ii) *Attempt Five questions in all.*
- (iii) *Question No. 1 is Compulsory.*
- (iv) *The marks are indicated in the right hand margin.*

1. Choose the correct option of the following (any seven):

2×7=14

(a) How many bytes are contained by 32 bits ?

- (i) 3
- (ii) 4
- (iii) 2
- (iv) None of the above

(b) If a Hexadecimal number needs to convert to binary. For each hexadecimal digit, there will be how many bits.

- (i) 1
- (ii) 2
- (iii) 4
- (iv) 8

(c) The NOR Gate is OR gate followed by

- (i) AND gate
- (ii) NAND gate
- (iii) NOT gate
- (iv) None of the above

(d) Digital circuit can be made by the repeated use of

- (i) OR gates
- (ii) NOT gates
- (iii) NAND gate
- (iv) None of the above

(e) The Boolean expression:  $XYZ+YZ+XZ$  can be reduced to

- (i)  $\bar{X}$
- (ii) Y
- (iii) Z
- (iv)  $(X+Y)Z$

(f) A full adder circuit may be constructed by using

- (i) Two 2-input AND gates and two 3-input OR gates.
- (ii) Two half adders and a-2-input AND gates

Code : 041302

2

P.T.O.

- (iii) Two half adders and a 2-input OR gates
- (iv) Two 2-input AND gates two 3-input XOR gates
- (g) The output of logic gate in the following figure is



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

(h) How many comparators are required to design Parallel Encoded ADC (Flash type ADC) having resolution of 3-bits.

- (i) 8
- (ii) 7
- (iii) 4
- (iv) None of the above

(i) Why decoder is used in the digital electronics

- (i) To convert coded information into non-coded form
- (ii) To convert non-coded information into coded form

Code : 041302

3

P.T.O.

- (iii) It is used to separate address bus and data bus
- (iv) None of the above
- (j) In case of EPROM which one of the following is correct

- (i) AND-gate programmable, OR-gate permanently hardwired
- (ii) Both AND and OR-gates are programmable
- (iii) AND-gate programmable, OUTPUT permanently hardwired but may be taken through Resistor, or tristate gate grammable
- (iv) AND-gate permanently hardwired, OR-gate programmable

2. (a) Write down simplified sum of products (SOP) and product of sums (POS) expressions for the Boolean functions:  
 $X = (A + B + C) \cdot (A + D) \cdot (A + C)$  6

(b) Implement the full adder by using 1 to 8 demultiplexer. Explain with help of truth table, Boolean equation and block diagram. 8

Code : 041302

4

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3. (a) What is de-Morgan's theorem? Solve using this theorem to prove the following:

$$(A+B) \cdot (C+D) = \overline{\overline{(A+B)} + \overline{(C+D)}} \quad 6$$

(b) Realize the following function with the help of NAND gates: 8

$$F(A, B, C, D) = \sum m(0, 1, 4, 12) + d(2, 3, 8)$$

4. (a) Write a short notes on any two: 6

(i) Excess-3 code

(ii) Gray code

(iii) 3-bit even parity generator

(iv) 2-bit magnitude comparator

(b) Design a circuit diagram of 4-bit even parity checker using XOR gates. Explain with help of truth table and Boolean equation. 8

Code : 041302

5

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5. (a) Explain the operation of a 2-input CMOS NOR gate. 6

(b) Explain merits and demerits of different logic families. 8

6. (a) Explain the working of D & T Flip-Flops with help of state table, excitation table and block diagram. 6

(b) Design a 4-bit ring counter using D Flip-Flop. 8

7. (a) Differentiate between synchronous and asynchronous counters. 6

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(b) Convert J-K Flip-Flop into S-R Flip-Flop. Explain with help of excitation table, characteristic equation and block diagram. 8

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8. (a) Explain with the help of a diagram, the principle of operation of R-2R ladder D/A converter. 6

(b) Draw the functional block diagram of timer LM555, and explain how it can be used to obtain a Monostable Multivibrator. 8

Code : 041302

6

9. (a) Draw the circuit diagram of ROM and explain with suitable examples. 6

(b) Explain Parallel Encoded ADC (Flash type ADC) with help of block diagram. 8

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