

Code : 041402

**B.Tech 4th Semester Exam., 2018**

**DIGITAL ELECTRONICS**

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Choose the correct answer from the following  
(any seven) :  $2 \times 7 = 14$

(a) In the expression  $A + BC$ , the total no. of min-terms will be

- (i) 2
- (ii) 3
- (iii) 4
- (iv) 5

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(b) The term VLSI generally refers to a digital IC having

- (i) more than 1000 gates
- (ii) more than 100 gates
- (iii) more than 1000 but less than 9999 gates
- (iv) more than 100 but less than 999 gates

(c) Digital technologies being used now-a-days are

- (i) DTL and EMOS
- (ii) TTL, ECL, CMOS and RTL
- (iii) TTL, ECL and CMOS
- (iv) TTL, ECL, CMOS and DTL

(d) Logic analyser is

- (i) a multichannel oscilloscope
- (ii) similar to logic pulsar
- (iii) similar to current tracer
- (iv) None of the above

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(e) Equivalent decimal number for binary number 1101.0101 is

- (i) 14.325
- (ii) 7.815
- (iii) 13.3125
- (iv) 13.5625

(f) A bulb in a staircase has two switches, one switch being at the ground floor and the other one at the first floor. The bulb can be turned ON and also can be turned OFF by any one of the switches irrespective of the state of the other switch. The logic of switching of the bulb resembles

- (i) AND gate
- (ii) OR gate
- (iii) XOR gate
- (iv) NAND gate

(g) The flip-flop which can have an uncertain output state is

- (i) J-K
- (ii) R-S
- (iii) D
- (iv) T

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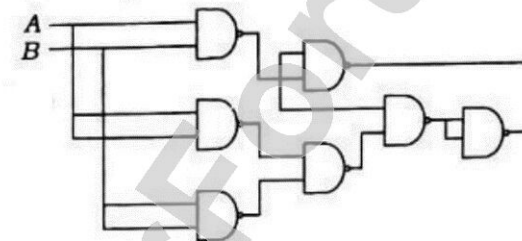
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(h) The time required for a pulse to decrease from 90 to 10 percent of its maximum value is called

- (i) rise time
- (ii) decay time
- (iii) binary level transition period
- (iv) propagation delay

(i) What logic function is performed by the circuit shown below?



- (i) Ring counter
- (ii) Ripple counter
- (iii) Full adder
- (iv) Half adder

(j) A small dot or circle printed on top of an IC indicates

- (i) Vcc
- (ii) Gnd
- (iii) Pin 14
- (iv) Pin 1

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2. (a) Implement the following Boolean expression using NAND gate only :

$$Y = ABC + A'C + AB'C$$

- (b) What are the salient features of digital systems over analog systems? Write at least four examples where digital systems are performed over analog systems. 7+7=14

3. (a) Minimize the following expression using K-map :

$$Y = \Pi M(0, 1, 5, 9, 14, 15) + d(3, 4, 7, 10, 11)$$

- (b) Convert the following equation into standard SOP form :

$$Y = AB'D + BCD' + CA' \quad 7+7=14$$

4. (a) Design a parity generator to generate even parity bit for a 4-bit word. Use EX-OR and EX-NOR gate.

- (b) Design a BCD to Excess-3 code converter using minimum number of NOR gates. 7+7=14

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5. (a) What is meant by open collector output of TTL gate? What is its utility? Draw the circuit showing open collector output and pull-up resistor. Explain its operation. What are the applications of open collector output?

- (b) What are the advantages of BiCMOS logic circuits? Draw the circuits of BiCMOS NAND and NOR gates. Explain their operations. 7+7=14

6. (a) Draw a neat diagram of clocked J-K flip-flop. Explain race around condition.

- (b) Define an universal shift register. Draw a 3-bit SISO left-shift register. Use D flip-flop. Assume data word 110. Also write truth table. 7+7=14

7. (a) Explain the working of BCD ripple counter with timing diagrams.

- (b) Using any type of flip-flop, design a 4-bit asynchronous counter that up counts in gray code. 7+7=14

8. (a) What are the different types of parallel adders? Explain carry save and carry look-ahead adders.

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(b) Determine Hamming code sequence with odd parity for natural BCD for making it an error correction code.  $7+7=14$

9. (a) Obtain a  $16:8$  memory using  $16 \times 4$  memory ICs and draw the concerned IC circuit.

(b) Write short notes on the following :

(i) Static and dynamic MOS RAM

(ii) ROM, EPROM, EEPROM  $7+7=14$

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