Code : 041402

B.Tech 4th Semester Exam., 2015

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 option from any *seven* of the following : 2×7=14

(a) Digital circuits mostly use

(i) diodes

(ii) bipolar transistors

(iii) diodes and bipolar transistors

(iv) bipolar transistors and FET

(b) Which of the following binary numbers is equivalent to decimal number 10?

(i) 1000

(ii) 1100

(iii) 1010

(iv) 1001

(c) In a three-input NOR gate, the number of states in which output is one, equals

(i) 1

(ii) 2

(iii) 3

(iv) 4

(d) In which function each term is known as max term?

(i) SOP

(ii) POS

(iii) Hybrid

(iv) Both *(i)* and *(ii)*

(e) 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

(f) A Karnaugh map with four variables has

(i) 2 cells

(ii) 4 cells

(iii) 8 cells

(iv) 16 cells

(g) A three-bit binary adder should use

(i) 3 full adders

(ii) 2 full adders and one half adder

(iii) 1 full adder and 2 half adders

(iv) 3 half adders

(h) Which device changes parallel data to serial data?

(i) Decoder

(ii) Multiplexer

(iii) Demultiplexer

(iv) Flip-flop

(i) A mod 4 counter will count

(i) from 0 to 4

(ii) from 0 to 3

(iii) from any number n to $n+4$

(iv) None of the above

(j) The access time of ROM using bipolar transistor is about

(i) 1 sec

(ii) 1 milisec

(iii) 1 microsec

(iv) 1 nanosec

2. (a) Convert the following decimal number into binary numbers :

(i) $(39 \cdot 12)_{10}$

(ii) $(675 \cdot 634)_{10}$

(b) Convert the following into binary numbers :

(i) $(278)_8$

(ii) $(E7\ F6)_{16}$

(c) Write truth table for 3-input XOR gate and realize it by using NOR gate.

(d) Convert decimal number 35 into gray code. 4+3+4+3=14

3. (a) Simplify the function and draw a circuit to realize the simplified function

$$Y = [A\overline{B}\ (C + BD) + \overline{A}\,\overline{B}]C$$

(b) $Y = \Pi\ M(0, 1, 3, 5, 6, 7, 10, 14, 15)$
Draw the logic circuit for the simplified function. 6+8=14

4. (a) Explain the operation of TTL NAND gate with totem pole output.

(b) What is the difference between current sourcing and current sinking? 8+6=14

5. *(a)* What is the difference between decoder and encoder? Draw the logic circuit of decimal to BCD encoder and explain its working.

(b) What is demultiplexer? Draw its block diagram and explain its working. 7+7=14

6. *(a)* Differentiate between combinational circuit and sequential circuit.

(b) Explain the working of *S-R* flip-flop with the help of a neat diagram. 6+8=14

7. *(a)* Draw the circuit of a 4-bit ripple counter. Explain its working. Draw its timing diagram.

(b) Draw the circuit of a serial-in, serial-out shift resistor and explain its working. 7+7=14

8. *(a)* Draw the circuit of a binary ladder network A/D converter and explain its working.

(b) Draw a circuit of astable multivibrator using timer 555 and explain its working. 7+7=14

9. Write short notes on any *two* of the following : 7×2=14

(a) EPROM

(b) ROM

(c) Full subtractor and half subtractor

(d) Magnitude comparators

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