

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 number 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) $(39.12)_{10}$
 - (ii) $(675.634)_{10}$
- (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
- $$Y = [A\bar{B} (C + BD) + \bar{A}\bar{B}]C$$
- (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 register 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 : $7 \times 2 = 14$
- (a) EPROM
- (b) ROM
- (c) Full subtractor and half subtractor
- (d) Magnitude comparators
