Reg. No. : | | | | | | | | | | |

Question Paper Code: 42207

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Second Semester

Computer Science and Engineering

14UCS207 – DIGITAL PRINCIPLES AND SYSTEM DESIGN

(Common to Information Technology)

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 1 = 10 Marks)

1. $(123.25)_{10} = (?)_2$

   (a) 1101011.01 (b) 1011011.001 (c) 1111011.01 (d) 11011.01

2. Which are called universal gates?

   (a) NAND and NOR (b) AND and OR (c) NOT and XOR (d) None

3. Convert the 2-4-2-1 weighted code 10010011 to its equivalent gray code

   (a) 10010011 (b) 00100010 (c) 93 (d) 01010110

4. Which gate is best used as a basic comparator?

   (a) AND (b) OR (c) XOR (d) XNOR

5. A demultiplexer is used to ----------

   (a) perform arithmetic division
   (b) select data from several inputs and route it to a single output
   (c) steer the data from a single input to one of the many outputs
   (d) perform parity checking

6. An EPROM----------

(a) is of random – access type (b) is non – volatile

(c) is programmable (d) has all the above requirements

7. The basic shift register operations are

(a) serial in serial out (b) serial in parallel out

(c) parallel in serial out (d) all of the above

8. Flip flop is to

(a)Store octal value (b) Store hexadecimal value

(c) Binary value (d) ACCII value

9. ---------- exist when two or more binary state variables changes value in reponse to change in an input variable.

(a) Race (b) Hazards

(c) Cycles (d) None of these

10. The most commonly used flip flop in the design of counter circuit is

(a) D (b) RS (c) JK (d) Latch

PART - B (5 x 2 = 10 Marks)

11. Prove x (x + y) = x.

12. Perform BCD addition of 178_{10} and 198_{10}.

13. Implement the logic function f = $\sum$ m (2, 3, 4, 6) using a decoder.

14. Justify the need for edge triggering.

15. What is a Hazard in Digital circuit?

PART - C (5 x 16 = 80 Marks)

16. (a) Reduce the following expression to the SOP and POS form

$$Y(W, X, Y, Z) = \sum m(1, 2, 3, 5, 9, 12, 14, 15) + \sum d(4, 8, 11). \quad (16)$$

Or

(b) How would you express the Boolean function using K-map and draw the logic diagram

F(w,x,y,z)= $\sum m(0,1,2,4,5,6,8,9,12,13,14)$ (16)

17. (a) Draw and explain 4 – bit magnitude comparator circuit. (16)

Or

(b) Combinational logic circuit has two inputs (a,b) and four outputs (w,x,y,z). The outputs represent a binary number whose value equals the square of input. For example, if ab=10, then wxyz=0100. Design the circuit and show the logic diagram. (16)

18. (a) Implement the Boolean function F(A, B, C, D) = AB'D + A'C'D + B'CD' + AC'D using 8x1 multiplexer. How do you implement the same function with 4x1 multiplexer? Illustrate with logic diagram. (16)

Or

(b) Design a BCD to Excess 3 code converter using PROM. (16)

19. (a) A sequential circuit has two flip flops (A and B), two inputs (x and y) and an output (Z). The flip flop input functions and the circuit output function are as follows.

JA = XB + y'B KA = xy'B'

JB = xA' KB = xy' + A

Z = xyA + x'y'B

Obtain the logic diagram; sate table, state diagram and state equations. (16)

Or

(b) (i) With neat diagram, explain the operation of 4-bit Universal Shift Register. (12)

(ii) Write HDL code for T Flip-flop. (4)

20. (a) Explain static, dynamic and essential hazards in digital circuit. Give hazard – free realization for the following Boolean function: $F(a, b, c, d) = \sum_m (2, 3, 5, 7, 10, 14)$. (16)

Or

(b) With suitable example explain Race Free State assignment. (16)