Q.P. CODE 12164

First Semester B.C.A. Degree Examination
October / November 2018
(2016-17 Syllabus)

BCA 440 : DIGITAL COMPUTER FUNDAMENTALS

Time : 3 Hours Max. Marks : 80

I. Answer ALL the following. 5x1=5

1. Perform 2's complement on 1101011.
2. $A + \overline{A}\,B =$ _____.
3. Define minterm.
4. Define de-multiplexer.
5. What is the drawback of SR - FF.

II. Answer any FIVE of the following: 15x5=75

6. a) Convert the following:
   i) $147.71 = ?_{(2)}$
   ii) $304.3024_{(8)} = ?_{(16)}$
   iii) $BCA_{(16)} = ?_{(8)}$
   b) Solve using 1's and 2's complement of subtraction.
   i) 78 - 62 ii) 62 - 78
   c) i) How do you convert binary to gray and vice-versa. Give example for each.
   ii) Expand BCD. **(5+5+5)**
7. a) Explain all the basic gates with circuit and truth table.
   b) State and prove Demorgan's theorem.
   c) Simplify the following using boolean laws
   i. $Y = (A + B)(\overline{A}\,\overline{C} + C)(\overline{\overline{B} + A\,C})$
   ii. Show that $\overline{A}\,\overline{B}\,C + \overline{B\,C\,D} + \overline{A\,D} = \overline{ABCD}$ **(5+5+5)**
8. a) Convert $A\,B + \overline{B}\,\overline{C}$ to its standard form and show SOP and POS are complement to each other.
   b) i. Write the outlet of 3 and 4 variable K-map.
   ii. List out the rules to simplify boolean expression using K-map.
   c) Simplify $Y = \overline{A}\,\overline{B}\,\overline{C} + \overline{B}\,C\,\overline{D} + \overline{A}\,B\,C\,\overline{D} + A\,\overline{B}\,\overline{C}$ using K-map and realise the simplified Expression using NAND gates only. **(5+5+5)**

9. a) Simplify

$F(A, B, C, D) = \pi_m (0, 5, 7) .d (1, 4, 8)$

using K-map and realise the simplified expression using NOR gates only.

b) Solve by using QM - method to find the prime implicants of

$F(w, x, y, z) = \Sigma_m (0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$

c) For the above QM - method problem find essemtial prime Implicants and realise the result with basic gates. **(5+5+5)**

10. a) Design a full adder using two half adders.

b) What is a multiplexer ? Explain the working of 4:1 multiplexer.

c) Design and explain two bit magnitude comparator. **(5+5+5)**

11. a) What is a flip flop ? Explain the working of JK - FF.

b) Explain: i. T - FF ii. D - FF

c) What is a shift register ? Explain SISO and PISO shift registers. **(5+5+5)**

12. a) Design and explain the working of 4-bit ripple up counter.

b) Explain 3-bit updown counter.

c) Explain the working of mod-11 counter. **(5+5+5)**

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