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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Third Semester, B.E. - Electrical and Electronics Engineering
Semester End Examination; Dec. - 2019
Digital Electronic Circuits

Time: 3 hrs   *Max. Marks: 100*

*Note: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit*

ii) Missing data if any, may be suitably assume.

UNIT - I

1 a. Convert the given Boolean function into min-term Canonical form,

　i) $R = f(a,b,c) = (\bar{a} + b)(b + \bar{c})$

　ii) $P = f(x,y,z) = x + \bar{x}\,\bar{z}(y + \bar{z})$ 6

　b. Simplify the following function into minimum number of literals,

　i) $xyz + \bar{x}y + xy\bar{z}$ ii) $xz + \bar{x}zy$

　iii) $y(w\bar{z} + wz) + xy$ iv) $xy + \bar{x} + \overline{xy}$ 8

　c. State and prove;

　i) Distributive   ii) Absorption law of Boolean Algebra using identities   6

2 a. State and Prove the De-Morgan's theorem for three variables using truth table.   6

　b. Simplify the following Boolean expression,

　i) $a + \bar{a}b + ab\bar{c}$ ii) $a + \bar{a}b + abc + a\bar{c}$ iii) $ab + \overline{ac} + a\bar{b}c[ab + c]$ 6

　c. Convert the following expression into standard SOP form:

　i) $AC + AB + BC = f(A,B,C)$ ii) $A + ABC = f(A,B,C)$ 8

UNIT - II

3 a. Find the minimal product of the following Boolean function using Karnaugh map,

　i) $f(a,b,c,d) = \sum(7,9,11,12,13,14) + \sum d(3,5,6,15)$ 8

　ii) $f(a,b,c,d) = \prod(2,8,11,15) + \prod d(3,12,14)$

　b. Simplify the given Boolean function using Quine Mccluskey method,

　$y = f(a,b,c,d) = \sum(0,1,2,6,7,9,10,12) + d(3,5)$. Verify the result using K-map.   12

4 a. With a neat logic diagram, explain Look-ahead carry adder.   10

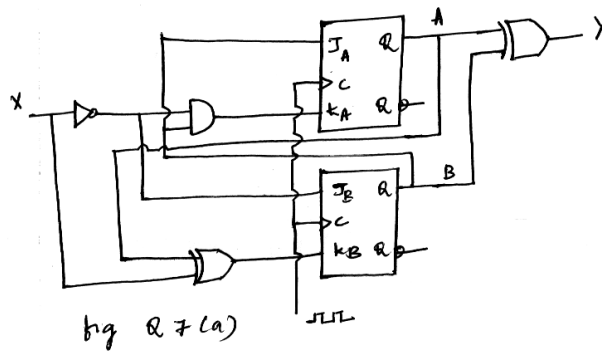　b. With a neat logic diagram, explain;

　i) Half adder

　ii) Full adder   10

UNIT - III

5 a.   Differentiate Latch and Flip flop.   4

  b.   With a neat logic diagram, explain Master Slave JK flip flop.   8

  c.   With a neat logic diagram, explain 8 line to 3 line, priority encoder.   8

6 a.   Realize the following Boolean function:

   $$P = f(w, x, y, z) = \sum(0,1,5,6,7,10,15)$$ 10

   using,   i) 16 to 1 MUX   ii) 8: 1 MUX   iii) 4: 1 MUX

  b.   Distinguish between a decoder and an encoder. Implement full adder using IC 74138.   10

UNIT-IV

7 a.   Construct the excitation table, transition table, state table and state diagram for the Moore sequential circuit shown below,

fig Q 7 (a)   10

  b.   With a neat logic diagram, explain;
   i) SISO   ii) SIPO   10

8 a.   Analyze the synchronous sequential circuit given below,

                                                                                                     10
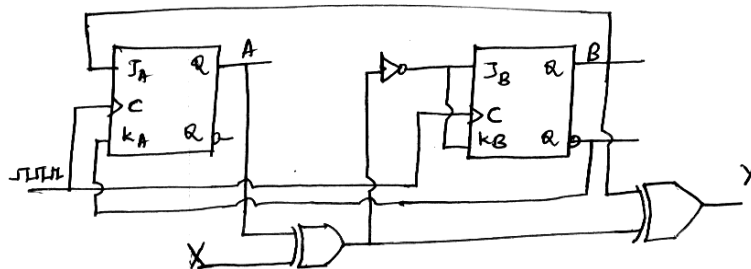
  b.   Design a synchronous 5421 code sequencer using positive edge triggered D flip-flop with minimal combinational circuit.   10

UNIT - V

9 a.   With a neat circuit diagram, explain the operation of 2-input TTL NAND gate with Totem pole output.   10

  b.   With a neat diagram, explain weighted DAC and successive approximation ADC.   10

10a.   Draw a 4 bit D/A converter using R-2R resistors and explain it working.   10

  b.   With a neat circuit diagram, explain two inputs CMOS NAND gate.   10

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