COA 304.1 **Reg.No. ……**

CREDIT BASED THIRD SEMESTER B.C.A. DEGREE EXAMINATION
OCTOBER 2012
B.C.A
DIGITAL ELECTRONICS

Time: 3 Hrs **Max. Marks: 120**

PART – A

1. Answer any 15 questions from the following: 15x2=30

a. Write any two postulates of Boolean algebra.

b. Prove that x+xy = x

c. Write BCD and Binary equivalent of $(45)_{10}$.

d. Draw the symbol of NOR gate and write the truth table.

e. What are universal gates? Why are they called so?

f. What is the difference between canonical and standard form?

g. Write the logic expression and truth table of half adder.

h. Define sum of product term with an example.

i. Write the block diagram of combinational circuit.

j. Give the general structure of three-variable K-map.

k. Differentiate between decoder and encoder.

l. Define a register.

m. Write the excitation table of JK flip flop.

n. Differentiate between 1's and 2's complement.

o. What do you mean by proof by perfect induction?

p. Write the truth table of full adder.

q. What is a flip-flop?

r. Define a multiplexer.

PART – B

Answer any TWO questions from each unit:

UNIT – I

2. a. Convert decimal number 242.225 to binary, octal and hexadecimal.
b. Implement the following Boolean function using gates.
(i) $F = XYZ$ (ii) $F = X + YZ$
c. What are Minterms and Maxterms? Explain with example. **(6+5+4)**

3. a. Give the Venn diagram representation of
(i) xy + xz (ii) xy + x.
b. Perform the following subtraction using 1's and 2's complement.
(i) $(1011.11)_2 - (1100.11)_2$
c. Design NOT, OR, AND gate from NAND gate. **(4+5+6)**

4. a. State and prove the DeMorgans theorem for two variables.
b. Explain the following

(i) Decimal code (ii) Alphanumeric codes

c. Simplify the given Boolean expression using postulates and theorems.

$F(W,X,Y,Z) = \Pi(2,4,5,6,7,12,13,14,15)$ **(6+4+5)**

UNIT – II

5. a. What is a full adder? Briefly explain the working of Full-Adder with logic diagram.

b. Using K-map simplify the Boolean function and draw the logic diagram using only NAND gates $F(A,B,C,D) = \Sigma(0,2,5,6,7,8,10,13,15)$ **(7+8)**

6. a. Explain the 2-bit magnitude comparator.

b. Minimize $F(A,B,C,D) = \Sigma(0,3,4,7,8) + \Sigma d(10,11,12,13,14,15)$ and draw the logic diagram for minimized expression. **(8+7)**

7. a. With the help of a suitable diagram explain the working of a half adder.

b. Design a code convertor to convert the BCD code to excess-3 code. **(6+9)**

UNIT – III

8. a. With a neat diagram explain the working of 1x4 demultiplexer.

b. What is a shift register? Explain with a neat diagram. **(8+7)**

9. a. Explain the working of RS flip-flop with a diagram.

b. Design a MOD-6 counter using D-Flip-Flop. **(7+8)**

10. a. Realize Y(A,B,C,D) = Σ (0,1,3,4,8,9,15) using multiplexer.

b. Explain the working of T Flip flop with characteristic table, characteristic equation and graphic symbol. **(7+8)**

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CREDIT BASED THIRD SEMESTER B.C.A. DEGREE EXAMINATION
OCTOBER 2013
B.C.A
DIGITAL ELECTRONICS

Time: 3 Hrs **Max. Marks: 120**

PART – A

1. Answer any 15 questions from the following: **15x2=30**

a. Convert $DAD_{(16)}$ into octal number system.

b. Prove that x(x+y)=x.

c. How do you form 1's and 2's complement of a binary number?

d. Define minterms and maxterms.

e. Why NOR gate is a called as a universal gate?

f. State the duality principle of Boolean algibra.

g. Write the truth table of 2 to 4 line decoder.

h. Write a block diagram of combinational circuit.

i. What is a code converter? What is its significance?

j. What is a K-map? Explain how it is useful to simplify a Boolean function?

k. Differentiate between decoder and encoder.

l. How many states a flip-flop has? List them.

m. Write the complement of Y=AB'C+BC'+ABC'.

n. Write the excitation table of D flipflop.

o. What is the difference between characteristic table and excitation table of the flipflop?

p. What is multiplexer? Why is it called a data selector?

q. Define a register and a counter.

r. What is the difference between register and a shift register?

PART – B

Answer any TWO questions from each unit:

UNIT – I

2. a. Convert $(127.75)_{10}$ to binary, octal and hexadecimal number systems.

b. Simplify the Boolean function using postulates and theorems.

i) F=xy'z+xyz'+x'yz+xyz ii) F=xy'+x'z

c. Explain the AND, OR and NOT gates with logic diagram and truth tables.**(6+4+5)**

3. a. Subtract $34_{(10)}$ from $23_{(10)}$ using 1's complement arithmetic.

b. State and prove Demorgan's theorems.

c. Express the function f(x,y,z)=xy+xz in canonical forms. **(6+4+5)**

4. a. State and prove any 3 theorems of Boolean algebra.

b. Prove that sum of all minterms of Boolean function of 3 variables=1

c. Represent $22_{(10)}$ -$5_{(10)}$ 32 bit floating point format. **(6+4+5)**

UNIT – II

5. a. Draw a block diagram of binary parallel adder and explain its working.
   b. Using K-map, simplify the Boolean function and draw the logic diagram using only NAND gates. F=B′D+B′C+ABCD
   d=A′BD+AB′C′D′ **(7+8)**

6. a. What is a decoder? Explain the working of 3-bit decoder with a diagram.
   b. What is magnitude comparator? With a circuit diagram explain the working of a 2-bit- magnitude comparator. **(7+**

7. a. Design a code converter to convert the BCD code to 2421 code.
   b. Minimize F(a,b,c,d)=Σ(0,1,2,3,6,8,9,10)+Σd(4,11,14). And draw the logic diagram for minimized expression. **(8+7)**

UNIT – III

8. a. What is multiplexer? Explain the implementation of F(a,b,c,d)=Σ(0,2,5,7,13,14,15) using multiplexer.
   b. Explain the working of a JK flipflop with the help of a diagram. **(7+8)**

9. a. With a neat diagram, explain the working of 1X4 demultiplexer.
   b. What is a shift register? With a block diagram explain 4-bit shift register using D-flipflop. **(7+8)**

10. a. Explain the working of a T-flipflop with the help of a diagram.
    b. Design a counter using D-flipflop for the following sequence: 0, 1, 3, 7, 6, 4 and repeats. **(7+8)**

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CREDIT BASED THIRD SEMESTER B.C.A. DEGREE EXAMINATION
OCTOBER 2014
B.C.A
DIGITAL ELECTRONICS

Time: 3 Hrs **Max. Marks: 120**

PART – A

1. Answer any 15 questions from the following: **15x2=30**

a. What is a gate?

b. Write the logic symbol and truth table of NAND gate.

c. Convert $(173)_8$ to hexadecimal.

d. Assign the proper even parity bit to the following code groups:

(i) 1010 (ii) 111000.

e. Write the dual of $F(A,B,C,D) = \bar{A}\bar{B}C + \bar{B}CD$

f. Give any two postulates of Boolean Algebra.

g. What is the difference between canonical and standard form?

h. Write the logic circuit and truth table of half adder.

i. Give the general structure of 4 variable K-map.

j. Differentiate between multiplexer and demultiplexer.

k. What is a Flip-Flop?

l. Write the excitation table of SR flip-flop.

m. State the two types of sequential circuits and also give the difference between them.

n. What is a shift register?

o. Apply De-Morgan's theorem to the expression $\overline{A + BC}$

p. What is a don't care condition? How it is useful in simplifying the expression using K-map?

q. Write the block diagram of sequential circuit.

r. Define sum-of-products (SOP) term with an example.

PART – B

Answer any TWO questions from each unit:

UNIT – I

2. a. Perform the following conversions:
(i) (ii)
b. Prove that NOR gate is universal gate.
c. State and prove De-Morgan's theorem. **(4+5+6)**

3. a. Perform the following subtractions using s and s complement method.
(i) (ii)
b. Explain the procedure of converting a decimal number to binary and vice-versa. Give an example.
c. Simplify the expression using the rules of Boolean Algebra. **(6+6+3)**

4. a. How parity bit is used to detect an error? Give an example.
b. Convert the following
(i) to sum of product terms.
(ii) to product of sum terms.
c) Explain the XOR and XNOR gates with symbol and truth table. **(5+4+6)**

UNIT – II

5. a. What is a magnitude comparator? Explain the 2-bit magnitude comparator.
b. Using the K-map, simplify the following expression and write the logic circuit for the simplified expression.

(7+8)

6. a. With the help of logic diagram and truth table, explain the working of a half subtractor.
b. Minimize the Boolean Expression and draw the logic diagram for the minimized expression using K-map. **(6+9)**

7. a. Design a code convertor to convert the Excess-3 to BCD code.
b. Explain the working of binary parallel adder with a neat diagram. **(9+6)**

UNIT – III

8. a. With a neat diagram, explain the working of 4:1 multiplexer.
b. Design the MOD-5 counter using JK flip-flops. **(7+8)**

9. a. Explain the working of D flip-flop with logic diagram and truth table.
b. Realise using multiplexer. **(7+8)**

10. a. Explain the working of a 4-bit shift register with a neat diagram.
    b. Design a MOD-10 counter using T flip-flops. **(7+8)**

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CREDIT BASED THIRD SEMESTER B.C.A. DEGREE EXAMINATION
OCTOBER 2015
B.C.A
DIGITAL ELECTRONICS

Time: 3 Hrs **Max. Marks: 120**

PART – A

1. **Answer any 15 questions from the following:** **15x2=30**
    a. What do you mean by duality principle of Boolean? Give an example.
    b. Convert $(942)_{10}$ to hexadecimal.
    c. Write truth table and logic diagram of XOR gate.
    d. Prove that $X+XYX$.
    e. Write the excitation table of RS Flip Flop.
    f. Write BCD and Binary equivalent of $(45)_{10}$.
    g. Draw the logic circuit for $F(x,y,z)=xyz+xyz$
    h. Write the block diagram of sequential circuit.
    i. Give the truth table of full Adder.
    j. What is a half subtractor?
    k. Why NOR gate is called a universal gate?
    l. Differentiate between decoder and encoder.
    m. What is a counter? Minimum of how many flip-flops are required to design 3-bit counter.
    n. What is a parity bit? Why is it used?
    o. What is a Shift Register?

p. What is a demultiplexer?

q. Give the general structure of 4 variable K-map.

r. Write any two postulates of Boolean algebra.

PART – B

Answer any TWO questions from each unit:

UNIT – I

2. a. State and prove De-Morgans theorems using proof by perfect induction.

b. Express the Boolean function $F(x,y,z)$ in sum of Minterms and product of Maxterms form.

c. Perform the following Conversion.

(i) $(135)_{10}$ (ii) $(1101.11)_2$ **(5+5+5)**

3. a. What is octal and hexadecimal number system? Explain conversion from decimal to hexadecimal.

b. What are Minterms and Maxterms? Explain with an example each.

c. Prove that (A+B) (A+C) = A + BC. **(5+5+5)**

4. a. Find the complement of the following $F = xyz + xy$

b. Design NOT, OR, AND gate from NAND gate.

c) Perform the following binary arithmetic using 2's complement

(i) 10001 – 1001

(ii) 10011 – 1001 **(3+6+6)**

UNIT – II

5. a. Draw the block diagram of parallel adder and explain its working.

b. Simplify the following Boolean function using K-map. $F = AC + AB + ABC + BC$

c. With a neat diagram explain the octal to binary encoder.

(6+4+5)

6. a. Obtain the simplified expression in sum of product for the Boolean function using K-map.

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

b. Design a code converter to convert the BCD code to excess-3 code. **(6+9)**

7. a. What is a decoder? Design a BCD to decimal decoder.

b. Simplify $f(w,x,y,z) = \sum(0,1,2,4,5,6,8,9,12,13,14)$ using K-map and draw the logic diagram using only NAND gates. **(9+6)**

UNIT – III

8. a. Explain the working of D flip-flop with block diagram.
   b. What is a multiplexer? With a neat diagram explain the working of 4 to 1 line multiplexer. **(7+8)**

9. a. Design a MOD-7 counter using JK flip-flop.
   b. What is a sequential circuit? How does it differ from combinational circuit? **(8+**

10. a. Explain the 4-bit shift register with the block diagram.
    b. Explain the working of JK flip flop with characteristics table, characteristic equation and graphic symbol and a logic diagram. **(7+8)**

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CREDIT BASED THIRD SEMESTER B.C.A. DEGREE EXAMINATION
OCTOBER 2016
B.C.A
DIGITAL ELECTRONICS

Time: 3 Hrs. Max. Marks: 120

PART – A

1. Answer any FIFTEEN questions from the following: 15×2=30

a. State the Demorgan's theorems.
b. Give two examples for alphanumeric codes.
c. Convert $(BCA)_{16} = (?)_2$.
d. Write the truth table and logic diagram of Ex-NoR gate.
e. Write the dual and complement of the Boolean function f=(xy+x)y.
f. What are universal gates? Why are they called so?
g. What is the difference between canonical form and standard form?
h. Define minterms and maxterms.
i. Write the excess 3 and 2421 code equivalents for decimal 367.
j. Differentiate between multiplexer and demultiplexer.
k. What is a half adder? Write its truth table.
l. Define register and shift register.
m. What do you mean by proof by perfect induction?
n. Differentiate between combinational circuit and sequential circuit.
o. Name any four characteristics of flipflops.
p. Write the excitation table of D-Flip-Flop.
q. What is a counter? How many flipflops required to design MoD-8 counter using D-Flipflop?
r. What are Don't care conditions?

PART – B

Answer any TWO full questions from each unit:

UNIT – I

2. a. Perform the following:
$341_{(16)} = (\ )_{10} = (\ )_8 = (\ )_2$
b. Implement the following Boolean function using logic gates.
i) $F = x + y'z$ ii) $F = x'y'z + x'yz + xy'$
c. Express the Boolean function (xy+z) (y+xz) in sum of minterm and product of maxterms. **(6+4+5)**

3. a. Give the venn diagram representation of
i) $a + (b.c)$ ii) $(a + b)(a + c)$
b. Subtract 70 from 63 using 2's complements.
c. Design NOT, OR and AND gate using only NOR gates. **(6+4+5)**

4. a. Explain the following:
   i) Reflecting code ii) Error detecting codes
   b. State any 5 postulates of Boolean algebra.
   c. Simplify the given Boolean expression using postulates and theorems.
   $F(w,x,y,z) = xy'z + x'y'z + w'xy + wx'y + wxy$ **(6+5+4)**

UNIT – II

5. a. What is a full subtracter? Explain the working of full subtracter with logic diagram.
   b. Simplify $f(w,x,y,z) = \sum(3,4,5,6,11\ 14,15)$ using K-map. **(8+7)**

6. a. With the help of a suitable diagram, explain the working of a BCD adder.
   b. Explain the working of octal-to-binary encoder with logic diagram and truth table. **(8+7)**

7. a. What is a decoder? Implement a full subtractor circuit using decoder and OR gates.
   b. Explain the working of 2-bit magnitude comparator. **(7+8)**

UNIT – III

8. a. With a neat diagram, explain the working of a 4-to-1 line multiplexer.
   b. Explain the working of RS flipflop with a diagram. **(8+7)**

9. a. With a block diagram, explain the working of a 4-bit register.
   b. Design a mod-7 counter using T-flipflop. **(7+8)**

10. a. Explain the implementation of $f(a,b,c,d) = \sum(2,5,9,10,14,15)$ using a multiplexer.
    b. Explain the working of JK flipflop with characteristic table, characteristic equation and graphic symbol. **(7+8)**

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