NEW SCHEME

USN | | | | | | | | | | |

First Semester M.C.A Degree Examination, July/August 2004

Master of Computer Applications

Digital Electronics

Time: 3 hrs.] [Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) Convert the Hexa decimal number COCA to binary, octal and decimal number systems. (6 Marks)
   (b) Subtract $(010111)_2$ from $(010011)_2$ using 2's complement method. (4 Marks)
   (c) If a memory location starts from 000 and ends with FFF in a memory segment. How many memory locations are there in the memory. (3 Marks)
   (c) Write a note on ASCI and EBCDIC codes. (7 Marks)

2. (a) State and prove Demorgan's law. (6 Marks)
   (b) Simplify the following expression
   $xy + yz + x\bar{z} + xy\bar{z}$ algebraically. (6 Marks)
   (c) Compare the performance of different logic families. (8 Marks)

3. (a) Simplify the following expression using k-map
   $F(A,B,C,D) = \sum m(0,4,5,6,7,12,13,15) + \sum d(1,11,14)$ (5 Marks)
   (b) Design even parity generator (for three inputs A, B and C) (5 Marks)
   (c) Using tabulation method, obtain the simplified expression
   $f(w,x,y,z) = \sum m(0,3,5,6,7,8,12,15)$ (10 Marks)

4. (a) What is full adder? Implement the same using only NAND gates. (10 Marks)
   (b) Design a circuit which converts BCD digits to EXCESS-3 code. (10 Marks)

5. (a) Explain the working of multiplexer. Design a full adder using multiplexer. (4+6 Marks)
   (b) Write notes on (i) ROM (ii) RAM (5+5 Marks)

6. (a) What is race around condition in J-K flip-flop and explain how it can be eliminated. (10 Marks)
   (b) Design mod-6 synchronous counter using J-K flip flops. (10 Marks)

7. (a) Explain the need for conversion of analog to digital and digital to analog. (5 Marks)
   (b) With a neat sketch explain the working of weighted resistor DAC. (7 Marks)
   (c) With a neat sketch, explain R/2R conversion process. (8 Marks)

8. Write short notes on : (5×4=20 Marks)
   (a) Universal gates
   (b) PLA
   (c) Parallel adder
   (d) Johnson counter

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MCA13

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

First Semester M.C.A Degree Examination, January /February 2003

Master of Computer Applications(New Scheme)

Digital Electronics

Time: 3 hrs.] [Max.Marks : 100

1. (a) Convert $(84672.125)_{10}$ to binary and hexadecimal. **(5 Marks)**

(b) Subtract

i) 11010.01 from 11100.10 using 2's complement , and

ii) 100 from 218 using 9's complement method **(5 Marks)**

(c) Explain the three basic logic functions with truth tables and logic diagram. **(5 Marks)**

(d) Write notes on 1) ASCII code and ii) Gray code. **(5 Marks)**

2. (a) Define canonical and standard forms of boolean expressions with examples **(6 Marks)**

(b) Obtain the canonical form of :
$f = ab'c' + a'cd + bd' + bc'd'$ **(4 Marks)**

(c) With a neat circuit diagram, explain a TTL NAND gate. **(10 Marks)**

3. (a) Given $f_1 = \sum(0,3,4,8,10,11,12,13,15)$, $f_2 = \sum(0,4,7,8,9,12,13,15)$ using K-map find $f_3 = f_1.f_2$. **(6 Marks)**

(b) Find essential prime implicants and hence the simplified expression using tabulation method for $f(a,b,c,d,e) = \sum(3,4,7,9,12,14,15,18,19,23,25,26,27) + d(0,1,8,31)$ in SOP. **(14 Marks)**

4. (a) What is a full subtractor? Write the truth table and logic circuit for difference and borrow using only NAND gates. **(10 Marks)**

(b) Design a circuit to generate the 2's complement of 4 bit binary numbers. **(10 Marks)**

5. (a) Design a BCD adder that has 2 digits BCD as its inputs and produces the sum of these. **(10 Marks)**

(b) Explain the working of a multiplexer. Realise $\sum(0,3,5,9,11,12,13,14)$ using multiplexer after simplification. **(10 Marks)**

6. (a) What is a flipflop? with relevant logic diagrams, tables, explain the working of SR flipflop. What are its limitations. **(10 Marks)**

(b) What is a ring counter? How is it useful? How is it converted to Johnson counter? explain. **(10 Marks)**

7. (a) Explain the need for ADC & DAC and basic concepts of the conversions. **(5 Marks)**

(b) Define accuracy and resolution of DAC. **(5 Marks)**

(c) With a neat sketch, explain R/2R convertor. **(10 Marks)**

8. Write short notes on:

i) Master slave flipflop ii) Universal gates

iii) Parity generators iv) ROM.

(4×5=20 Marks)

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NEW SCHEME

MCA13

USN

First Semester M.C.A Degree Examination, January/February 2004

Master of Computer Applications

Digital Electronics

Time: 3 hrs.] [Max.Marks : 100

Note: *1. Answer any FIVE full questions.*
2. Write figures and truth table wherever necessary.

1. (a) Perform the following operations.

i) $\frac{(37)_{16}}{(67)_8} - \frac{(66)_8}{(312)_4} = (?)_{10}$

ii) $(?)_8 + (B2)_{16} = (3100)_4$

iii) $(455)_8 = (?)_{16}$

iv) $(1000)_x = (64)_{10}$ find x. **(8 Marks)**

(b) Subtract 11010.010011 from 101.1001 using $2^{'}$ and $1^{'}s$ complement. **(4 Marks)**

(c) Explain in detail

i) Error detection code

ii) Gray code. **(8 Marks)**

2. (a) Prove that

i) $\overline{A}BC + A\overline{B}C + AB\overline{C} + ABC = AB + BC + CA$

ii) $(A + C + D).(A + C + \overline{D}).(A + \overline{C} + D)(A + \overline{B}) = (A + \overline{B}.C.D)$ **(6 Marks)**

(b) Complement the following and reduce them to minimum

i) $\overline{A.B} + \overline{A.C}$

ii) $(\overline{x.\overline{y} + x.y.z}) + x.(y + x.\overline{y})$ **(4 Marks)**

(c) Express the following Boolean function in canonical form

i) $F(x,y,z) = z + (\overline{x} + y).(x + \overline{y})$

ii) $F(A,B,C,D) = (A + \overline{B} + C).(A + \overline{B}).(A + \overline{C} + \overline{D}).(\overline{A} + B + C + \overline{D}).(B + \overline{C} + \overline{D})$ **(10 Marks)**

3. (a) Minimize the following using K-map

i) $F(A,B,C,D) = \Sigma(0,3,4,5,7) + d(8,9,10,11,12,13,14,15)$

ii) $F(A,B,C,D,E) = \Sigma(0,2,4,6,9,11,13,15,17,21,25,27,29,31)$ **(8 Marks)**

(b) Simplify the given function using Quine Mclusky method.

$F(A,B,C,D,E) = \Sigma m(0,1,2,8,9,15,17,21,24,25,27,31)$ **(12 Marks)**

Contd.... 2

4. (a) Explain the full subtracter, with truth table, logic circuit for difference and borrow using only NAND gates. **(10 Marks)**

   (b) Design a combinational circuit that converts a decimal digit from 8, 4, –2, –1 code to BCD. **(10 Marks)**

5. (a) Explain multiplexer and implement the Boolean function

   $F(A,B,C) = \Sigma(1,3,5,6)$ using MUX. **(10 Marks)**

   (b) Design BCD to decimal Decoder . **(10 Marks)**

6. (a) Explain the following with neat diagram,

   i) Shift register

   ii) Ring counter **(6 Marks)**

   (b) Explain master slave J-K flip flop, with neat diagram. **(8 Marks)**

   (c) Explain Binary up-down counter with neat diagram and necessary table. **(6 Marks)**

7. (a) Explain the digital to analog converter with a neat diagram. **(8 Marks)**

   (b) Explain the programmable logic array. **(6 Marks)**

   (c) What is SRAM and DRAM? Explain their advantages and disadvantages. **(6 Marks)**

8. Write notes on :

   i) Need for ADC and DAC

   ii) ROM and its types

   iii) Comparators

   iv) Encoders. **(5×4=20 Marks)**

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NEW SCHEME

MCA13

USN | | | | | | | | | | |

First Semester M.C.A Degree Examination, January/February 2005

Master of Computer Applications

Digital Electronics

Time: 3 hrs.] [Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) Perform the following number conversions :

i) $(1101.10)_2 = (?)_{10}$ ii) $(95.4)_{10} = (?)_2$
iii) $(ABCD0)_{16} = (?)_2$ iv) $(156.7)_8 = (?)_2$
v) $(101011)_2 = (?)_8$ **(10 Marks)**

(b) Given M = 1000100, N = 1010100, perform M-N operation in 2's complement method. **(2 Marks)**

(c) Explain with examples (i) error detection and ii) reflected codes. **(8 Marks)**

2. (a) Define Boolean algebra and principle of duality. **(4 Marks)**

(b) Express the Boolean function $F = xy + \overline{x}z$ in

i) Standard SOP form and

ii) Standard POS form. **(8 Marks)**

(c) i) Compare TTL, CMOS and ECL logic families.

ii) Explain what are positive and negative logics. **(8 Marks)**

3. (a) Simplify the following functions using K-map

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

ii) $f(w,x,y,z) = \pi(3,4,5,6,7,8,9,10)$ **(6+6=12 Marks)**

(b) Implement the following function using

i) NAND gates only

ii) NOR gates only

$f(x,y) = \overline{x}y + x\overline{y}$. **(8 Marks)**

4. (a) Simplify the following function using tabulation method. **(10 Marks)**

$f(w,x,y,z) = \sum(1,4,6,7,8,10,11,15)$

(b) Design the following combinational circuits

i) Full adder circuit

ii) Full subtracter circuit. **(10 Marks)**

Contd.... 2

5. (a) Design a 4-bit carry look ahead adder circuit. **(10 Marks)**

   (b) Design a 4-bit BCD to excess - 3 code converter circuit. **(10 Marks)**

6. (a) Design a 4 bit magnitude comparator circuit. **(10 Marks)**

   (b) Design a BCD to decimal decoder circuit using AND gates. **(10 Marks)**

7. (a) Explain programmable logic array with an example. **(10 Marks)**

   (b) Design a Mod-6 synchronous counter. **(10 Marks)**

8. (a) Explain a 4-bit bidirectional shift register with parallel load. **(10 Marks)**

   (b) Explain R/2R digital to analog converter circuit (DAC) and derive an expression for output voltage. What is the meaning of resolution? **(10 Marks)**

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MCA13

USN

NEW SCHEME

First Semester M.C.A. Degree Examination, Dec. 06/Jan. 07

Digital Electronics

Time: 3 hrs.] [Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Perform the following number conversions
i) $(4021)_5 = (\quad)_{10}$. iv) $(56)_{10} = (\quad)_2$
ii) $(AB2D)_{16} = (\quad)_{10}$. v) $(101\ 110\ 1011)_2 = (\quad)_8$
iii) $(305.C)_{16} = (\quad)_2$. **(10 Marks)**

b. i) Let M = $(101\ 011\ 00)_2$ and N = $(1001\ 00\ 11)_2$. Using s's complement method perform M – N. **(04 Marks)**
ii) Let M = 5260 and N = 380. Using 9's complement method performs M – N. **(06 Marks)**

c. Write notes on i) BCD code ii) Gray code.

2 a. Simplify the following Boolean functions to minimum number of literals.
i) $(x + y)(x + y')$ ii) $(A + B)'(A' + B')'$ **(04 Marks)**

b. Express the following function in sum of minterms
$F(w, x, y, z) = xy'z + wxy' + wxz' + w'x'z$. **(06 Marks)**

c. Explain the following terms with respect to digital IC families. **(10 Marks)**
i) Fan – out ii) Power dissipation iii) Propagation delay iv) Noise margin.

3 a. Using K – map, find the simplest form in SOP for the following Boolean function.
$F(A, B, C, D) = \sum (0, 1, 2, 3, 8, 10, 14)$
$d(A, B, C, D) = \sum (5, 6, 11, 15)$ **(06 Marks)**

b. i) Implement the Boolean function F = AB + CD + EF' using only NAND gates.
ii) Implement the Boolean function F = (A+B) (C+D)E, using only NOR gates. **(08 Marks)**

c. Design an odd parity generator circuit for three inputs. **(06 Marks)**

4 a. Simplify the following function using tabulation method .
$F(w, x, y, z) = \sum (0, 2, 3, 6, 7, 8, 9, 10, 13)$. **(10 Marks)**

b. Write the truth table of a full adder. Construct full adder using two half adders. **(10 Marks)**

5 a. Design a code converter to convert 2 4 2 1 code to 8- 4 -2 -1 code. **(10 Marks)**

b. Design a 4 – bit full adder with look-ahead carry. **(10 Marks)**

6 a. Design a comparator to compare two 4–bit binary numbers and explain its operations. **(10 Marks)**

b. Explain the working of multiplexers and implement the Boolean function
$F(A, B, C) = \sum (1, 3, 5, 6)$ using MUX. **(10 Marks)**

7 a. With a neat diagram, explain the working of master – slave flipflop. **(10 Marks)**

b. Design a BCD ripple counter using JK flipflop. **(10 Marks)**

8 a. Describe the operations of 4–bit shift register with parallel load. **(10 Marks)**

b. With neat sketch, explain the working of a digital ramp, Analog to digital converter. **(10 Marks)**

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NEW SCHEME

MCA13

USN

First Semester M.C.A Degree Examination, July/August 2003

Master of Computer Applications

(New Scheme)

Digital Electronics

Time: 3 hrs.] [Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) Convert the decimal number 250.5 to base 2, base 8, base 16. **(6 Marks)**

(b) Perform the subtraction with the binary numbers using 2's complement
i) 11010-11000 ii) 100-110000 **(6 Marks)**

(c) Write a note on :
i) Binary coded decimal ii) Reflected code. **(8 Marks)**

2. (a) Find the complement of the following Boolean functions and reduce them to a minimum number of literals.
i) $\overline{AB} + \overline{A} + AB$ ii) $\overline{A\overline{B} + ABC} + A(B + A\overline{B})$ **(8 Marks)**

(b) Express the Boolean function $F = A + B'C$ in a sum of minterms. **(4 Marks)**

(c) With a neat sketch, explain TTL NAND gate. **(8 Marks)**

3. (a) Minimize the following using K-map method
i) $f(A,B,C) = \sum(0,1,2,6)$
ii) $f(A,B,C,D) = \sum(0,13,14,15) + \phi(1,2,3,9,10,11)$

(b) Simplify the function given below using Quine McClusky procedure

$$f(W,X,Y,Z) = \sum(2,\ 3,\ 5,\ 7,\ 8,\ 9,\ 11,\ 13,\ 15)$$

(12 Marks)

4. (a) What is full adder? Give the expression for the carry and sum outputs. Draw the full adder circuit. **(12 Marks)**

(b) Design a 4 bit parallel adder and explain its operation. **(8 Marks)**

5. (a) Design a circuit that converts BCD to excess - 3 codes. **(10 Marks)**

(b) Write notes on : i) ROM ii) PLA. **(10 Marks)**

6. (a) Implement the following function with a multiplexer
$F(A,B,C,D) = \sum(0,1,3,4,8,9,15)$ **(10 Marks)**

(b) Draw the block diagram of a master slave JK flip-flop and explain its operation. **(10 Marks)**

7. (a) Design a synchronous BCD decade counter using JK flip-flops. **(10 Marks)**

(b) Explain digital to analog converter with a neat block diagram. **(10 Marks)**

8. (a) With the help of circuit diagram, explain the working of a counter ramp analog to digital converter. **(8 Marks)**

(b) Write a note on
i) Binary Ripple counter ii) Binary counter. **(12 Marks)**

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USN

MCA13

First Semester MCA Degree Examination, Dec. 07 / Jan. 08
Digital Electronics

Time: 3 hrs. Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. Convert the hexa decimal number BAAB to binary, octal and decimal number systems. (06 Marks)

b. Use 2's complement to perform M-N with the given binary numbers:
i) M = 1010100 N = 1000100
ii) M = 1000100 N = 1010100. (06 Marks)

c. Explain in detail:
i) Binary coded decimal
ii) Gray code. (08 Marks)

2 a. State and prove Demorgan's theorems. (06 Marks)

b. Simplify the expression $Z = AB + A\overline{B}\cdot\left(\overline{\overline{A}\,\overline{C}}\right)$. (04 Marks)

c. Simplify the following Boolean function by using the tabulation method:
$F = \sum(0,1,2,8,10,11,14,15)$. (10 Marks)

3 a. Convert the given expression in standard SOP form:
$Y = A + AB + ABC$ (05 Marks)

b. Convert the given expression in standard POS form:
$Y = A(A+B)(A+B+C)$. (05 Marks)

c. Design a code converter to convert a excess – 3 code to BCD code. (10 Marks)

4 a. Design a 4-bit parallel adder using full adders. Explain its operation. (08 Marks)

b. Simplify the following Boolean function by using a Quine - McCluskey method:
$F(A,B,C,D) = \sum m(0,2,3,6,7,8,10,12,13)$. (12 Marks)

5 a. Write notes on: i) ROM and ii) RAM. (10 Marks)

b. Design BCD to decimal decoder. (10 Marks)

6 a. Draw the circuit diagram of a master slave JK flip-flop. Explain its operation. (10 Marks)

b. Explain the following terms with respect to digital IC families:
i) Fan-out ii) Noise immunity iii) Fan-in iv) Propagation delay v) Power consumption. (10 Marks)

7 a. Explain different types of flip-flops along with their truth table. Also explain the race around condition in flip-flops. (10 Marks)

b. Design a Mod-6 synchronous counter. (10 Marks)

8 Write short notes any FOUR of the following:
a. Universal gates
b. 4-bit magnitude comparator
c. Error detection codes
d. Parity generators
e. Comparators. (20 Marks)

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MCA13

USN

NEW SCHEME

First Semester M.C.A. Degree Examination, July 2007

Digital Electronics

Time: 3 hrs.] [Max. Marks:100

Note : *Answer any FIVE full questions.*

1 a. i) Convert $(630.4)_8$ into decimal number.
ii) Convert $(320)_{10}$ into Hexadecimal number. (08 Marks)
b. Use 2's complement to perform M – N with the given binary numbers.
M = 1010100, N = 1000100 (04 Marks)
c. Write a note on error – detection code and reflected code. (08 Marks)

2 a. State and explain Demorgan's theorem. (08 Marks)
b. Explain Huntington's postulates. (06 Marks)
c. Simplify $X = \overline{\overline{A + B\overline{C} + D(\overline{E + \overline{F}})}}$ using Demorgan's theorem. (06 Marks)

3 a. Express the Boolean function F = A + B'C in a sum of min terms form. (10 Marks)
b. Simplify the Boolean function using map method.
$F(w, x, y, z) = \sum(1,3,7,11,15) + \sum d(0,2,5)$ (10 Marks)

4 a. Simplify the following Boolean function by using the tabulation method.
$F = \sum(0,1,2,8,10,11,14,15)$ (12 Marks)
b. Construct a full adder using only NAND gates. Write the tenth table of a basic full adder. (08 Marks)

5 a. Design a circuit that converts BCD to excess – 3 code converter circuit. (10 Marks)
b. What is a full subtractor? Give the truth table for full subtractor and obtain logical expression for difference and borrow outputs and implement using 2 half subtractor. (10 Marks)

6 a. Design a 4 – bit magnitude comparator circuit. (10 Marks)
b. Design a BCD to decimal decoder circuit using AND gates. (10 Marks)

7 a. What is a multiplexer? Design a 4-1 line multiplexer. (10 Marks)
b. Explain the working of a JK flip – flop. (10 Marks)

8 a. Explain R/2R digital to analog converter circuit (DAC) and derive an expression for o/p voltage. What is the meaning of resolution? (10 Marks)
b. Write short notes on :
i) Demultiplexer.
ii) EX – OR and Equivalence functions (10 Marks)

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