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NEW SCHEME

MCA13
Sri Jayas Institute of Technology
Library, Mangalore

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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 ASCII 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 x 4 = 20 Marks)
 - (a) Universal gates
 - (b) PLA
 - (c) Parallel adder
 - (d) Johnson counter

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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 i) 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 $f_3 = f_1 \cdot f_2$. (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)

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) $(\overline{x.y} + \overline{x.y.z}) + x.(y + x.\overline{y})$ (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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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 $F = xy + \bar{x}z$ 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

$$f(x, y) = \bar{x}y + x\bar{y}$$

(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)

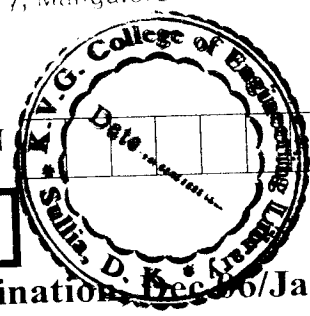
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Srinivas Institute of Technology
Library, Mangalore

H3



USN



MCA13

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) $(4021)_5 = (\quad)_{10}$.
 - ii) $(AB2D)_{16} = (\quad)_{10}$.
 - iii) $(305.C)_{16} = (\quad)_2$.
 - iv) $(56)_{10} = (\quad)_2$
 - v) $(101\ 110\ 1011)_2 = (\quad)_8$

(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. (06 Marks)
- 2 a. Simplify the following Boolean functions to minimum number of literals. (04 Marks)
 - i) $(x + y)(x + y')$
 - ii) $(A + B)'(A' + B')$
- b. Express the following function in sum of minterms (06 Marks)
 $F(w, x, y, z) = xy'z + wxy' + wxz' + w'x'z$.
- 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. (08 Marks)
- ii) Implement the Boolean function $F = (A+B)(C+D)E$, using only NOR gates. (06 Marks)
- c. Design an odd parity generator circuit for three inputs. (06 Marks)
- 4 a. Simplify the following function using tabulation method. (10 Marks)
 $F(w, x, y, z) = \sum (0, 2, 3, 6, 7, 8, 9, 10, 13)$.
- 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

Srinivas Institute of Technology
Library, Mangalore

USN

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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) AB + A + AB ii) AB + ABC + A(B + AB) (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)

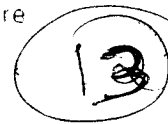
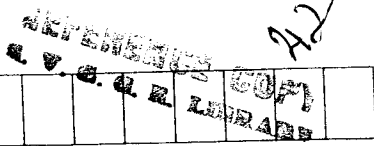
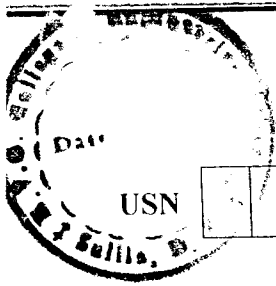
- 6. (a) Implement the following function with a multiplexer
F(A, B, C, D) = sum(0, 1, 3, 4, 8, 9, 15) (10 Marks)
(b) Draw the block diagram of a master slave JK flip-flop and explain its operation. (10 Marks)

- 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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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 (08 Marks)
 - ii) Gray code. (06 Marks)
- 2 a. State and prove Demorgan's theorems. (06 Marks)
- b. Simplify the expression $Z = AB + \overline{A}\overline{B} \cdot (\overline{A}\overline{C})$. (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)



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. (08 Marks)
ii) Convert $(320)_{10}$ into Hexadecimal number. (04 Marks)
b. Use 2's complement to perform $M - N$ with the given binary numbers.
 $M = 1010100, N = 1000100$ (08 Marks)
c. Write a note on error - detection code and reflected code. (06 Marks)
- 2 a. State and explain Demorgan's theorem. (08 Marks)
b. Explain Huntington's postulates. (06 Marks)
c. Simplify $X = \overline{A + BC + D(E + F)}$ 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 truth 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. (10 Marks)
ii) EX - OR and Equivalence functions