NRT/KS/19/2230

Bachelor of Computer Application (B.C.A.) Semester—III Examination

DIGITAL ELECTRONICS—I

Paper—VI

Time : Three Hours] [Maximum Marks : 50

N.B. :— (1) All questions are compulsory and carry equal marks.
(2) Draw neat and well labelled diagrams wherever necessary.

EITHER

1. (a) What is base or radix of number system ? Explain hexadecimal number system with examples. 5

(b) Do as directed :

(i) $(1FA2)_{16} = (?)_2$

(ii) $(341)_8 = (?)_{16}$. 5

OR

(c) What is Excess-3 Code ? What are its advantages ? Perform the following addition using Excess-3 Code :

41 + 38 5

(d) What is Parity ? What are its types ? Explain how it can be used for error checking. 5

EITHER

2. (a) Explain how negative numbers are represented in binary with suitable example. 5

(b) Perform the following subtraction using 1's complement method :

(i) $(10101)_2 - (10010)_2$

(ii) $(10110) - (1111)_2$. 5

OR

(c) What do you mean by underflow and overflow ? Explain it with example. 5

(d) What is 2's complement of a number ? Perform the following subtraction using 2's complement method :

$(11000)_2 - (11100)_2$. 5

EITHER

3. (a) Explain NAND gate and NOR gate using logic symbol and truth table. 5

(b) Explain the construction and working of Ex-OR gate using basic gate. Give its logical symbol also. 5

OR

(c) Construct the following gate using NOR gate exclusively :

(i) AND

(ii) OR

(iii) Ex-NOR. 5

(d) What is positive and negative logic ? Explain AND gate and OR gate and give their symbol and logical expression. 5

EITHER

4. (a) State and prove :

(i) Associative law

(ii) Distributive law. 5

(b) What is K-map ? Simplify the following equation using K-map :

$f(A, B, C) = \Sigma m\ (1, 4, 5, 6)$. 5

OR

(c) State and prove the De-Morgan's theorem for three variables. 5

(d) Simplify the following expression using K-map and draw the logical circuit for the simplified expression :

$f(A, B, C, D) = A\overline{B}CD + \overline{A}\,\overline{B}CD + ABCD + A\overline{B}\,\overline{C}D + \overline{A}\,\overline{B}\,\overline{C}D + \overline{A}\,\overline{B}\,\overline{C}\,\overline{D}$. 5

5. (a) Write a short note on ASCII code. 2½

(b) Perform the following addition :

$(101110)_2 + (1111)_2$ 2½

(c) Give the logic symbol, truth table and logical expression for 2 input Ex-NOR gate. 2½

(d) Explain the following terms related to K-map :

(i) SOP

(ii) Quad. 2½

Bachelor of Computer Application (B.C.A.) Semester-III (C.B.S.) Examination

DIGITAL ELECTRONICS–I

Paper—VI

Time : Three Hours] [Maximum Marks : 50

N.B. :— (1) All questions are compulsory and carry equal marks.
(2) Draw a well labelled diagram wherever necessary.

EITHER

1. (a) What is number system ? Explain binary, octal and hexadecimal number system with example. 5

(b) Do as directed :

(i) $(134F)_{16} = (?)_2$

(ii) $(3467)_8 = (?)_{10}$ 5

OR

(c) What is parity ? What are its types ? What are its advantages ? 5

(d) What is Excess-3 code ? Perform the following addition using excess-3 code :

(i) 22 + 44

(ii) 36 + 41. 5

EITHER

2. (a) How are positive and negative numbers separated in binary ? Explain with example. 5

(b) What is 1's complement of a number ? Perform the following subtraction using 1's complement method :

$(10110)_2 - (1011)_2$ 5

OR

(c) What are the different rules for binary addition ? Perform the following binary addition :

(i) $(1010)_2 + (111)_2$

(ii) $(1111)_2 + (1000)_2$ 5

(d) Explain the following with example :

(i) Underflow of data

(ii) Range of data

(iii) Overflow of data. 5

EITHER

3. (a) Explain AND, OR and NOT gate with their truth table. 5

(b) Explain how NOR gate can be used to construct :

(i) AND gate

(ii) OR gate

(iiii) NOT gate. 5

OR

(c) Explain the construction and working of Ex-OR gate using basic gates. 5

(d) Why NAND gate is called universal gate ? Explain. 5

EITHER

4. (a) State and prove De-Morgon's theorem with truth table. 5

(b) What is K-map ? Explain the following terms related to K-map :

(i) SOP

(ii) POS

(iii) Quad

(iv) Octate

(v) Pair. 5

OR

(c) State and prove :

(i) AND law

(ii) OR law

(iii) NOT law. 5

(d) Simplify the following equation using K-map :

$Y = \sum m\ (0, 2, 4, 6, 9, 11, 13)$

draw the logic diagram for simplified equation. 5

5. Attempt all :

(a) What is ASCII code ? What are its advantages ? 2½

(b) Find the 2's complement of :

(i) $(1000)_2$

(ii) $(1111)_2$ 2½

(c) Draw the logic diagram of Ex-NOR gate and give its truth table. 2½

(d) Prove :

$(A + \bar{A}\, B) = (A + B)$ 2½

TKN/KS/16 – 5974

Third Semester B. C. A. Examination

DIGITAL ELECTRONICS–I

Paper - VI

Time : Three Hours] [Max. Marks : 50

N. B. : (1) All questions are compulsory and carry equal marks.
(2) Draw diagrams wherever necessary.

EITHER

1. (a) What is a number system ? Explain hexadecimal number with suitable example. What are its advantages over other number system. 5

(b) Do as directed :—

(i) $(10010)_2 = (?)_{10}$

(ii) $(3478)_{10} = (?)_8$

(iii) $(217)_8 = (?)_2$ 5

OR

(c) What is Excess–3 code ? What are its advantages? Perform the following addition using excess–3 code,

(i) 27 + 13 (ii) 49 + 18 5

(d) Explain ASCII and EBCDIC codes in brief. 5

EITHER

2. (a) How positive and negative numbers are represented in binary ? Explain it with suitable example. What will be maximum and minimum value of 8 bit binary number ? 5

(b) Explain the following terms related to numbers:—

(i) Under flow.

(ii) Over flow.

(iii) Range.

(iv) Accuracy. 5

OR

(c) Do as directed :—

(i) $(10101.10)_2 + (1111.01)_2$

(ii) $(10111)_2 - (1101)_2$

(iii) $(1000)_2 - (1111)_2$ 5

(d) What is 1's and 2's compliment of a number ? perform the following subtraction using 2's compliment method.

(i) $(1101)_2 - (1000)_2$

(ii) $(111)_2 - (1000)_2$ 5

EITHER

3. (a) What is logic gate ? Explain all basic gates with their truth table. 5

(b) Construct the following gates using NAND gate exclusively :—

(i) NOT (ii) AND

(iii) OR (iv) Ex–OR

(v) NOR 5

OR

(c) What is Ex–OR gate ? Explain construction and working of Ex–OR gate using basic gates. 5

(d) Explain how NOR gate exclusively can be used for construction of other gates. 5

EITHER

4. (a) State and prove De–Morgans theorem for three variables using truth table. 5

(b) What is k–map ? What are its advantages ? Simplify the following expression using k–map

$f(A, B, C, D) = \Sigma m(0, 1, 4, 5, 7, 10, 12, 13)$ 5

OR

(c) State and prove :—

(i) Laws of Associative.

(ii) Laws of distributive.

(iii) Commutative law. 5

(d) Explain the following terms related to k–map:

(i) SOP (ii) POS

(iii) Pair (iv) Quad

(v) Octate 5

5. (a) What is parity codes ? Explain. $2\frac{1}{2}$

(b) Perform the following subtraction using 1's complement method :

$(101111)_2 - (111111)_2$ $2\frac{1}{2}$

(c) What is gates universal. $2\frac{1}{2}$

(d) Simplify the following expression using k–map

$f(x, y, z) = \bar{x}\bar{y}z + z\bar{y}z + x\bar{y}\bar{z} + xyz$ $2\frac{1}{2}$

NKT/KS/17/5263

Bachelor of Computer Application (B.C.A.) Semester–III (C.B.S.) Examination

DIGITAL ELECTRONICS–I

Paper–VI

Time : Three Hours] [Maximum Marks : 50

N.B. :— (1) **ALL** questions are compulsory and carry equal marks.

(2) Draw neat and labelled diagrams wherever necessary.

EITHER

1. (A) Do as directed :

(i) $(1011)_2 = (\quad)_{10}$

(ii) $(ABC)_{16} = (\quad)_8$ 5

(B) Explain the method of converting a decimal number into its binary equivalent with suitable example. 5

OR

(C) Explain the method of converting a binary number into gray code. 5

(D) Explain BCD code. 5

EITHER

2. (A) How are real numbers represented ? Explain. 5

(B) What is overflow and underflow ? Explain. 5

OR

(C) Explain the method of 2's complement method of subtraction. 5

(D) How are negative numbers represented ? Explain. 5

EITHER

3. (A) Why is NOR gate called as universal building block ? 5

(B) Draw logic diagram of construction of all basic gates using only NAND gates. 5

OR

(C) Draw logic diagram of EX-OR gate. Explain the construction of EX-OR gate using basic gates with truth table. 5

(D) Draw the logic diagram and truth tables of basic gates. 5

EITHER

4. (A) State and prove De-Morgan's theorem. 5

(B) What is Duality Theorem ? Explain. 5

OR

(C) What is k-map ? What are advantages and disadvantages of k-map ? 5

(D) Explain :

(i) Pair

(ii) Quad

(iii) Octate

with reference to k-map. 5

5. Attempt **ALL** :

(A) Explain ASCII code. 2½

(B) How are positive numbers represented ? Explain. 2½

(C) Construct EX-OR and EX-NOR gates using only NAND gates. 2½

(D) Reduce the following equation using k-map :

$F(A,B,C) = \Sigma m(1,4,5,6)$. 2½

Bachelor of Computer Application (B.C.A.) Semester-III (C.B.S.) Examination

DIGITAL ELECTRONICS–I

Paper—VI

Time : Three Hours] [Maximum Marks : 50

N.B. :— (1) All questions are compulsory and carry equal marks.
(2) Draw a well labelled diagram wherever necessary.

EITHER

1. (a) What is number system ? Explain binary, octal and hexadecimal number system with example. 5

(b) Do as directed :

(i) $(134F)_{16} = (?)_2$

(ii) $(3467)_8 = (?)_{10}$ 5

OR

(c) What is parity ? What are its types ? What are its advantages ? 5

(d) What is Excess-3 code ? Perform the following addition using excess-3 code :

(i) 22 + 44

(ii) 36 + 41. 5

EITHER

2. (a) How are positive and negative numbers separated in binary ? Explain with example. 5

(b) What is 1's complement of a number ? Perform the following subtraction using 1's complement method :

$(10110)_2 - (1011)_2$ 5

OR

(c) What are the different rules for binary addition ? Perform the following binary addition :

(i) $(1010)_2 + (111)_2$

(ii) $(1111)_2 + (1000)_2$ 5

(d) Explain the following with example :

(i) Underflow of data

(ii) Range of data

(iii) Overflow of data. 5

EITHER

3. (a) Explain AND, OR and NOT gate with their truth table. 5

(b) Explain how NOR gate can be used to construct :

(i) AND gate

(ii) OR gate

(iiii) NOT gate. 5

OR

(c) Explain the construction and working of Ex-OR gate using basic gates. 5

(d) Why NAND gate is called universal gate ? Explain. 5

EITHER

4. (a) State and prove De-Morgon's theorem with truth table. 5

(b) What is K-map ? Explain the following terms related to K-map :

(i) SOP

(ii) POS

(iii) Quad

(iv) Octate

(v) Pair. 5

OR

(c) State and prove :

(i) AND law

(ii) OR law

(iii) NOT law. 5

(d) Simplify the following equation using K-map :

$Y = \sum m\ (0, 2, 4, 6, 9, 11, 13)$

draw the logic diagram for simplified equation. 5

5. Attempt all :

(a) What is ASCII code ? What are its advantages ? 2½

(b) Find the 2's complement of :

(i) $(1000)_2$

(ii) $(1111)_2$ 2½

(c) Draw the logic diagram of Ex-NOR gate and give its truth table. 2½

(d) Prove :

$(A + \bar{A}\, B) = (A + B)$ 2½

KNT/KW/16/5263

Bachelor of Computer Application (B.C.A.) Semester—III (C.B.S.) Examination

DIGITAL ELECTRONICS—I

Paper—VI

Time : Three Hours] [Full Marks : 50

Note :— (1) **ALL** questions are compulsory and carry equal marks.

(2) Draw well labelled diagram wherever necessary.

EITHER

1. (a) What is hexadecimal number system ? What are its advantages ? 5

(b) Is there a direct method of conversion of octal to hexadecimal number ? Justify your answer with an example. 5

OR

(c) What is parity code ? State its types. Explain how parity code uses for error detection. 5

(d) What is gray code ? What are its characteristics ? 5

EITHER

2. (a) Perform the following binary subtraction using 1's complement method :

(i) $(11011)_2 - (100011)_2$

(ii) $(10010)_2 - (1110)_2$. 5

(b) Explain real number representation with an example. Explain what is its range and accuracy. 5

OR

(c) Explain how negative numbers are represented in binary with suitable example. 5

(d) Do as directed :

(i) $(11100)_2 + (1110)_2$

(ii) $(101010)_2 - (1111)_2$. 5

EITHER

3. (a) What are universal gates ? Explain how different logic gates are constructed using NAND gate. 5

(b) What are the fundamental gates ? Explain it with logic equation and truth table. 5

OR

(c) What is EX-NOR gate ? Explain it with truth table, logic equation any symbol. 5

(d) What are logic gates ? Explain different logics used in digital system. 5

EITHER

4. (a) Given the logical equation

$$y = \overline{(BC + A)}\,(\overline{C}A + B)$$

Design a circuit using gates to realize this function. 5

(b) Using Boolean algebra show that :

(i) $(A + B\overline{A} + \overline{B}A) = A + B$

(ii) $(A + B).A = A.$ 5

OR

(c) Simplify the following using De Morgan's theorem :

(i) $y = \overline{(A + B)(A + \overline{C})(\overline{B + C})}$

(ii) $y = \overline{(\overline{A - B} + C)} + \overline{(A + B)}$. 5

(d) Explain the SOP and POS with examples. Obtain the equation in SOP form using K-map of the following equation :

$$A\,B\,\overline{C} + A\,\overline{B}\,C + A\,\overline{B}\,\overline{C} + \overline{A}\,\overline{B}\,C.$$ 5

5. Attempt **ALL** :—

(a) What is Excess-3 code ? Explain its use with suitable example. 2½

(b) What do you mean by complements of numbers ? Explain 2's complement method. 2½

(c) With the help of a suitable circuit explain the difference between EX-OR and EX-NOR gate. 2½

(d) State the laws and identities of Boolean algebra. 2½

Bachelor of Computer Application (B.C.A.) Semester—III (C.B.S.) Examination

DIGITAL ELECTRONICS—I

Paper—VI

Time : Three Hours] [Maximum Marks : 50

N.B. :— (1) **All** questions are compulsory and carry equal marks.
(2) Draw neat and labelled diagrams wherever necessary.

EITHER

1. (A) Explain how binary numbers can be converted to their decimal equivalent with examples. 5
(B) Do as directed :
(i) $(12)_8 \Leftrightarrow (?)_2$
(ii) $(12)_{10} \Leftrightarrow (?)_8$. 5

OR

(C) Explain interconversion of binary and gray code. 5
(D) Explain BCD and Excess 3 Codes. 5

EITHER

2. (A) Explain with example how negative integers are represented. 5
(B) Explain subtraction of binary nos. using 2's complement methods with suitable examples. 5

OR

(C) Explain representation of real nos. in memory. 5
(D) Explain the following :
(i) Underflow
(ii) Overflow. 5

EITHER

3. (A) Explain basic logic gates with their symbol, logic equation and truth table. 5
(B) Explain how AND, OR and NOT gates can be designed using NOR gates. 5

OR

(C) What is universal gate ? Prove that NAND gate is universal. 5
(D) Explain Ex-OR and EX-NOR gates with logic diagrams. 5

EITHER

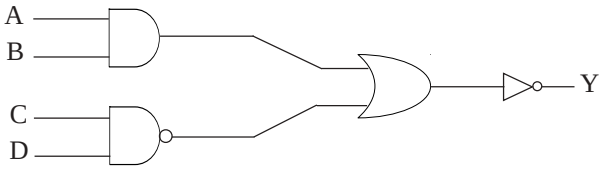
4. (A) Explain how POS and SOP equations can be converted to standard POS and standard SOP with suitable example of each. 5
(B) Explain formation of pairs, quads and octates in four variable K-map. 5

OR

(C) State and prove DeMorgan's theorems. 5
(D) Minimize the following function using K-map and draw the logic circuit for reduced equation :

$$f(A, B, C, D) = \sum m\,(0, 1, 5, 7, 8, 9, 13, 15)$$ 5

5. Attempt **all** :
(i) Explain ASCII and EBCDIC Codes. 2½
(ii) Perform the following :
$(1101)_2 - (11)_2 = (?)_2$. 2½
(iii) Write the logic equation for y :



2½

(iv) Prove that $(A + B)(A + \overline{B}) = A$. 2½

Bachelor of Computer Application (B.C.A.) Semester–III Examination

DIGITAL ELECTRONICS–I

Paper–VI

Time : Three Hours] [Maximum Marks : 50

Note :— (1) All questions are compulsory and carry equal marks.
(2) Draw neat and labelled diagram wherever necessary.

EITHER

1. (a) Explain double-dabble method with suitable examples. 5
   (b) Solve the following :
   (i) $(C7\ D8)_{16} = (?)_{10}$ (ii) $(21.6)_{10} = (?)_2$ 5

OR

   (c) Write a short note on alphanumeric code. 5
   (d) What is Excess-3 code ? Perform the following addition using excess-3 code :
   (i) 11 + 22 (ii) 36 + 41 5

EITHER

2. (a) How are real numbers represented ? Explain. 5
   (b) Explain the various methods to represent a negative perform the following subtraction using 1'S complement method :
   $(10111)_2 - (101)_2$ 5

OR

   (c) Explain Binary subtraction by 2'S complement method with suitable examples. 5
   (d) Explain the following with examples :
   (i) Underflow of data
   (ii) Range of data
   (iii) Mantissa of data. 5

EITHER

3. (a) Why NAND and NOR gates are called universal building blocks ? Explain with logic diagram. 5
   (b) Explain AND, OR and NOT gate with their truth table and logic symbol. 5

OR

   (c) Explain the construction and working of EX-NOR gate using basic gates. 5
   (d) Differentiate between basic gates and universal building blocks. 5

EITHER

4. (a) State and prove De-Morgen's theorem. 5
   (b) Prove the following identities using Boolean laws :
   (i) (A+B) (A+C) = A+BC (ii) $A + \overline{A}.B = A + B$ 5

OR

   (c) What is K-map ? What are advantages and disadvantages of K-map ? 5
   (d) Explain the terms :
   (i) Sum of product
   (ii) Product of sum with reference to K-map with example. 5

5. (a) Convert the Hexadecimal number $(57\ B.8)V_{16}$ into equivalent binary number. 2½
   (b) How are positive numbers represented ? Explain. 2½
   (c) Draw the logic diagram of EX-OR gate and give its truth table. 2½
   (d) Prove that :
   $(A + B)(A + \overline{B})(\overline{A} + C) = AC$ 2½