KNT/KW/16/5060

Bachelor of Science (B.Sc.) Semester—I (C.B.S.) Examination

ELECTRONICS (Fundamentals of Digital Electronics)

Compulsory Paper—2

Time : Three Hours] [Maximum Marks : 50

N.B. :—All questions are compulsory and carry equal marks.

EITHER

1. (A) Define the following :—

(1) Base of a number system

(2) Weight of a digit.

How is negative number represented using 1's and 2's complement methods. Give examples. Perform the following subtraction using 2's complement method :

$(67)_{10} - (47)_8$ in 8 bit pattern. 2+4+4

OR

(B) What is excess-3 code ? Why excess-3 code is called a self complementary code ? Add the following decimal numbers by first converting them to excess-3 form :

(1) 3 and 3

(2) 15 and 53

(3) 62 and 28 1+3+6

EITHER

2. (A) Explain the use of NAND and NOR gates as universal building blocks. State and prove the Morgan's theorems. What are its circuit implications ? 5+5

OR

(B) What is a logic gate ? Explain the basic logic gates with truth table and logic symbol. State Duality theorem of Boolean Algebra. Give one example. Prove using Boolean laws $A + \overline{B}C = (A + \overline{B})(A + C)$. 1+3+3+3

EITHER

3. (A) What is k-map ? Explain various terms related to k-map. What are its advantages ? Explain the SOP and POS terms in k-map with examples. 1+3+2+4

OR

(B) Simplify the following logic functions using k-map. Draw the logic diagram for simplified equation :

f (A, B, C, D) = Σm (1, 3, 5, 7, 8, 9, 10, 11, 14, 15)

f (A, B, C, D) = Σm (0, 1, 2, 3, 5, 7, 8, 9, 11, 14). 5+5

EITHER

4. (A) What are the decoder and encoder ? Draw the block diagram of 3 : 8 line decoder and explain its working. Explain decimal to BCD Encoder with the help of logic diagram. 2+3+5=10

OR

(B) Give the truth table and logic diagram of a full adder and explain its working. What is multiplexer ? Construct 8 : 1 MUX using 4 : 1 MUX and explain. 5+5

5. Solve any **TEN** :—

(A) Convert $(ABC)_{16}$ = (————)$_2$

(B) Find 2's complement of $(1010, 1111)_2$.

(C) Convert $(1001)_2$ = (———)$_{gray}$.

(D) Draw the truth table of NOR gate.

(E) What is the dual of (A + 1) = 1 ?

(F) Construct XOR gate using only NOR gates.

(G) What do you mean by min term ?

(H) How many variables are eliminated in a quad ?

(I) Find the SOP of the equation :

$Y = (A + BC) \cdot (A + \overline{C}\,A)$.

(J) Define combinational logic.

(K) Draw half adder circuit using basic gates.

(L) What is an encoder ? 10×1=10