Bachelor of Science (B.Sc.) Semester—I Examination
ELECTRONICS (Fundamentals of Digital Electronics)
Optional Paper—2

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) Do as directed :
(i) $(1010)_2 = (\ )_8$
(ii) $(60)_{10} = (\ )_{16}$
(iii) $(1234)_{10} = (\ )_{BCD}$.
Explain how negative integers are represented using 2's complement number representation. Explain BCD and gray code. 3+4+3

OR

(B) Explain the difference between weighted and non-weighted code. Give two examples of each. Explain any one weighted and non-weighted code in detail. Give their limitation and advantages. Why Excess-3 code is called as self complementary code ? 2+6+2

EITHER

2. (A) Draw the symbol and truth table of XOR gate using basic logic gates. Explain why NOR and NAND gates are called universal building blocks. 3+7

OR

(B) State and prove DeMorgan's theorems. Draw their logic diagrams. Simplify the following equation using Boolean laws :
(i) $Y = ABC + B\overline{C}D + \overline{A}BC$
(ii) Prove : $AB + AC + B\overline{C} = AC + B\overline{C}$
(iii) Prove : $A + \overline{A}B = A + B$. 4+6

EITHER

3. (A) Explain what are standard SOP and POS form of Boolean equation with examples. Design binary to gray code converting using K-map. 4+6

OR

(B) Define Quad, pair and octet. Simplify using K-maps $F(ABCD) = \Sigma m\ (0, 3, 5, 6, 9, 10, 12, 15)$. Plot K-map and write simplified equation. 3+7

EITHER

4. (A) With logic diagram and truth table. Explain the working of :
(i) Full Adder
(ii) Full Substractor. 5+5

OR

(B) Draw the logic diagram and explain the working of 4 : 1 multiplexer using logic gates. Draw the circuit diagram and explain the working of even parity generator. 5+5

5. Solve any ***ten*** :
(A) Write gray code for decimal 9.
(B) Why binary number system is used in the working of computer ?
(C) Write the 2's complement of $(1010)_2$.
(D) Draw the pin diagram of IC 7400.
(E) State the Duality theorem.
(F) Using truth table prove the relation $A \oplus B = \overline{A} \oplus \overline{B}$.
(G) How many variables are elimated in a octet of K map ?
(H) Give the truth table of XNOR gate.
(I) What is POS ?
(J) What is encoder ?
(K) Define odd parity generator.
(L) Write the limitation of half adder. 1×10