# 2019

## DIGITAL ELECTRONICS

PAPER – 1104

*Full Marks* : 100

*Time* : 3 hours

Answer **Q.No. 1** and any **four** from the rest

*The figures in the right-hand margin indicate marks*

*Candidates are required to give their answers in their own words as far as practicable*

*Illustrate the answers wherever necessary*

1. Answer any *five* questions : 2 × 5

   (*a*) State De Morgan's theorem.

   (*b*) What is combinational circuit ? Give example.

   (*c*) Define min term and max term.

(*d*) Define latch.

(*e*) Compare EEPROM and flash memory.

(*f*) Define shift register.

(*g*) Convert B64.53 to binary.

(*h*) Define the term propagation delay and hold time.

**2.** (*a*) Simplify the following expression using k-map method

$$F(w,x,y,z) = \sum_m (7,9,10,11,12) + \sum_d (2,4)$$

(*b*) Implement a full adder using NAND gates only and explain the working procedures using truth table. 8 + 7

**3.** (*a*) What is decoder ? Design a 3 to 8 line decoder and explain its operation with a truth table.

(*b*) What is the difference between Fan-in and Fan-out ?

(*c*) Design a 8 : 1 MUX using two 4 : 1 MUX and any gates (if required). 8 + 3 + 4

**4.** (*a*) What is digital comparator circuit ?

(*b*) Design a 2 bit comparator circuit and explain its operation.

(*c*) Implement the expression using a multiplexer

$$f(A,B,C,D) = \sum_m (0,2,3,6,8,9,12,14)$$

2 + 8 + 5

**5.** (*a*) Explain full adder with truth table and logic circuit.

(*b*) Subtract $(29)_{10} - (7)_{10}$ using 2's complement method.

(*c*) What is BCD addition connection ? Perform BCD addition of 1001 and 0111. 5 + 5 + 5

**6.** (*a*) What is flip-flop ?

(*b*) What do you mean by race condition in a *flip-flop* ?

(*c*) Design a JK master slave flip-flop and explain its operation.

(*d*) Express the function $Y = A + \overline{BC}$ in a canonical SOP form. 2 + 2 + 8 + 3

7. Write short notes on any *three* of the following : 5 × 3

(*i*) Shift register

(*ii*) MOD-10 counter

(*iii*) Seven segment display

(*iv*) Edge triggering in a flip-flop

(*v*) BCD addition.

[ *Internal Assessment* : 30 Marks]