MCA 1st Semester Examination, 2019

MCA

PAPER – MCA-103

Full Marks : 100

Time : 3 hours

Answer any **seven** questions

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. (*a*) Add the following two BCD numbers :

$(1000\ 0101)_{BCD}$ and $(0110\ 1000)_{BCD}$.

(*b*) State De Morgan's law and distributive law.

(*c*) Prove $\overline{(\bar{A}+B+\bar{C})\cdot(\bar{A}+B+C)}$
$= A\bar{B}C + A\bar{B}\bar{C}$

(*d*) Draw the circuit diagram for the boolean expression :
$Y = AB + C(A + B)$

(*e*) Convert hexadecimal number $(A\ 7\ B\ 5)_{16}$ to its octal equivalent. 2 + 2 + 2 + 2 + 2

2. (*a*) Simplify $F(W,X,Y,Z) = \Sigma m(1, 2, 3, 5, 7, 8, 9, 10, 12, 13)$ using k-map in SOP form.

(*b*) Find all prime implicants and essential prime implicants for $F(W,X,Y,Z) = \Sigma m(0, 4, 5, 10, 11, 13, 15)$ 5 + 5

3. (*a*) What is the difference between combinational and sequential circuit ?

(*b*) Design a full adder using a decoder and two OR gates.

(*c*) What is the advantage of Look ahead carry adder ? 3 + 5 + 2

4. (*a*) What is parity checker ?

(*b*) Design a 8-bit odd parity generator ?

(*c*) What is the application of parity checker and generator ? 2 + 5 + 3

5. (*a*) What is multiplexer ?

(*b*) Design a 32 : 1 multiplexer using two 16 : 1 multiplexers and a OR gate.

(*c*) What are the functions of decoder and encoder ? 2 + 5 + 3

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

(*b*) Compare between edge triggering and level clocking.

(*c*) Explain J-K master slave flip-flop with proper diagram. 2 + 2 + 6

7. (*a*) Explain the terms : Propagation delay set-up time and hold time.

(*b*) Explain D-flip-flop with diagram. 6 + 4

8. (*a*) What is synchronous counter ?

(*b*) What is the basic difference of it from asynchronous counter ?

(*c*) Explain MOD-10 counter with circuit diagram. 2 + 2 + 6

9. (*a*) What is register ?

(*b*) Design and explain a 4-bit shift register with circuit diagram.

(*c*) What is race condition of a flip-flop ? 2 + 6 + 2

[*Internal Assessment*—30 Marks]