I Semester M.C.A. Degree Examination, January 2017
(CBCS)
COMPUTER SCIENCE
MCA 103T : Digital Electronics and Microprocessor

Time : 3 Hours
Max. Marks : 70

Instruction: Answer any five questions from Section – A and answer any four full questions from Section – B.

SECTION – A

(5x6 = 30)

1. a) Convert (345.765)10 to binary, octal and hexadecimal number system. (3+3)
   b) Subtract 10111 from 11000 using 2’s complement method.

2. a) Simplify the expression \( f(A, B, C) = \overline{ABC} + \overline{A} \overline{B} + BC \) and draw the logic diagram for the simplified expression. (3+3)
   b) State Demorgan’s theorem and prove any one.

3. Express the Boolean expression \( f(x, y, z) = x + yz \) in SOP and POS form and write its minterm designation form.

4. Simplify the following function using K-map technique
   \( f(A, B, C, D) = \Sigma m(0, 1, 2, 3, 7, 8, 9, 10, 14) \) and draw the logic diagram for the simplified expression.

5. Define combinational logic circuit. With relevant truth table and expression show the implementation of full adder.

6. With a neat circuit diagram and truth table briefly explain the working of clocked T flipflop. Write its characteristic equation and excitation table.

7. Design mod 8 synchronous counter using D flipflop.

8. What is shift register? Explain various types of shift register.

P.T.O.
SECTION - B

9. a) Explain instruction queue and general purpose registers of 8085. (8+2)
b) What is the memory addressing capability and maximum size of data segment memory?

10. a) Briefly explain MIN/MAX mode of operation of 8086. (4+6)
b) Explain instruction template of 8086 with suitable example template.

11. Explain the function of following pins of 8086.
   i) ALE
   ii) DEN
   iii) HOLD
   iv) M/IO
   v) BHE

12. a) Explain memory addressing modes of 8086 with suitable example. (5+5)
b) Write an assembly language program to multiply 8 bit number with 16 bit number.

13. Explain the following instructions of 8086.
   i) MOV DL, CL
   ii) SUB BX, DX
   iii) CWD (ax & bx)
   iv) OR CL, [BX + SI]
   v) JNB 8 bit

14. Explain hardware interrupts of 8086 in detail. Also explain how 8086 responds to occurrence of interrupt.
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Instruction : Answer any five questions from Part – A and four questions from Part – B.

PART – A

1. a) Simplify the Boolean function $F(A, B, C)$ in SOP using don’t care condition $F = B + AC$.  
   b) Perform 2’s complement for 101010.  

2. Define:
   i) BCD Numbers
   ii) Demorgan’s theorem.
   iii) NAND Gate.  

3. Construct full-adder from half-adder along with truth tables.  

4. Explain various basic logic gates with truth table.  

5. Explain with the functional block diagram, the architecture of 8085 microprocessor.  

6. Explain the use of stack in the microprocessor based system with examples.  

7. Write short notes on
   a) I/O port addressing.
   b) Bus buffering.  

8. Explain:
   i) CBW
   ii) CMPS
   iii) RET
   iv) JCXZ
   v) Set/reset flags
   vi) Test.
PART – B

9. i) Convert \((98.625)_{10}\) to its equivalent Hexa decimal number.  
   ii) Convert \((C.D.E8)_{16}\) to its equivalent binary number.  
   iii) Explain 3-variable k-map.

10. i) Draw the circuit of D-flip-flop and discuss its working.  
      ii) Describe the importance of combinational logic circuits.

11. i) Describe the programming model of 8086 along with registers.  
      ii) Explain MIN/MAX mode of operations in microprocessor.

12. Explain the following instructions in 8086:
    i) Data transfer instructions  
    ii) PUSH, POP and exchange

13. i) The 8 databytes are stored from memory location E00H to E07H. Write
      8086 ALP to transfer the block of data to new location B001H to B006H.  
      ii) Compare microprocessors and microcomputers.

14. i) Define interrupt. Explain the priorities of interrupts.  
      ii) Compare and contrast between subroutine and macros.