Third Semester B. E. (Computer Science Engg.) (CSE) (CBS) Examination

DIGITAL CIRCUITS AND FUNDAMENTAL OF MICROPROCESSOR

Time : Three Hours] [Max. Marks : 80

N. B. : (1) All questions carry marks as indicated.
(2) Assume suitable data wherever necessary.
(3) Illustrate your answers wherever necessary with the help of neat sketches.

1. (a) State and prove the De–Morgan's theorem. 4

(b) Simplify the following function using k–map and realize using NOR gates.

$f(P, Q, R, S) = \sum m(0, 1, 3, 8, 10, 13, 14) + d(9, 16, 17, 24, 31)$

$f(A, B, C, D) = \pi M (0, 1, 3, 8, 9, 17, 19, 24) + d(13, 14, 16, 31)$. 10

OR

2. (a) Perform the following operations :—

(i) $(A12C)_H \longrightarrow (\quad)_8$

(ii) $(146.24)_D \longrightarrow (\quad)_B$

(iii) $(11010110111010)_B \longrightarrow (\quad)_H$

(iv) $(10110110101)_B \longrightarrow (\quad)_G$

(v) $(179\ A)_H \longrightarrow (\quad)_{BCD}$. 10

(b) Simplify the following function using Boolean algebra and implement by using gates.

$$f(w, x, y, z) = \bar{w}yz + x\bar{y}\bar{z} + \overline{xyz} + w\bar{x}y\bar{z}$$ 4

3. (a) Design 4 bit carry look ahead adder and explain. Also give its advantages and disadvantages. 7

(b) Design the full Adder with half adders and explain in detail. 6

OR

4. (a) Design a BCD to Excess–3 code converter circuit and explain it. 7

(b) Implement the following using 3:8 decoder circuit.

(i) $f_1(A, B, C) = \sum m(0, 3, 2, 4)$

(ii) $f_2(A, B, C) = \pi M(1, 2, 5, 6)$. 6

5. (a) Draw and explain J–K flip flop using NAND gates. 6

(b) What is race around condition ? How is race around condition eliminated by using Master slave JK flip–flop ? 5

(c) What do you mean by sequential circuits. 3

OR

6. (a) Write a note on triggering methods for flip–flops. 4

(b) Explain how latch can be used as one bit memory cell. 3

(c) Design the T and D flip flop using NAND gates and explain. 7

7. (a) Write short notes on :—

   (i) Shift Registers.

   (ii) Synchronous and asynchronous counter. 6

   (b) Design a synchronous 3–bit gray code up–counter using J–K flip–flop. 7

OR

8. (a) Convert the following :—

   (i) J–K flip flop to T flip flop.

   (ii) T flip flop to D flip flop. 8

   (b) Draw and explain 3–bit ripple counter using T–flip flop. 5

9. (a) Explain the following in detail :—

   (i) ROM

   (ii) PLA

   (iii) PAL. 9

   (b) Explain the operation of following instructions :—

   (i) LHLD 1100H ;

   (ii) MOV A, M ;

   (iii) STA 2000H ;

   (iv) POP RP, 4

OR

10. (a) Draw and explain the architecture of micro-processor 8085. 8

(b) Implement the following function using PAL :

$f(A\ B\ C) = \sum m\ (3,\ 5,\ 6,\ 7)$ 5

11. (a) Explain the hardware interrupt structure of μp 8085 in detail. 7

(b) Draw the timing diagram for the instruction "MOV M, A". 6

OR

12. (a) Write a program to find the greatest number in the block of 10 bytes which are present in memory location from address 7000H. Store the greatest number at location 8000H. 7

(b) Explain the following instructions of μp 8085.

(1) RIM

(2) SIM

(3) EI

(4) DI. 6