Q.2 a. Perform the following conversions:

(i) $(3742)_8 = (?)_{10}$

(ii) $(2A64)_{16} = (?)_2$

(iii) $(2047)_{10} = (?)_{16}$

(iv) $(1101011)_2 = (?)_{10}$

Answer: Pages 26 to 40 (Chapter 1) of Text Book

b. With the help of neat sketch explain serial and parallel transmission.

Answer : Pages 16 to 17 (Chapter 1) of Text Book

c. Draw functional diagram of digital computer.

Answer: Pages 18 to 20 (Chapter 1) of Text Book

Q.3 a. Draw the symbol of AND and NOR gate and explain their working using truth table

Answer: Pages 62 to 64 (Chapter 3) of Text Book

b. Simplify the following expression using K map and implement it using logic gate.

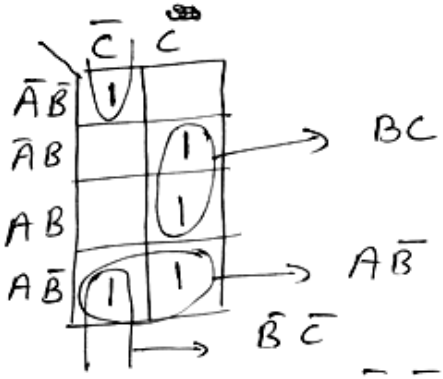
$$Y = \overline{A}\overline{B}\overline{C} + \overline{A}BC + ABC + A\overline{B}\overline{C} + A\overline{B}C$$

Answer:

Give equation is

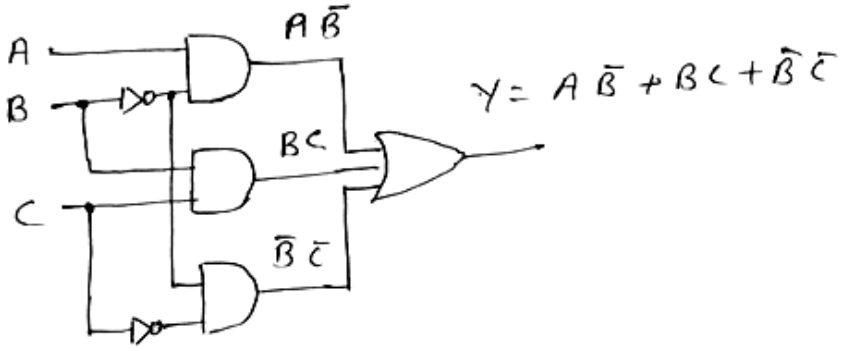
$$Y = \bar{A}\bar{B}\bar{C} + \bar{A}BC + ABC + A\bar{B}\bar{C} + A\bar{B}C$$

The K-MAP is



$$\therefore Y = BC + A\bar{B} + \bar{B}\bar{C}$$

Logic diagram of given equation is



c. Draw the symbols and truth tables of XOR gate and XNOR gates.

Answer: Pages 134 to 135 (Chapter 4) of Text Book

Q.4 a. Draw logic circuit of 4-bit BCD adder and explain its working.

Answer : Pages 297 to 301 (Chapter 6) of Text Book

b. Perform the following operation:

(i) $(45)_{10} - (23)_{10}$ **Using 2's complement method.**

(ii) $(10111)_2 - (100)_2$

(iii) $(385)_{10} + (118)_{10}$ **Using BCD addition.**

(iv) Represent decimal value -12 **as an 8-bit signed binary value.**

Answer:

(i) 45 − 23 using 2's complement.

$(45)_{10} = 101101$

$(23)_{10} = 010111$

1' complement of 23 = 101000

2' complement of 23 = 101000 + 1 = 101001

So $(45)_{10} - (23)_{10}$ = 101101

101001

1 0101 10

Discard

Since there is carry generated, so result is positive number, and magnitude is given by.

$(01011\,0)_2 = 16 + 4 + 2 = (22)_{10}$

(ii) Binary subtraction

10111

− 100

10011

Answer = 10011

(iii) $(385) + (118)_{10}$ Using BCD

$385 = 0011\ 1000\ 0101$

$118 = 0001\ 0001\ 1000$

503

$0100\ 1001\ 1101$ → Last term. Invalid. so Add 0110

0110

$0100\ 1010\ 0011$ Middle term Invalid so Add 0110

0110

Ans → $0101\ 0000\ 0011$

Q.5 a. Draw the circuit of 4 bit serial in parallel out shift register and explain its working.

Answer: Pages 385 to 386 (Chapter 7) of Text Book

b. Draw logic circuit of 4 bit ring counter and explain its working with the help of truth table, waveforms and state diagram.

Answer: Pages 370 to 375 (Chapter 7) of Text Book

Q.6 a. What is encoder? Explain working of octal to binary encoder.

Answer: Pages 517 to 518 (Chapter 9) of Text Book

b. What is de-multiplexer? Draw logic diagram of 1:8 de-multiplexer and explain its working.

Answer: Pages 536 to 538 (Chapter 9) of Text Book

Q.7 a. Draw the logic diagram NOR gate latch and its working using truth table.

Answer: Pages 188 to 189 (Chapter 5) of Text Book

b. What is frequency division? How can flip flop be used for this application? Also list other applications of flip flop.

Answer: Pages 224 to 226 (Chapter 5) of Text Book

Q.8 a. Explain working principle of decade counter with suitable logic diagram.

Answer: Pages 328 to 330 (Chapter 7) of Text Book

b. What are synchronous counters? Design a Mod-6 synchronous counter using J-K Flip-Flops.

Answer: Pages 340, 341 and 362 to 367 (Chapter 7) of text Book

Q.9 a. What is RAM? Distinguish between SRAM and DRAM.

Answer: Pages 694 to 704 of Text Book

b. How many address bits are required to access a 32 K memory?

Answer: Pages 694 to 704 (Chapter 11) of Text Book

The memory stores $32K = 32 \times 1024 = 32768$ words
Thus there are 32768 memory locations.. Since $32768 = 2^{15}$, it requires a 15 bit address code to specify one of 32768 addresses.

c. What is ROM? Draw 16×8 ROM architecture and explain its working.

Answer: Pages 673 to 675 (Chapter 11) of Text Book

TEXT BOOK

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