OCTOBER 2009, DIGITAL ELECTRONICS, PAPER 2

Ques 1 (A): Select correct alternative and rewrite the following sub question – (4 Marks)

a) Two's complement of (1010)2 is _____.

(i) 0110 (ii) 0111 (iii) 0011 (iv) 1100

b) A 16 MHz square wave drives a 4 bit binary counter, then MSB output will have a frequency of _____

(i) 4MHz (ii) 16MHz (iii) 1 MHz (iv) 8 MHzs

c) In a 4 bit weighted resistor type DAC, weight of LSB is _____

(i) ¼ (ii) 1/15 (iii) 1/8 (iv) 1/16

d) Output of a NOR Gate is high when _____

(i) Either of the inputs is low (ii) Either of the inputs is high (iii) All inputs are high (iv) All inputs are low

Ques 1 (B): Attempt any TWO of the following – (6 Marks)

a) What is a Multiplexer? Draw a logic diagram of 4:1 multiplexer and explain.
b) Convert the following :
i) $(2B4)_{16} = (?)_2$ ii) $(352)_{10} = (?)_{16}$ iii) $(10101010)_2 = (?)_{10}$
c) What is 1's complement of a Binary Number? Explain 1's Complement Method of Subtraction with suitable example.

Ques 2 (A): Attempt any TWO of the following – (6 Marks)

a) Draw a logic diagram for the following expression and write truth table for the same.
ABCDE + F = Y
b) Prove the following identities using Boolean Laws.
i) (A+B) (A+B) (A+C) = AC.
ii) A+AB = A + B
c) Explain BCD to decimal decoder with neat logic diagram.

Ques 2 (B): Attempt any ONE of the following – (4 Marks)

a) With suitable examples, explain decimal to binary conversion for integer as well as for fraction.
b) State rules for binary addition and subtraction and solve the following.

Ques 3 (A): Attempt any TWO of the following – (6 Marks)

a) With neat diagram, explain working of TTL Inverter.
b) State and explain any three characteristics of Digital ICs.
c) Explain working of 1:4 Demultiplexer with neat logic diagram.

Ques 3 (B): Attempt any ONE of the following – (4 Marks)

a) Define Full Adder. Draw a logic diagram for Full adder. State logic equation and write the truth table.
b) What are Universal Building Blocks? With neat logic diagrams explain how basic gates are constructed from NAND Gates?

Ques 4 (A): Attempt any TWO of the following – (6 Marks)

a) With neat logic diagram explain D flip-flop. Write any one application of a D flip-flop.
b) Explain J-K flip-flop with the help of neat logic diagram.
c) Draw and explain 4 bit Left Shift Register.

Ques 4 (B): Attempt any ONE of the following – (4 Marks)

a) Draw a block diagram of Computer and explain function of each block.
b) State and explain any for types of Semi conductor Main Memories.

Ques 5 (A): Attempt any TWO of the following – (6 Marks)

a) Explain 3-bit Binary Ripple Counter with neat logic diagram. Also draw Waveforms.
b) What is an Encoder? Draw and explain Decimal of BCD Encoder using OR Gates.
c) With neat logic diagram, explain Simultaneous ADC.

Ques 5 (B): Attempt any ONE of the following – (4 Marks)

a) Draw and explain circuit diagram of 4 bit Binary Ladder (R-2R) Type DAC. What will be its output voltage for a binary input of 1001, where logic '0' corresponds to 0 volt and logic '1' corresponds to 16 volt?
b) Explain need of ADC and DAC by giving suitable examples.

OR

Ques 5 (A): Attempt any TWO of the following – (6 Marks)

a) With the help of a logic diagram, explain working of Decade Counter.
b) Explain working of CMOS NAND Gate with neat circuit diagram.
c) With neat block diagram, explain BCD to seven segment decoder/driver.

Ques 5 (B): Attempt any ONE of the following – (4 Marks)

a) Compare Synchronous and Asynchronous Counters.
b) Implement the following multi-output combination logic circuits using 4 to 16 line decoder (active low outputs)
$F_1 = m(2, 3, 6, 9, 12)$
$F_2 = m(4, 8, 12)$
$F_3 = m(5, 10, 13)$
