B.E.(with Credits)-Regular-Semester 2012 - Instrumentation Engineering Sem IV

IN405 - Digital Circuits

P. Pages : 2 **GUG/W/16/3917**

Time : Three Hours * 4 0 3 2 * Max. Marks : 80

Notes : 1. Same answer book must be used for each section.
2. All question carry marks as indicated.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) What are the various merits and demerits of digital system over analog system. **6**

b) What is the advantage of using 2's compliment over 1's compliment give illustration. **2**

c) Do as per instruction **8**

i) Subtract $(78D6.3B)_{16}$ from $(B08E.A1)_{16}$

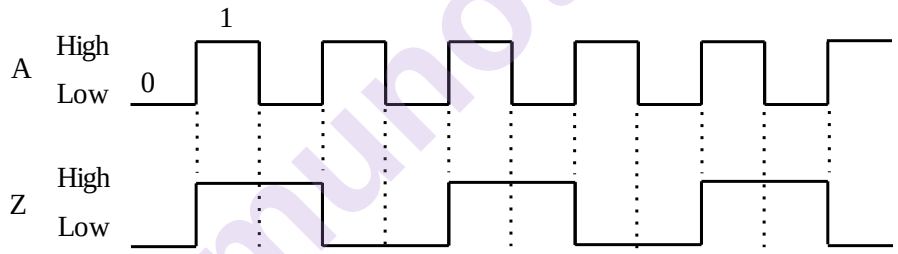
ii) Given that $(16)_{10} = (100)_b$, find 'b'

iii) Subtract the following octal nos. by the 7's & 8's compliment.

a) 76-25 b) 173.5-66.6

OR

2. a) If the waveforms A & Z shown in fig 1. (a) are applied to a two input X-OR gate, determine the output waveform (draw) for o/p 'y'. **2**



b) Find the logical equivalent of the following expressions. **6**

i) $A \oplus 0$ ii) $A \oplus 1$

iii) $A \odot 0$ iv) $A \odot 1$

v) $1 \oplus \overline{A}$ iv) $O \oplus \overline{A}$

c) i) Show that: $A\overline{B}C + B + B\overline{D} + AB\overline{D} + \overline{A}C = B + C$ **8**

ii) Reduce the expression: $(B + BC)(B + \overline{B}C)(B + D)$

3. a) Compare the following logic families. TTL, ECL, MOS, CMOS, IIL/(I^2L), on the basis of following parameters **12**

i) Propagation delay time.

ii) Power dissipation per gate.

iii) Noise margin.

iv) Fan-in

v) Fan -out

vi) Cost.

b) Define the following digital IC specification terminology **4**

i) Threshold vtg. ii) Propagation delay.

iii) Power-dissipation. iv) Fan-in & fan-out.

OR

4. a) With neat sketch, explain the working of CMOS inverter. **8**

b) Explain the working of two -input I^2L NOR Gate. With neat diagram. **8**

5. a) What is an encoder? Draw logic-symbol, logic diagram & truth-table of Decimal to BCD encoder. **8**

b) Draw full adder using NAND gates only. **6**

c) What are the applications of code convertors. **2**

OR

6. a) Draw logic circuit, function table, & k-map to derive simplified expression for driving segment (a) for BCD to seven segment decoder. **8**

b) Write the applications of multiplexer. Use a multiplexer having three data select inputs to implement the logic for the function. **8**

$F = \Sigma m(0,1,2,3,4,10,11,14,15)$

7. a) Convert J-K flip-flop into S-R. flip-flop. **8**

b) What is Race-around condition? How to avoid it? Draw logic diagram & truth table of M-S. J-K. flip-flop. **8**

OR

8. a) What are the various types of counters? Draw and explain 3-bit ripple-up counter. **8**

b) What are the various applications of flip-flops & counters. **8**

9. a) Design a mod-6 synchronous counter using J-K flip-flops. **8**

b) Write a note on VHDL. **8**

OR

10. a) Draw and explain 7490-decode counter. **8**

b) What do you mean by lock-free counter. Give short description about PLD. **8**

****