Total No. of Questions—12] [Total No. of Printed Pages—4+1

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S.E. (Information Technology) (I Sem.) EXAMINATION, 2009

DIGITAL ELECTRONICS AND MICROPROCESSOR

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer Question Nos. **1** *or* **2**, **3** *or* **4**, and **5** *or* **6** from Section I and Question Nos. **7** *or* **8**, **9** *or* **10** and **11** *or* **12** from Section II.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Assume suitable data, if necessary.

SECTION I

1. (*a*) Perform the following arithmetic's using 2's complement method. (Show step by step process and comment on result) : [8]

(*i*) $(8)_{10} - (6)_{10}$

(*ii*) $(6)_{10} - (8)_{10}$

(*iii*) $(-8)_{10} - (6)_{10}$

(*iv*) $(8)_{10} - (-6)_{10}$

(*b*) What is BCD and Excess 3 code ? State specific properties and applications of these codes. [6]

(*c*) State representations used for representing negative numbers in binary and represent $(-8)_{10}$ using all these representations (Use 8 bit word length). [4]

P.T.O.

Or

2. (*a*) Perform the following. (Show step by step process) : [8]

(*i*) $(11101.101)_2 = (\ )_{10}$

(*ii*) $(126.77)_8 = (\ )_{10}$

(*iii*) $(7FE.6A)_{16} = (\ )_{10}$

(*iv*) $(12AB.CD)_{16} = (\ )_8$

(*b*) Perform the following additions with base 8, 16 and 2 : [6]

(*i*) $(2374)_8 + (6276)_8$

(*ii*) $(3FC5)_{16} + (7FAE)_{16}$

(*iii*) $(101101)_2 + (011001)_2$

(*c*) What is gray code ? State applications of gray code and explain *one* of them. [4]

3. (*a*) Describe the difference between TTL and CMOS with respect to fan-out, power dissipation per gate, propagation delay and noise margin. [4]

(*b*) What do you mean by open-collector TTL gate ? What is its advantage ? Explain with suitable circuit. [4]

(*c*) A TTL gate is supposed to drive CMOS gates. What arrangement has to be made to work this interface satisfactorily ? Justify your answer with suitable circuit diagram. [8]

Or

4. (*a*) What is the difference between low power TTL and Schottky TTL ? [4]

(*b*) Define the terms sourcing and sinking current with respect to CMOS family and give typical values for CMOS family. [4]

(*c*) Explain wired logic using two CMOS inverters. [8]

5. (*a*) Simplify the following Boolean function using K map and realize the same : [6]

$$F(A, B, C, D) = \prod M(0, 4, 9, 15) .d (2, 7, 13)$$

(*b*) Design and draw the basic circuit of single digit BCD adder using IC 7483. Explain the logic to convert it into two digit BCD adder. [10]

Or

6. (*a*) Design a full subtractor circuit using 4 : 1 multiplexers and some logic gates. Explain your logic and optimization using truth table. [6]

(*b*) Design BCD to 7-segment code decoder using logic gates. Assume common anode 7-segment LED's. [10]

SECTION II

7. (*a*) Define the following terms as applied to Flip-Flop : [4]

(*i*) Set-up time

(*ii*) Hold time

(*iii*) Propagation delay

(*iv*) Power dissipation.

(*b*) How will you convert the basic SR Flip-Flop into J-K Flip-Flop ? [6]

(*c*) Draw and explain the internal architecture of IC 7490. Design and draw BCD MOD 12 counter with IC 7490 and draw the waveform for the same. [8]

Or

8. (*a*) What do you mean by synchronous and asynchronous sequential circuits ? State merits and demerits of both the circuits. [4]

(*b*) With neat diagrams, explain the working of the Bidirectional shift register with shift right and shift left facility. [6]

(*c*) Design a Mod-6 counter using J-K Flip-Flops. (Use excitation table) and draw timing diagrams and determine the duty cycle of the output of the most significant stage. [8]

9. (*a*) What are the advantages of the R-2R ladder DAC over the Weighted resister type DAC ? [4]

(*b*) What do you mean by sample and hold circuit ? How is it necessary in ADC ? [4]

(*c*) With the help of suitable diagram, explain the basic operation of Dual slope ADC. [8]

Or

10. (*a*) State and explain Sampling theorem. [4]

(*b*) Define the following parameters of DAC's : [4]

(*i*) Settling time

(*ii*) Resolution

(*iii*) Monotonicity

(*iv*) Conversion time

(*c*) Explain successive approximation technique of conversion of simple 8-bit ADC. [8]

11. (*a*) Explain the block diagram of 8255 PPI. Explain all of its operation modes with control word format in detail. [10]

(*b*) What is the difference between : [6]

(*i*) Memory mapped I/O and I/O mapped I/O

(*ii*) Polled I/O data transfer and interrupt driven I/O data transfer.

Or

12. (*a*) What are various addressing modes of 8085 microprocessor ? Explain all 8085 addressing modes with suitable instructions as an example. [10]

(*b*) State the syntax and mention operations carried out by 8085 microprocessor to execute the following instructions : [6]

(*i*) LHLD

(*ii*) DAA

(*iii*) CMP