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

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S.E. (Comp. Engg.) (First Semester) EXAMINATION, 2010

(Common to Computer and I.T.)

DIGITAL ELECTRONICS AND LOGIC DESIGN

(2008 COURSE)

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

N.B. :— (*i*) Answer Q. No. **1** or **2**, Q. No. **3** or **4**, Q. No. **5 or 6** from Section I and Q. No. **7** or **8**, Q. No. **9** or **10**, Q. No. **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.

SECTION I

1. (*a*) Design and explain in detail 4-bit input grey code to 7-segment BCD code conversion technique. For this design use K-map reduction and MSI circuit for each segment of display. [16]

(*b*) Enlist various code conversion methods. [2]

Or

2. (*a*) Express the following numbers in binary format. Write step by step solution. [12]

(*i*) $(7762)_{octal}$

P.T.O.

(*ii*) $(432A)_{hex}$

(*iii*) $(2946)_{decimal}$

(*iv*) $(1101.11)_{decimal}$.

(*b*) What will max. 4-digit equivalent Hex number for 4-digit max. Decimal number ? Also perform the following substraction : [6]

$$(7048)_{Decimal} - (07A8)_{Hex.}$$

3. (*a*) Solve the following using K–map reduction technique. Also draw MSI circuit for output. [12]

(*i*) $Z = f(A, B, C, D) = \pi (1, 2, 3, 9, 10, 12, 15)$

(*ii*) $Z = f(A, B, C, D) = \pi (0, 2, 3, 4, 6, 8, 11, 13)$.

(*b*) Explain for IC 74LSXX various characteristics in brief. [4]

Or

4. (*a*) Draw and explain the design of 3-I/P TTL NAND gate circuit. Also explain various I/P, O/P states and corresponding transistor (ON/OFF) states. [12]

(*b*) Explain working of 2-input CMOS-NOR gate. [4]

5. (*a*) Explain the working of cascaded mode magnitude comparator IC 7485. [8]

(*b*) Draw and explain 4-bit BCD adder using IC 7483. Also explain with reference to your design addition of $(9 + 5)_{BCD}$ and $(7 + 2)_{BCD}$. [8]

Or

6. (*a*) Explain decoder (1 : 8) as full adder and full substractor. Show your design. [8]

(*b*) Design 28 : 1 mux using 8 : 1 mux (with enable inputs). Explain truth table of your design in short. [Hint : you can use separate mux for enable of respective IC's] [8]

SECTION II

7. (*a*) Draw a 4-bit synchronous counter. Also explain timing diagram for the same. [10]

(*b*) What is the advantage of M-S flip-flop ? Explain working of MS J-K flip-flop in detail. [8]

Or

8. (*a*) What is advantage of MOD counter ? Explain working of MOD-17 and MOD-24 counter with detail diagram using IC-7490. [8]

(*b*) Explain ring counter with design having initial state '01011', from initial state explain all possible states in that ring. [10]

9. (*a*) What is VHDL ? Explain entity-architecture declaration for 2-bit NOR and AND gate. [8]

(*b*) What is ASM chart ? Design ASM chart for 4-bit grey code sequence with up-down conditions. [8]

Or

10. A sequential ring counter with present state '01011'. The circuit also have an input 'Z'. If Z = 0, circuit shows next-output (right shift) else for Z = 1, it shows initial state. Draw an ASM chart and state stable for this circuit to generate the output using mux controller method. [16]

11. (*a*) Explain difference between FPGA and CPLD logic. [8]

(*b*) Explain machine cycle of an addition operation of a micro-processor. Use two 8-bit numbers to explain the same. [8]

Or

12. (*a*) Explain in brief the function of Address bus, Data bus and control bus for a basic microprocessor. [8]

(*b*) Explain in brief design model of PLA for any code conversion example. [8]