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Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2006

EC/AI 2K 305—DIGITAL ELECTRONICS

Time : Three Hours

Maximum : 100 Marks

Answer **all** *questions.*

Part A

1. (a) Simplify the following expressions using Boolean identities :—

(i) $Y = \overline{A}\,\overline{B}CD + ABCD + \overline{A}C\overline{D} + \overline{A}CD + A\overline{B}D$.

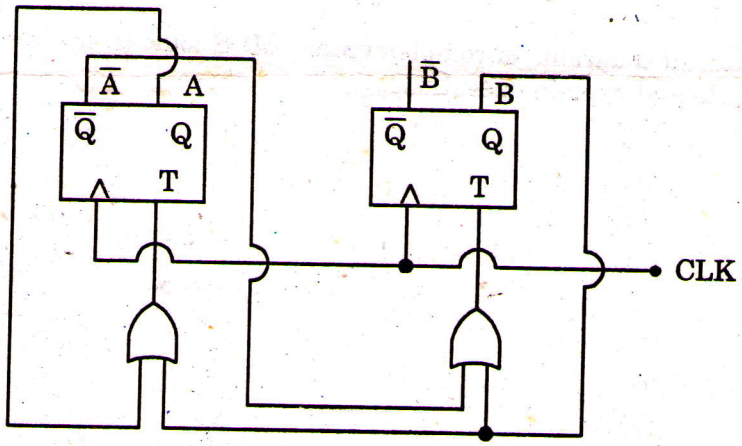
(ii) $Y = ABCD + \overline{A}\,\overline{B}C\overline{D} + AB\overline{C} + BC$.

(b) Draw 8 : 1 multiplexer using NAND only and explain.

(c) Draw full adder circuit and explain.

(d) Draw the circuit diagram of Johnson counter and explain.

(e) Derive the state table of the following sequential circuit :—



(f) Explain what is meant by state diagram.

(g) Explain what is meant by (i) Noise immunity ; (ii) Logic flexibility.

(h) What is meant by static memory and dynamic memory ? Explain.

(8 × 5 = 40 marks)

Part B

2. (a) Reduce the following logic function using tabular method and realize it using basic gates :—

$$Y = \sum m\,(0, 2, 6, 7, 8, 10, 12, 14, 15, 52).$$

Or

(b) Design a combinational logic circuit to convert BCD to excess-3 code.

Turn over

3. (a) (i) Design a full subtractor using NAND only. (8 marks)

(ii) Draw the circuit diagram of BCD counter and explain. (7 marks)

Or

(b) Draw the block diagram of divider unit and explain its operation.

4. (a) Design a sequential circuit described by the following state equations. Use JK flip-flops.

$$A(t+1) = \bar{A}\,\bar{B}CD + \bar{A}\,\bar{B}C + ACD + A\bar{C}\,\bar{D}$$

$$B(t+1) = \bar{A}C + C\bar{D} + \bar{A}B\bar{C}$$

$$C(t+1) = B$$

$$D(t+1) = \bar{D}$$

Or

(b) Design a sequential logic circuit to generate the following repeated random sequences :—

1, 3, 7, 2, 5, 1, 3 ....

5. (a) (i) Draw the transfer characteristic of ECL logic gate and explain. (8 marks)

(ii) Explain what is meant by fan-in and fan-out of logic diagram. (7 marks)

Or

(b) Draw the circuit diagrams of complementary MOS logic (i) inverter ; (ii) NAND gate ; and (iii) NOR gate and explain operations.

(5 + 5 + 5 = 15 marks)

[4 × 15 = 60 marks]