

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2010

 $\frac{\text{EC 09 305}}{\text{PTEC 09 304}} \text{ DIGITAL ELECTRONICS}$

(2009 admissions)

Time: Three Hours

Maximum: 70 Marks

Part A

Answer all questions.

Each question carries 2 marks.

- 1. Write De Morgan's theorem with three variables.
- 2. Simplify $F(x, y, z) = \Sigma(0, 1, 5, 7)$ using three variable map.
- 3. Write the significance of Gray code.
- 4. Write the concept of Johnson counter.
- 5. Write the applications of ASM Chart.

 $(5 \times 2 = 10 \text{ marks})$

Part B

Answer any four questions. Each question carries 5 marks.

- 6. Draw a NAND logic diagram that implements the complement of the function $F(A, B, C, D) = \Sigma(0, 1, 2, 3, 4, 8, 9, 12)$.
- 7. Determine the value of base x if $(211)_x = (152)_8$.
- 8. Explain the principle of encoder.
- 9. Give the excitation tables of SR, D JK and T flip-flops.
- 10. Write short notes on Moore's model.
- 11. Construct a MOD-12 counter.

 $(4 \times 5 = 20 \text{ marks})$

Part C

Answer section (a) or section (b) of each question. Each question carries 10 marks.

12. (a) Simplify the Boolean function by means of the tabulation method:

P (A, B, C, D, E, F, G) = Σ (20, 28, 52, 60).

Or

(b) What are universal gates? Construct full adder and half adder using only the universal gates.

Turn over

13. (a) (i) Draw the block diagram of a BCD adder and explain.

(5 marks)

(ii) Implement $F(A, B, C) = \Sigma (1, 3, 5, 6)$ with a multiplexer.

(5 marks)

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- (b) Draw the Schottky TTL gate and explain.
- 14. (a) Draw the diagram of D-type positive edge triggered flip-flop and explain.

- (b) Explain the operation of shift registers and discuss their types.
- 15. (a) Design a sequential circuit with two JK flip-flops A and B and two inputs E and x. If E = 0, the circuit remains in the same state regardless of the value of x. When E = 1 and x = 1, the circuit goes through the state transitions from 00 to 01 to 10 to 11 back to 00 and repeats. When E = 1 and x = 0, the circuit goes through the state transitions from 00 to 11 to 10 to 01 back to 00 and repeats.

(b) Design a counter with the following repeated binary sequence 0, 1, 3, 7, 6, 4 using T flip-flops. 10 = 40 marks

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