

Roll No. ....  
Printed Pages : 2

**8406**

BT-4 / M-14

**DIGITAL ELECTRONICS (New)**

**Paper-ECE-204-E**

Time allowed : 3 hours]

[Maximum marks : 100

**Note :** Attempt five questions in all, selecting at least one question from each unit.

### Unit-I

1. (a) Explain the following terms with reference to a gate :
  - (i) propagation delay.
  - (ii) fan-in
  - (iii) fan-out
  - (iv) noise-margin.
  - (v) speed- power product. 10
- (b) Obtain the minimal expression using the Quine McClusky method :  
 $\Sigma m (1, 5, 6, 12, 13, 14) + d (2, 4).$  10
2. (a) Prove :
  - (i)  $AB + \bar{A}BC = AB + AC$
  - (ii)  $(A + B)(A + \bar{B} + C) = (A + B)(A + C)$  10
- (b) Design a 4-bit binary - to - BCD converter. 10

### Unit-II

3. (a) Implement a full subtractor using NAND logic. 10
- (b) A counter steers through the states 2, 4, 5, 7, 2, 4, ..... Design and construct a synchronous counter using J-K flip-flops. The counter should be locking- free. 10

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4. (a) Use a multiplexer to implement the logic function  
 $F = A \oplus B \oplus C.$  10
- (b) Draw and explain the circuit of a master- slave flip-flop. Explain clearly the reason for such an interconnection of FF. 10

### Unit-III

5. (a) Draw the circuit diagram of a standard TTL NAND gate using multi-emitter transistor as Input transistor. Justify the logic levels of the output voltage (under no load) with the help of components constituting the gate structure. 10
- (b) Write atleast four advantages and four disadvantages of ECL gate. 10
6. (a) What are the merits and demerits of various logic families ? 10
- (b) Write short note on CMOS logic. 10

### Unit-IV

7. (a) Sketch the circuit of a 4-bit DAC using an R-2R ladder network. Explain how the circuit operates and discuss the resolution of DAC outputs. 10
- (b) Design a 4-bit weighted resistor DAC whose full-scale output voltage is -5V. The logic levels are 1 = +5V and 0 = 0V. What is the output voltage when the input is 1101 ? 10
8. (a) With the help of suitable diagram, explain the operation of parallel- comparator type analog-to-digital converter. 10
- (b) Write short note on specifications for A/D converters. 10

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