



# 17333

11718

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All questions are **compulsory**.
  - (2) Answer **each** next main question on a **new** page.
  - (3) Illustrate your answers with **neat** sketches **wherever** necessary.
  - (4) Figures to the **right** indicate **full** marks.
  - (5) Mobile Phone, Pager and any other Electronic Communication devices are **not permissible** in Examination Hall.

**Marks**

1. a) Attempt **any six** of the following : **12**
- i) List any two advantage and disadvantage of digital circuits.
  - ii) Define fan in and noise margin.
  - iii) Simplify using Boolean algebra  $(A + B)(A + C)$ .
  - iv) Draw symbol, truth table and logic equation of EX-NOR gate.
  - v) Define minterm and maxterm.
  - vi) Draw symbol and truth table of T-flip-flop.
  - vii) What is the difference between edge Triggering and level Triggering (any 2) ?
  - viii) State two specification of DAC.
- b) Attempt **any two** of the following : **8**
- i) Perform the following operation
    - a)  $10110 - 1010$  using 1<sup>st</sup> complement method.
    - b)  $11010 - 11110$  using 2<sup>nd</sup> complement method.
  - ii) State and verify De-Morgan's first theorem using truth table.
  - iii) Compare R-2R and weighted resistor DAC any four points.
2. Attempt **any four** of the following : **16**
- a) Reduce the following logic expression using Boolean laws and De-Morgan's theorems.  
$$Y = \overline{A \cdot (\overline{A \cdot B})} \cdot \overline{B \cdot (\overline{A \cdot B})}$$
  - b) Convert the following :
    - i)  $(6AC)_{16} = (?)_{10}$
    - ii)  $(372)_8 = (?)_2$
  - c) Design Half adder using K-map and basic gates.
  - d) Draw 8 : 1 multiplexer using basic logic gates.
  - e) Compare RAM and ROM any four point.
  - f) Draw logic diagram of JK-flop-flop and write its truth table.

**P.T.O.**



3. Attempt **any four** of the following :

- Perform the following BCD arithmetic operation :
  - $(637)_{10} + (463)_{10}$
  - $(63)_{10} + (19)_{10}$
- What is an universal gate ? Prove NAND as an universal gate.
- Design 1 : 8 De-multiplexer using 1 : 4 demultiplexer.
- Design 1 bit comparator using K-map and draw its logic diagram.
- With the help of block diagram explain the working of a ring counter.
- Give four features of a dynamic RAM.

4. Attempt **any four** of the following :

16

- Compare between TTL and CMOS logic family (any four).
- Simplify following equation using Boolean Algebra and draw circuit diagram  

$$Y = \bar{A}(A + \bar{B}) + \bar{B}(\bar{A} + B) .$$
- Design asynchronous mod-6 counter with its truth table.
- Minimize the following Boolean expression using K-map,  $Y = \sum_m (1, 3, 5, 7, 10, 11, 14, 15)$ .  
 Draw the logical circuit diagram of minimized expression using basic gates.
- What is race around condition ? How can it be avoided ?
- Draw block diagram of ALU IC-74181 and explain function of each pin.

5. Attempt **any four** of the following :

16

- Reduce the following expression and implement logic gates  

$$Y = AB + ABC + AB(E + F)$$
- Simplify the following SOP expression with K-Map
  - $F(A, B, C, D) = \sum_m (0, 1, 3, 4, 5, 7)$
  - $F(A, B, C) = \sum_m (0, 1, 3, 4, 6)$ .
- Draw and explain the block diagram of IC-74147 decimal to BCD encoder. Write truth table.
- Describe working of R-2R ladder type DAC.
- Differentiate between combination logic and sequential logic system.
- Draw circuit diagram of 3-bit SIPO shift register, right shift mode with the help of block diagram.

6. Attempt **any four** of the following :

16

- Draw neat block diagram of Ramp ADC and explain its working.
- State the application of shift register (any four).
- Implement following logical equation using multiplexer :  

$$Y(A, B, C) = \sum_m (0, 1, 2, 3, 6, 7) .$$
- Perform the binary arithmetic
  - $(11011.11)_2 + (11011.01)_2 = (?)_2$
  - $(11101.1101)_2 - (101.011)_2 = (?)_2$
- Draw symbol for 3 input OR gate with truth table and 3 input NAND gate with truth table.
- Define the following specification of A-D Converter
  - Conversion time
  - Resolution.