

Code :

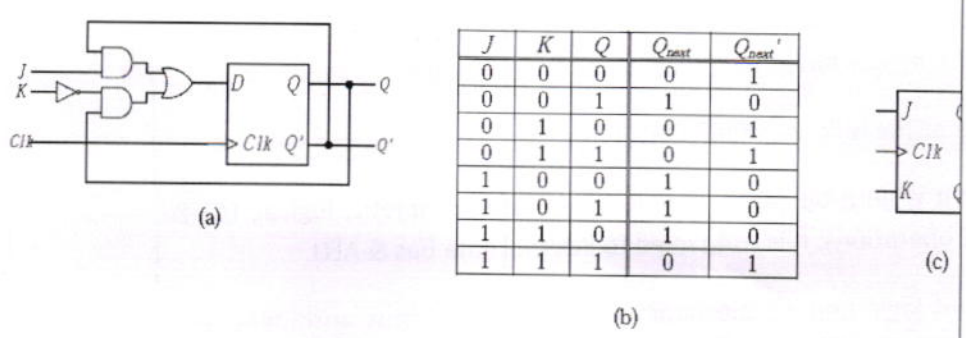
Version:

Qn. No.	Scoring Indicators	Split score	Total score
II	<p style="text-align: center;">PART -B</p> <p>1. Explain the steps to subtract $(1110.011)_2$ from $(11011.11)_2$ using basic rules of binary subtraction and verify the result by showing equivalent decimal subtraction.</p> <div style="text-align: center;"> $\begin{array}{r} 11110.011 \\ 01110.011 \\ \hline 01101.011 \end{array}$ </div> <p>Decimal equivalent of $(1110.011)_2 = 27.75$</p> <p>$(11011.11)_2 = 14.375$</p> <p>Difference is 13.375 equivalent binary is 01101.011</p> <p>2. Explain the properties of various logic families.</p> <ol style="list-style-type: none"> 1. RTL and DTL families are no more used for new systems because of their low speed, high power dissipation, and low fan-out. 2. TTL is the most popular general purpose logic family. It is available in seven different series with a wide range of operating speed, power dissipation, and fan-out. There are a large number of functions in SSI and MSI available in TTL. TTL ICs are available with totem-pole output (which decreases speed-power product), open-collector output (which makes possible wired-AND connection and bus operation), and tri-state (TSL) outputs (which are ideally suited for bus operation). 3. HTL are best suited for an industrial environment where electrical noise level is high. 4. ECL is the fastest logic family. Its main disadvantages are low noise-margins and high power dissipation. For interfacing with other logic families, level-shifting networks are required. 5. IzL is the only saturated bipolar logic suitable for LSI because of small silicon chip area required, and low power consumption. The supply voltage required is low hence it is highly suitable for battery operated systems. 6. MOS devices occupy a very small fraction of silicon chip area in comparison to bipolar devices and require very small power. Therefore, MOS logic is the most popular logic for LSI. The main drawback of MOS logic is slow speed, which is being improved upon by improvements in the technology of MOS fabrication. HMOS, a variety of NMOS has speeds comparable to bipolar logic families. 7. CMOS has the lowest speed power product and requires very small power. It is the most popular logic family and has led to the VLSI chips. 8. Corresponding to TTL 54/74 series, 54C/74C, 54HC/74HC, 54HCT/74HCT, 54AC/74AC and 54ACT/74ACT series have been developed which are directly compatible with various 54/74TTL series and have the same numbering scheme and pinouts. <p>3. State the postulates of Boolean algebra.</p> <p>Boolean Algebra A Boolean Algebra is a mathematical system consisting of a set of elements B, two binary operations OR (+) and AND (\cdot), a unary operation NOT ($'$), an equality sign (=) to indicate equivalence of expressions, and parenthesis to indicate the ordering of the operations, which preserves the following postulates:</p>	<p style="text-align: center;">6</p> <p style="text-align: center;">2+2+2</p> <p style="text-align: center;">6x1=6</p> <p style="text-align: center;">6x1=6</p>	

- P1. The OR operation is closed for all $x, y \in B$ $x + y \in B$
- P2. The OR operation has an identity (denoted by 0) for all $x \in B$ $x + 0 = 0 + x = x$
- P3. The OR operation is commutative for all $x, y \in B$ $x + y = y + x$
- P4. The OR operation distributes over the AND operation for all $x, y, z \in B$ $x + (y \cdot z) = (x + y) \cdot (x + z)$
- P5. The AND operation is closed for all $x, y \in B$ $x \cdot y \in B$
- P6. The AND operation has an identity (denoted by 1) for all $x \in B$ $x \cdot 1 = 1 \cdot x = x$
- P7. The AND operation is commutative for all $x, y \in B$ $x \cdot y = y \cdot x$
- P8. The AND operation distributes over the OR operation for all $x, y, z \in B$ $x \cdot (y + z) = (x \cdot y) + (x \cdot z)$
- P9. Complement for all $x \in B$ there exists an element $x' \in B$, called the complement of x , such that (a) $x + x' = 1$ (b) $x \cdot x' = 0$
- P10. There exist at least two elements $x, y \in B$ such that $x \neq y$

4. Explain the operation of J-K flip flop.

JK Flip-Flop JK flip-flops are very similar to SR flip-flops. The J input is just like the S input in that when asserted, it sets the flip-flop. Similarly, the K input is like the R input where it clears the flip-flop when asserted. The only difference is when both inputs are asserted. For the SR flip-flop, the next state is undefined, whereas, for the JK flip-flop, the next state is the inverse of the current state. In other words, the JK flip-flop toggles its state when both inputs are asserted. The circuit, truth table and the logic symbol for the JK flip-flop is shown in Figure



JK flip-flop: (a) circuit; (b) truth table; (c) logic symbol.

2+2+2 = 6 marks

5. Explain the various types of A/D converters based on conversion methodologies.

1. Simultaneous or flash A/D converter
2. Half flash A/D converter

3. Counter type A/D converter
4. Tracking type A/D converter
5. Successive approximation type A/D converter
6. Single dual and multi slop A/D converter
7. Sigma-delta A/D converter

(explanation with any three $3 \times 2 = 6$)

6. Explain the features of 8085 microprocessor.

The most prominent features of any microprocessor:

Cost-effective: The microprocessor chips are available at low prices and results its low cost.

Size: The microprocessor is of small size chip, hence is portable

Low Power Consumption: Microprocessors are manufactured by using metal oxide semiconductor technology, which has low power consumption.

Versatility: The microprocessors are versatile as we can use the same chip in a number of applications by configuring the software program.

Reliability: The failure rate of an IC in microprocessors is very low, hence it is reliable.

8085 is pronounced as "eighty-eighty-five" microprocessor. It is an 8-bit microprocessor designed by Intel in 1977 using NMOS technology.

It has the following configuration:

8-bit data bus • 16-bit address bus, which can address upto 64KB • A 16-bit program counter • A 16-bit stack pointer • Six 8-bit registers arranged in pairs: BC, DE, HL • Requires +5V supply to operate at 3.2 MHZ single phase clock • It is used in washing machines, microwave ovens, mobile phones, etc.

8085 consists of the following functional units:

Accumulator It is an 8-bit register used to perform arithmetic, logical, I/O & LOAD/STORE operations. It is connected to internal data bus & ALU.

Arithmetic and logic unit As the name suggests, it performs arithmetic and logical operations like Addition, Subtraction, AND, OR, etc. on 8-bit data.

General purpose register There are 6 general purpose registers in 8085 processor, i.e. B, C, D, E, H & L. Each register can hold 8-bit data. These registers can work in pair to hold 16-bit data and their pairing combination is like B-C, D-E & H-L.

Program counter It is a 16-bit register used to store the memory address location of the next instruction to be executed. Microprocessor increments the program whenever an instruction is being executed, so that the program counter points to the memory address of the next instruction that is going to