

This question paper contains 4 printed pages.

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Your Roll No.

MECTA

J

COMPUTER TECHNOLOGY AND APPLICATION

Paper— CS.501

(Computer System Organisation)

Time : 3 hours

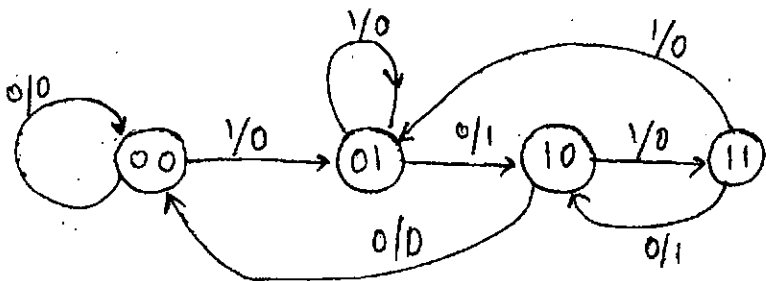
Maximum Marks : 100

(Write your Roll No. on the top immediately
on receipt of this question paper.)

Attempt any five questions.

Assume missing data, if any.

1. (a) Design a common bus system for 8 registers with 4 bits each using tristate buffers and decoder. 6
- (b) Design a sequential circuit with two D flip-flops A and B and one input x for the following state diagram: 8



P. T. O.

- (c) Draw a block diagram showing the hardware implementation of the following register transfer:
 if $(P=0)$ or $(Q=1)$ then $R1 \leftarrow R2$
 else $R1 \leftarrow R3$. 6
2. (a) What is the difference between hardwired control unit and microprogrammed control unit? 4
- (b) Explain with diagram how the fetch phase of an instruction cycle is implemented in the bus system for a basic computer. 8
- (c) List the sequence of micro-operations for the following instructions:

Operation Decoder

- | | | | |
|-------|-----|-------|---|
| (i) | ADD | D_1 | |
| (ii) | BUN | D_4 | |
| (iii) | BSA | D_5 | |
| (iv) | ISZ | D_6 | 8 |
3. (a) Explain the rules of Assembly language. 4
- (b) Explain how the translation from symbols to binary is done by an assembler program. Illustrate with an example for addition of two decimal numbers 83 and -23. Hexcode for instructions LDA, ADD, STA and HLT are 2 or A, 1 or 9, 3 or B and 7001 respectively. 8
- (c) Write a symbolic program to subtract two numbers 7ABC from A23B—

- (i) without subroutine
- (ii) with subroutine. 8
4. (a) In a computer instruction format, the instruction length and size of an address field are 11 and 4 bits respectively. What is the maximum number of two-address instructions, one-address instructions and zero-address instructions possible using this format? Explain. 6
- (b) Explain the various addressing modes with the help of example. 8
- (c) What is the essential difference between base and index register addressing mode? 3
- (d) Mention the important uses of post-increment and pre-decrement addressing mode. 3
5. (a) Draw the block diagram of a microprogrammed digital computer. 8
- (b) How will you perform the Boolean OR operation $Y \leftarrow X$ or Y using the two Boolean instructions
- $$\text{XOR } X \ Y : Y \leftarrow X \oplus Y$$
- $$\text{AND } X \ Y : Y \leftarrow X \text{ AND } Y \quad 6$$
- (c) Explain the characteristics of RISC computer. 6
6. (a) Convert the following numerical arithmetic

expression into Reverse Polish Notation and show the stack operations for evaluating the result:

$$12/(10-2*(1+3)) \quad 7$$

- (b) Explain the function of an Arithmetic pipeline with the help of suitable example. 7
- (c) Explain (i) Speed up, (ii) Internal Interrupts. 6

7. Write notes on any *four* of the following:

- (i) General Register Organisation
- (ii) Hardwired Control Unit
- (iii) Asynchronous Data Transfer
- (iv) Cache Memory, Associative Memory and Virtual Memory
- (v) Booth Algorithm
- (vi) Vector Processing. $5 \times 4 = 20$