

Maximum marks: 100 (External: 80, Internal: 20)**Time: 3 hours**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT - I

Digital Logic Fundamentals: Boolean algebra-basic functions, manipulating Boolean functions, K-maps and Quine McCluskey procedures. Combination Logic-multiplexers, decoders, encoders, comparators, adders & subtractors, BCD-to-Seven segment decoder. Basic Sequential Circuits-Flip-flops (RS, JK, T-type and D-Type), Ripple counter, Shift Register.

UNIT - II

Basic Computer Organization: Generic computer organization - system bus, instruction cycle, timing diagram of memory read and write operations, CPU organization, memory subsystem organization and interfacing - types of memory, chip organization, memory subsystem configuration, multibyte data organization, I/O subsystem organization and interfacing, memory subsystem configuration.

Register Transfer Language (RTL): different types of micro-operations, using RTL to specify digital systems - specification of digital components, simple systems, Modulo-6 counter.

UNIT - III

CPU Design: design and implementation of simple CPU-fetching, decoding & executing instruction, establishing required data paths, designing hardwired control unit.

Microsequencer Control Unit Design: microsequencer operations, microinstruction formats, design and implementation of a simple microsequencer, reducing number of microinstructions.

Computer Arithmetic: Hardware implementation of unsigned & signed (addition & subtraction, multiplication, booth's algorithm, division). Floating-point numbers (IEEE 754 standard) - addition, subtraction, multiplication, division.

UNIT - IV

Memory Organization: Hierarchical memory system, associative memory, cache memory - associative, direct and set associative mappings, replacing & writing data in cache, cache performance, virtual memory - paging, segmentation, memory protection.

I/O Organization: Asynchronous data transfer - source and destination - initiated, handshaking, programmed I/O, interrupts, DMA, IOP, serial communication-UART, RS-232C standard, USB standard.

Text Books:

1. John D. Carpinelli, "Computer Systems Organization & Architecture", Pearson Education.
2. Stallings W., "Computer Organization and Architecture", Pearson Education.

Reference Books:

1. Rajaraman, V., Radhakrishnan, T. "An Introduction To Digital Computer Design", PHI Learning.
2. Mano, M. Morris "Digital Logic and Computer Design", Pearson Education.
3. Tanenbaum A.S., Todd Austin, "Structured Computer Organization", PHI Learning.
4. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", Tata McGraw Hill.