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Printed Page:-3 **Subject Code:- BCSBS0303**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: III - THEORY EXAMINATION (2025 - 2026)
Subject: Computer Organization & Architecture

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION-A 20

1. Attempt all parts:-

1-a. In Boolean algebra, A + AB = ? (CO1,K3) 1

(a) A
(b) AB
(c) B
(d) A+B

1-b. The ALU performs: (CO1,K2) 1

(a) Arithmetic and Logic operations
(b) Memory control
(c) Input-output control
(d) Interrupt handling

1-c. 2's complement of 1001 is: (CO2,K3) 1

(a) 0110
(b) 1110
(c) 1011
(d) 0111

1-d. ASCII and Unicode are examples of: (CO2,K2) 1

(a) Error-detecting codes
(b) Character representation techniques
(c) Floating-point formats
(d) Signed number formats

1-e. 8086 microprocessor is a ____ bit processor. (CO3,K1) 1

(a) 8
(b) 16
(c) 32
(d) 64

1-f. The x86 architecture supports ____ addressing modes. (CO3,K2) 1

(a) Immediate, direct, indirect, register
(b) Only direct
(c) Only immediate
(d) Only register

1-g. DMA allows data transfer between ____. (CO4,K1) 1

(a) Memory and I/O device
(b) CPU and I/O device
(c) Cache and CPU
(d) Registers

1-h. USB supports ____ data transfer rates. (CO4,K1) 1

(a) Multiple
(b) Single
(c) Low
(d) Only fixed

1-i. Parallel processors execute multiple instructions ____. (CO5,K2) 1

(a) Simultaneously
(b) Sequentially
(c) One after another
(d) Independently

1-j. Cache memory is placed between CPU and ____. (CO5,K1) 1

(a) Main memory
(b) Disk
(c) Registers
(d) I/O unit

2. Attempt all parts:-

2.a. Define a flip-flop and its purpose. (CO1,K1) 2

2.b. Define signed number representation. (CO2,K1) 2

2.c. State the function of the ALU in a CPU. (CO3,K1) 2

2.d. List basic components of the USB interface. (CO4,K2) 2

2.e. What do you mean by memory interleaving? (CO5,K1) 2

SECTION-B 30

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i) Design a full adder circuit and explain its logic diagram. (CO1,K3) 6

3.a.(ii) Explain the working of an ALU with example. (CO1,K2) 6

3.b. Answer any one of the following:-

3.b.(i)	Explain the Booth multiplication algorithm with an example. (CO2,K2)	6
3.b.(ii)	Explain IEEE 754 single precision floating-point representation. (CO2,K2)	6

3.c. Answer any one of the following:-

3.c.(i)	Compare primary and secondary memory with examples. (CO3,K3)	6
3.c.(ii)	Discuss the working principle of DRAM and SRAM. (CO3,K2)	6

3.d. Answer any one of the following:-

3.d.(i)	Implement Role of interrupts in process state transitions in detail. (CO4,K4)	6
3.d.(ii)	Classify Interrupt handling process in detail. (CO4,K3)	6

3.e. Answer any one of the following:-

3.e.(i)	Demonstrate memory interleaving technique in detail. (CO5,K4)	6
3.e.(ii)	Summarize cache memory operation in detail. (CO5,K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explain addressing modes with suitable example and also discuss about the instruction format. (CO1,K2)	10
4-b.	Develop Boolean equations and logic diagram for a 2-bit binary multiplier. (CO1,K3)	10

5. Answer any one of the following:-

5-a.	Discuss the working of Booth's multiplier with an example and flowchart. (CO2,K2)	10
5-b.	Design a block diagram for a carry look-ahead adder and explain how it minimizes delay. (CO2,K4)	10

6. Answer any one of the following:-

6-a.	Explain the complete architecture of the x86 processor with a neat diagram. (CO3,K2)	10
6-b.	Explain the memory hierarchy and its impact on computer performance. (CO3,K2)	10

7. Answer any one of the following:-

7-a.	Differentiate Different types of I/O transfers with suitable examples. (CO4,K4)	10
7-b.	Discuss Privileged and non-privileged instructions with suitable examples. (CO4,K2)	10

8. Answer any one of the following:-

8-a.	Examine memory interleaving and its performance benefits with suitable examples. (CO5,K4)	10
8-b.	Explain replacement algorithms and their impact with suitable examples. (CO5,K2)	10