Printed Page:- 04 Subject Code:- BCSAI0302

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: III - THEORY EXAMINATION (2024- 2025)

Subject: Logic Design and Computer 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. The expression A(A+B) = ? (CO1,K2) 1

(a) AB

(b) 1

(c) 1+AB

(d) None of these

1-b. When both inputs of a S-R flip-flop are 0, the output will _____.(CO1,K2) 1

(a) invalid

(b) toggle

(c) 1

(d) None of these

1-c. What is the operation called when data is removed from the top of the stack? (CO2,K3) 1

(a) Push

(b) Pop

(c) Insert

(d) Delete

1-d. Which component of a CPU decodes the instruction format? (CO2,K3) 1

(a) ALU

(b) Register Array

(c) Control Unit

(d) Cache Memory

1-e. Which representation is most efficient to perform arithmetic operations on the numbers? (CO3,K4) 1

(a) Sign-magnitude

(b) 1's complement

(c) 2'S complement

(d) None of the mentioned

1-f. The most efficient method followed by computers to multiply two signed numbers is _____.(CO3,K4) 1

(a) Booth algorithm

(b) Bit pair recording of multipliers

(c) Restoring algorithm

(d) Non restoring algorithm

1-g. What is the primary role of cache memory? (CO4,K5) 1

(a) To store large amounts of data

(b) To bridge the speed gap between the CPU and main memory

(c) To permanently store data

(d) To replace secondary storage

1-h. What is the main characteristic of volatile memory? (CO4,K5) 1

(a) It retains data permanently

(b) It loses data when power is turned off

(c) It is slower than non-volatile memory

(d) It is used for long-term storage

1-i. Which of these is not a typical input device? (CO5,K5) 1

(a) Keyboard

(b) Mouse

(c) Monitor

(d) Scanner

1-j. What is the purpose of an interrupt vector in a computer system? (CO5,K5) 1

(a) To store data temporarily

(b) To provide the address of the interrupt service routine

(c) To increase the clock speed of the CPU

(d) To store input data

2. Attempt all parts:-

2.a. Convert the given binary number 1101101 into decimal and octal number system. (CO1,K2) 2

2.b. What is the function of Stack Pointer and Program Counter? (CO2,K3) 2

2.c.	What are the differences between the hardwired control organization and micro programmed control organization? (CO3,K4)	2
2.d.	Differentiate between the DRAM and SRAM. (CO4,K5)	2
2.e.	What are the advantages of asynchronous communication over synchronous communication? (CO5,K5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Explain the working and truth table of full adder. (CO1,K2)	6
3-b.	Explain the various types of counter.(CO1,K2)	6
3-c.	What is system bus? Draw its architecture and explain the different types of buses with their functions. (CO2,K3)	6
3-d.	Draw the basic functional units of a computer system and explain each of them. (CO2,K3)	6
3.e.	Write in detail about the different data transfer instructions. (CO3,K4)	6
3.f.	Explain the terms “cache hit” and “cache miss.” How do they influence system performance? (CO4,K5)	6
3.g.	Explain the different types of peripheral devices and their functions in a computer system. (CO5,K5)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explain the construction and working of JK flip flop in detail. (CO1,K2)	10
4-b.	Explain the working of 4 to 2 encoder and 2 to 4 decoder. (CO1,K2)	10

5. Answer any one of the following:-

5-a.	With the help of proper block diagram explain the bus transfer using multiplexer. (CO2,K3)	10
5-b.	What is bus arbitration? Describe the various bus arbitration techniques, including daisy chaining, polling, and independent request methods. (CO2,K3)	10

6. Answer any one of the following:-

6-a.	Why the array multiplier is useful? Also, perform the multiplication of (-5) X (-7) using Booth's algorithm. (CO3,K4)	10
6-b.	Explain the IEEE standard for floating-point numbers and also represent (1460.125) using the single and double precision of IEEE representation. (CO3,K4)	10

7. Answer any one of the following:-

7-a.	Explain the working of a semiconductor RAM with help of block diagram and function table. (CO4,K5)	10
7-b.	How the mapping is done between cache and main memory? Explain at least two methods of mapping. (CO4,K5)	10

8. Answer any one of the following:-

8-a.	Discuss the concept of Direct Memory Access (DMA). How does DMA improve data transfer speeds and system performance? (CO5,K5)	10
8-b.	Write short notes on:- (i) Parallel processing and (ii) Serial Communication (CO5,K5)	10