MGM's College of Engineering and Technology, Kamothe, Navi Mumbai

Department of Computer Engineering

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Assignment-1

Course Code: CSC 304
Course Name: Digital Logic & Computer Organization and Architecture
Class: SE-A

1. Floating point representation is used to store
   A) Boolean values B) Whole numbers **C)** Real integers D) Integers

2.Assembly language
   A) Uses alphabetic codes in place of binary numbers used in machine language
   B) Is the easiest language to write programs
   C) Need not be translated into machine language
   D) None of these

3. The collection of 8-bits is called as -

   a. Byte b. Nibble c. Word d. Record

4.In which of the following form the computer stores its data in memory?

a. Hexadecimal form

b. Octal form

c. Binary form

d. Decimal form

5.Convert the following decimal number to 8-bit binary.
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A. 10111011_2

B. 11011101_2

C. 10111101_2

D. 10111100_2

6.Convert binary 111111110010 to hexadecimal.

A. $EE2_{16}$

B. $FF2_{16}$

C. $2FE_{16}$

D. $FD2_{16}$

7.A decimal number is converted to BCD by replacing each decimal digit with the appropriate 3-bit binary code.

A. True

B. False

8.In ASCII code, the hexadecimal sequence 53 54 55 44 45 4E 54 decodes to STUDENT.

A. True

B. False

9.The basic logic gate whose output is the complement of the input is the:

A. OR gate

B. AND gate

C. INVERTER gate

D. comparator

Q2.

1. Differentiate between Computer Organization and Computer Architecture.
   Ans:

S.No.	Computer Organization	Computer Architecture
1	Computer architecture explains what a computer should do.	Computer organization explains how a computer works.

2	It deals more with the interface between software and hardware.	It deals more with the lower-level details.
3	It deals with Hardware System Architecture (HSA).	It deals with Instruction Set Architecture (ISA).
4	The task is to find out and investigate the organizational structure for its proper operation.	It investigates instruction formats, instruction set and addressing technology. It also includes the specifications of various functional modules like CPU and memories.
5	While designing, it is not fixed first.	Firstly, the computer's architecture is fixed and then its organization is decided.
6	It reveals computer's performance.	It reveals the computer's hardware.

2. What is a stored program concept?
   Ans: The term Stored Program Concept refers to the storage of instructions in computer memory to enable it to perform a variety of tasks in sequence or intermittently.
3. Explain Von Neumann Architecture in detail.
   Ans: Von Neumann Architecture also known as the *Von Neumann model*, the computer consisted of a CPU, memory and I/O devices. The program is stored in the memory. The CPU fetches an instruction from the memory at a time and executes it. he von Neumann architecture is a design model for a stored-program digital computer that uses a processing unit and a single separate storage structure to hold both instructions and data.
4. Differentiate between Von Neumann and Harvard Architecture.
   Ans:

Basis for	**Von Neumann Architecture**	**Harvard Architecture**

Comparison		
Basic	Data and instructions reside within a single memory unit.	Data and instruction are provided 2 different memory units.
Based on	Stored program computer concept	Harvard Mark I relay based model
Memory system	Single	Dual
Required space	Less	Comparatively more
Set of address/ data bus	One	Two
Development cost	Low	Comparatively more
Efficiency	Less	More
Execution speed	Slow	Comparatively fast
Operation	Simple	Complex
Performance offered	Low	Comparatively high
Clock cycle	Single instruction is executed in minimum two clock cycles.	Single instruction is executed in one clock cycle.
Feature	Data transfer and instruction	Data transfer and instruction

	fetching do not occur simultaneously.	fetch take place at the same time.
Space utilization	Good	Not so good
Applications	PCs, workstations, notebooks, etc.	Microcontrollers, digital signal processing, etc.

5. Explain the role of various registers used in Von Neumann.

   Ans:

- program counter - holds the memory address of the next instruction to be fetched from primary memory
- memory address register (MAR) - holds the address of the current instruction that is to be fetched from memory, or the address in memory to which data is to be transferred
- memory data register (MDR) - holds the contents found at the address held in the MAR, or data which is to be transferred to primary memory
- current instruction register (CIR) - holds the instruction that is currently being decoded and executed
- accumulator (ACC) – holds the data being processed and the results of processing

6. Give the block level description of various functional units of a computer

   Ans: .

- A computer organization describes the functions and design of the various units of a digital system.
- A general-purpose computer system is the best-known example of a digital system. Other examples include telephone switching exchanges, digital voltmeters, digital counters, electronic calculators and digital displays.

- Computer architecture deals with the specification of the instruction set and the hardware units that implement the instructions.
- Computer hardware consists of electronic circuits, displays, magnetic and optic storage media and also the communication facilities.
- Functional units are a part of a CPU that performs the operations and calculations called for by the computer program.
- Functional units of a computer system are parts of the CPU (Central Processing Unit) that performs the operations and calculations called for by the computer program. A computer consists of five main components namely, Input unit, Central Processing Unit, Memory unit Arithmetic & logical unit, Control unit and an Output unit.

7.Explain different types of codes used in digital systems

Ans: 1. Weighted Codes

• Obey positional weight principle.

• A specific weight is assigned to each position of the number.

• Eg.: Binary, BCD codes

2. Non-weighted Codes

• Do not obey positional weight principle.

• Positional weights are not assigned.

• Eg.: excess-3 code, Gray code

3. Reflective Codes

• A code is said to be reflective when code for 9 is complement of code for 0, code for

8 is complement of code for 1, code for 7 is complement of code for 2, code for 6 is

complement of code for 3, code for 5 is complement of code for 4.

• Reflectivity is desirable when 9's complement has to be found.

• Eg.: excess-3 code

4. Sequential Codes

• A code is said to be sequential when each succeeding code is one binary number

greater than preceding code.

• Eg.: Binary, XS-3

5. Alphanumeric Codes

• Designed to represent numbers as well as alphabetic characters.

• Capable of representing symbols as well as instructions.

• Eg.: ASCII, EBCDIC

6. Error Detecting and Correcting Codes

• When digital data is transmitted from one system to another, an unwanted electrical

disturbance called 'noise' may get added to it.

• This can cause an 'error' in digital information. That means a 0 can change to 1 or 1

can change to 0.

• To detect and correct such errors special type of codes capable of detecting and

correcting the errors are used.

• Eg.: Parity code, Hamming code

8.State and prove the De-Morgan's theorem

Ans: De Morgan's theorem

The complement of the sum of two or more variables is equal to the product of the complement of the variables.

The complement of the product of two or more variables is equal to the sum of complements of variables.

prove

A=0 B=1

$A+B=0+1=1^{-}=0$

$A^{-}.B^{-}=0^{-}.1^{-}=1.0=0$

Hence $A+B=A^{-}.B^{-}$