جامعة الحسين التقنية
Al Hussein Technical University

ASSIGNEMNT BRIEF

HTU Course No: 30201480 BTEC UNIT No: N/A	HTU Course Name: Advanced Computer Architecture BTEC UNIT Name: N/A

Version: 1

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Assignment Brief

Student Name/ID Number/Section	
HTU Course Number and Title	30201480 - Advanced Computer Architecture
BTEC Unit Number and Title	N/A
Academic Year	2021/2022 (Fall Semester)
Assignment Author	Dr. Huthaifa Al-Omari
Course Tutor	Dr. Huthaifa Al-Omari
Assignment Title	Advanced Computer Architecture Assignment
Assignment Ref No.	Assignment 1
Issue Date	Part 1: 03/01/2022 Part 2: 31/01/2022
Formative Assessment dates	Part 1: 20/01/2022 Part 2: 24/01/2022
Submission Date	Part 1: 27/01/2022 Part 2: 31/01/2022
IV Name & Date	Eng. Moath Sulaiman

Submission Format

This assignment consists of two parts where the submission of the assignment should be:

For part 1:

A hard copy of an individual word-processed report that should:

- be written in a concise, formal business style using single spacing and font size 12 with use of headings, paragraphs and subsections as appropriate.
- be supported with research and referenced using the Harvard referencing system.

For part 2:

- In-class closed book, closed notes examination

Your answer should be clear and coherent. Providing final answers without showing detailed steps is not accepted. If the tasks are completed over multiple pages, ensure that your name and student number are present on each sheet of paper.

Unit Learning Outcomes

LO1 Investigate the functions of computer system components.
LO2 Examine the design and organization of basic computer.
LO3 Discuss how data and programs can be represented within computer systems.
LO4 Investigate advanced computer architectures and performance.

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Assignment Brief and Guidance

Part1:

1) Identify the main components of the Basic Computer (BC) and explain their functionality and how they are organized and connected.

2) Consider the following truth table:

a	b	c	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

a. derive the Boolean expression for the output F

b. Simplify the function F to a minimum number of literals using Boolean algebra

c. Draw the logic diagram from the simplified expression

3) Examine how the DMA affects computer performance stating benefits and drawbacks.

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4) Explain in detail how the interrupt is handled by the Basic Computer.

5) An 8-bit register contains the binary value 01010110.

a. What is the register value after arithmetic shift right?

b. Starting from the initial value 01010110, determine the register value after an arithmetic shift left.

6) Build a full adder using only a 3x8 Decoder and a minimum number of basic gates.

7) Implement G(a,b,c) = $\Sigma(1,2,3,7)$ using a 4x1 multiplexer

8) Construct a common bus system for five registers where each register has seven bits.

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9) Convert the hexadecimal number ABCD to octal.

10) Perform the arithmetic operations (+77) + (+90) and (-77) + (-90) with binary numbers in signed-2's complement representation. Use eight bits to accommodate each number together with its sign. Verify your answer.

11) Write an assembly program that multiplies two 8-bit numbers A and B and stores the result in Z. For simplicity neglect the sign bit and assume positive numbers. Explain in detail how your program works and provide a flowchart that shows the step by step procedure for programming the multiplication operation.

12) Compare and contrast the RISC and the CISC architectures and show their advantages and disadvantages.

13) Critically evaluate, with illustrations, computer performance improvements with MIMD architectures.

Part2:

An in-class exam on Monday 31/01/2022 01:00 PM.

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Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Investigate the functions of computer system components		**D1** Examine how the DMA affects computer performance stating benefits and drawbacks. .
P1 Identify the main subsystems of a computer and explain how they are organized and connected. **P2** Carry out Boolean logic operations.	**M1** Illustrate how adder circuits are used to add binary numbers.	
LO2 Examine the design and organization of basic computer		**D2** Create a design of control logic circuits for Basic Computer components
P3 Examine the structure of instruction set for a basic digital computer **P4** Identify the sequence of events in carrying out the Instruction cycle	**M2** Analyze digital components used in the organization of digital computers **M3** Examine the structure of the common bus system	
LO3 Discuss how data and programs can be represented within computer systems		**D3** Examine the content of memory and registers of the Basic Computer while executing low-level programs
P5 Investigate how different types of data can be converted and stored in computer systems. **P6** Examine different types of addressing modes	**M4** Create a low-level program which includes decision making, branching, subroutine, and I/O operations.	
LO4 Investigate advanced computer architectures and performance		**D4** Critically evaluate, with illustrations, computer performance improvements with MIMD architectures.
P7 Examine the general register organization and the stack organization **P8** Assess how pipelining improves the performance of a computer system	**M5** Compare and contrast the RISC and the CISC architectures and show their advantages and disadvantages.	

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STUDENT ASSESSMENT SUBMISSION AND DECLARATION

When submitting evidence for assessment, each student must sign a declaration confirming that the work is their own.

Student name: **Student ID:** **Is the student repeating this unit?** **YES** **NO**		**Assessor name:** Dr. Huthaifa Al-Omari
Issue date: 03/01/2022	**Submission date:** 27/01/2022	**Submitted on:**
Programme: Computing		
HTU Course Name: Advanced Computer Architecture **HTU Course Code:** 30201480		**BTEC Course name:** N/A **BTEC Course Code:** N/A
Assignment number and title: Assignment 1 [Advanced Computer Architecture Assignment]/ Part 1		

Plagiarism

Plagiarism is a particular form of cheating. Plagiarism must be avoided at all costs and students who break the rules, however innocently, may be penalised. It is your responsibility to ensure that you understand correct referencing practices. As a university level student, you are expected to use appropriate references throughout and keep carefully detailed notes of all your sources of materials for material you have used in your work, including any material downloaded from the Internet. Please consult the relevant unit lecturer or your course tutor if you need any further advice.

Student declaration
I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.

Student signature: **Date:**