
UNIVERSITI MALAYSIA PERLIS

Peperiksaan 1 Pertengahan Semester Kedua
Sidang Akademik 2019/2020

DKT 217 – Computer System [Sistem Komputer]

Masa: 1 jam

Please make sure that this question paper has **THREE (3)** printed pages including this front page before you begin the examination.

*(Sila pastikan kertas soalan ini mengandungi **TIGA (3)** mukasurat yang bercetak termasuk muka hadapan sebelum anda memulakan peperiksaan ini.)*

This question paper has **THREE (3)** questions. Answer **ALL** questions.

*(Kertas soalan ini mengandungi **TIGA (3)** soalan. Jawab **SEMUA** soalan.)*

QUESTION 1

- a) Computers are built on virtual machine layers. Briefly explain the layers of a computer and give examples. [6 marks]
- b) Jack Kilby and Robert Noyce contributed a major stepping stone towards the third generation of computer evolution. Discuss the definitive concept for this evolution and what this third generation is all about. [4 marks]

QUESTION 2

- a) Discuss the Moore's law concept of VLSI in computer design methodology. [6 marks]
- b) Show the differences in the design methodology for a 2-to-4 decoder when using dataflow VHDL *2 input to 4 outputs* [8 marks]

QUESTION 3

Suppose you have a program with the following mix of instruction characteristics as shown in the following table :

Operation type	Frequency	Machine cycles
ALU	35 %	2
LOAD	25 %	2
STORE	20 %	2
BRANCH	20 %	4 2

- a) If the total number of instructions for this program is 2,400,063 and running on a 950MHz microcontroller, determine
- The number of instruction count for each operation type.
 - The effective cycles per instruction for this operation.
 - The total CPU clock cycle.
 - The execution time to complete this program.
- [6 marks]
- b) If the program is improved so that the branch operation cycle is reduced by 50%, determine the performance for the new program running on the same number of instructions and speed. [3 marks]
- c) Prove this enhancement in Question 1(b) by using Amdahl's law. [4 marks]
- d) Determine the throughput for both old and new programs. [3 marks]

APPENDIX
CPU Performance Measurement Formula

$$\text{Performance } (X) = \frac{1}{\text{Execution } (X)}$$

$$\text{Execution @ CPU time} = IC \times CPI \times T_{\text{cycle}}$$

$$\text{Effective / Average CPI} = \sum_{i=1}^n CPI_i \times IC_i$$

$$\text{MIPs} = \frac{\text{freq (Hz)}}{(CPI \times 10^6)}$$

$$\text{Speedup} = \frac{1}{(1-F) + \frac{F}{s}}$$

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