

Programme Code: TU856
Shared with: TU858
Module Code: CMPU1006
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TECHNOLOGICAL UNIVERSITY DUBLIN
CITY CAMPUS - GRANGEGORMAN

TU856 – BSc. (Honours) in Computer Science
TU858 – BSc. (Honours) in Computer Science
(International)

Year 1

SEMESTER 2
EXAMINATIONS 2023/24

Computer Architecture and Technology

Internal Examiners:
Dr. Art Sloan
Dr. Paul Doyle

Exam Duration: Two Hours

Instructions: Answer QUESTION 1 and ANY TWO questions of the remaining three available.

Question 1 carries 40 marks, all other questions carry 30 marks each.

1. **NOTE: This question is compulsory**

- (a) Expand on the term, “stored program concept” which can be attributed to the von Neumann Architecture, to include the background and main principles of this concept. (10 marks)
- (b) List four memory types associated with the CPU (Central Processing Unit) and/or the motherboard and, in relation to these, define the main aspects of the function of Memory Addressing. (10 marks)
- (c) How are binary numbers associated with information on (or for) a computer? In your answer, explain the structure imposed upon a computer’s binary numbers. (10 marks)
- (d) In a personal computer (PC), which **bus** is a computer bus that connects the major components of a computer system? In your answer, identify the characteristics of this bus. (10 marks)
2. (a) What were the historic contributions to early computing from Wilhelm Schickard, Gottfried Wilhelm von Leibniz and Charles Babbage? (10 marks)
- (b) Describe briefly the historic development of integrated circuits (ICs) as ‘microchips’ and the further development of these chips as microprocessors. (10 marks)
- (c) What is the main principle of an electrical circuit? In your answer, explain how a computer’s electrical circuit relates to digital functionality. (10 marks)
3. (a) Compare ‘serial’ and ‘parallel’ bus types as internal interface arrangements. In your answer, identify the major advantage of serial connectivity over parallel. (10 marks)
- (b) Compare, in a few sentences, ‘packet-switching’ and ‘circuit-switching’ in computer networks. How does a router work in a packet-switched network? (10 marks)
- (c) Describe the arrangement of technologies for a Client Server Network. Give an example of such a network. (10 marks)
4. (a) List four typical functions of systems software such as the Operating System. In your answer, identify the purpose of a ‘kernel’ in systems software. (10 marks)
- (b) Compare ‘Open-Source’ and ‘Closed-Source’ software. In your answer, describe the nature of ‘application software’ (which can be open-source or closed-source). (10 marks)
- (c) What are the fundamental characteristics of a database and, by extension, a Database Management System (DBMS)? (10 marks)