2CS63 Computer Systems and Architecture

Instructions.

All questions carry equal marks. Questions are marked out of 25.

Question 1.

(a) Discuss the problems and limitations associated with the Von Neumann 'Linear Store' memory model in relation to the requirements of modern computer systems. (**10 marks**)

(b) Describe modifications to the store organisation and addressing structures of the machines that can alleviate these problems. (**8 marks**)

(c) What are the implications of these modifications for (i) the execution speed of the machine and (ii) the way in which memory is managed by the operating system? (**7 marks**)

Question 2.

(a) Explain what is meant by an associative store. Discuss various ways in which associative stores can be used to improve the computer's instruction-execution performance. Use one of these to describe in detail the operation of an associative store. (**16 marks**)

(b) What is the principal limitation on the use of associative store? Describe how conventional memory, organised as a cache, can provide an alternative. Outline the operation of an instruction cache. (**9 marks**)

Question 3.

(a) Describe in detail the layered O.S.I. reference model, specifying the functionalities of each layer. (**10 marks**)

(b) Describe the principles behind Asynchronous Transfer Mode. (**5 marks**)

(c) Describe in detail the layered A.T.M. reference model, specifying the functionalities of each layer. Compare A.T.M. layers and O.S.I. layers. (**8 marks**)

(d) Comment on the impact of A.T.M. technology on distributed systems. (**2 marks**)

Question 4.

(a) Describe (with examples) design and implementation issues involved in processor allocation in distributed systems. (**12 marks**)

(b) Give at least three different examples of processor allocation algorithms. Your description should contain details about the algorithmic solutions and comments about advantages and disadvantages of each of them. (**13 marks**)

Question 5.

(a) Describe (with examples) design and implementation issues involved in distributed file systems. In particular explain the different caching mechanisms, their advantages and drawbacks. (**18 marks**)

(b) Describe the key features of Sun's Network File System. (**7 marks**)