

1994 Paper 6 Question 7

Concurrent Systems

A transaction processing system for a banking application is to be implemented using object semantics. Bank account objects include the following among their operations:

```
credit (account_id, amount)
debit (account_id, amount)
add_interest (account_id)
```

By defining “transactions” based on this example, show what is meant by

- (a) a non-serialisable execution schedule [3 marks]
- (b) a non-strict execution schedule leading to a cascading abort [3 marks]

Explain the ACID properties of transactions, drawing on the above application for examples. Indicate which properties are concerned with failure resilience and which with concurrency control. [8 marks]

Again using the above application for examples, explain concurrency control based on

- (a) two-phase locking [3 marks]
- (b) time-stamp ordering [3 marks]