Concurrent Systems and Applications

(a) A transaction processing system is using a write-ahead log as a mechanism for providing persistent storage. What information must be written to the log

(i) when a transaction starts;

(ii) when a transaction performs an operation on a persistent object;

(iii) when a transaction commits? [2 marks each]

(b) Describe how the log can be used to roll-back a transaction that has aborted or become deadlocked. [6 marks]

(c) The log can also be used to recover after some kinds of system failure.

(i) Describe how the log can be used to recover after a fail-stop crash. [2 marks]

(ii) What is meant by checkpointing? How will using it affect the structure of the log and the recovery procedure after a crash? [6 marks]