(*All words in Black, except for figures, are from the real exam paper, and those in color are added/replaced for illustration. Page numbers adjusted*)

AUSTRALIA ECU EDITH COWAN UNIVERSITY		INTERNAL/ EXTERNAL Semester One, 2019
Unit Code and Title	**CSI3344 Distributed Systems**	**STANDARD EXAM**
Student Number	SURNAME/FAMILY NAME	OTHER OR GIVEN NAME/S
Please print clearly		

Duration 3 hours

Attempt Attempt ALL questions

Marks 100 marks

Type of Exam Closed Book Exam
Textbooks, reference books and notes are NOT permitted.

Special Instructions

- **Answers to Question 1 (one) MUST be written on the *computer answer sheet* provided. Answers to all other questions MUST be recorded on the exam paper** (not on the booklet provided, unless you run out of space reserved to each question)**.**
- Use the booklet as scratch paper, or extra answer sheet when you run out of space reserved to each question.
- The booklet **MUST be handed in with your exam paper** for recording your exam mark.
- Calculator (non-programmable) is optional.
- There are a total of 17 pages.

Do not commence reading or writing this examination until you are told to do so.

SECTION A (30 MARKS)

Question 1 (30 marks)**:** *Select ONE from the supplied answers for each of the following questions (if you think that more than one answer was correct, select the ONE that best matches the question). All answers should be written on the* Computer Answer Sheets *provided. The relevant question number must identify each of your answers (e.g., if the answer you have chosen for the first question is* (C)*, then mark on* © *to question No. 1 on your* Computer Answer Sheets*).* (*Each question is worth 1 mark*).

(Questions may look like:)

1. Routing is handled at the
   (A) Session layer.
   (B) Transport layer.
   (C) Network layer.
   (D) Data Link layer.

2. A file is replicated on 9 servers. Which of the following combination of write and read quorums are permitted by the Gifford's voting algorithm (or Gifford's Quorum Scheme) ?
   (A) (9, 1)
   (B) (4, 5)
   (C) (8, 1)
   (D) All of above.

……

30. Which communication blocks the system?
    a. Persistent synchronous communication
    b. Persistent asynchronous communication
    c. Transient synchronous communication
    d. Transient asynchronous communication

……

(Go to next page)

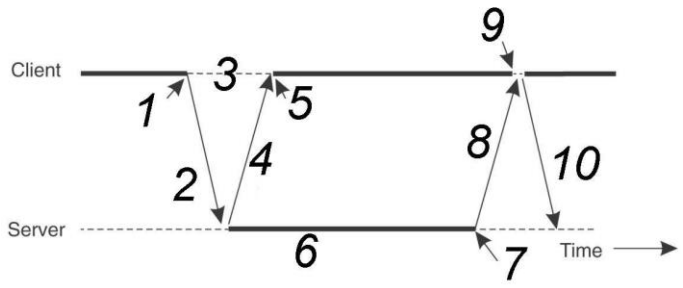
SECTION B: Short-answer questions (25 MARKS)

This section has two questions (i.e., Question 2 *and* Question 3*), each consisting of a number of sub-questions. You should attempt all these (sub)questions.*

Question 2: Answer the following questions. (15 marks in total)

(a total of 5 sub-questions - 1 example given below)

1. Remote Procedure Call (RPC)
   The following diagram shows the interaction between a client and a server through a deferred synchronous RPC. The 10 actions are labeled by 1-10 in the diagram. List these actions. (4 marks)



(Record your answer here)

2 . Word …

(Record your answer here)

3. Words…
   …
4. Words…
   …
5. Words…
   …

Question 3: *Questions from Advanced Readings.* (10 marks in total)

(There are 2 sub-questions in Q3. Question type is the same to that of Q2. No example given)

1. Words… (5 marks)

(Record your answer here)

2. Words… (5 marks)

(Record your answer here)

SECTION C (45 MARKS)

This section has two questions (i.e., Question 4 *and* Question 5*). Question 4 carries 25 marks while* Question 5 *is worth 20 marks. Attempt all questions.*

Question 4. Synchronization and Consistency (25 marks in total)

(A total of 5 sub-questions - examples given below)

1) What are the two simple points, on which the causal ordering is based? (2 marks)

(Record your answer here)

2) Draw a diagram showing three processes with some events, and then use vector timestamps to illustrate the Happen-before Relation. (4 marks)

(Record your answer here)

3) Words …

4) Words …

5) Words …

Question 5. Fault Tolerance and Security (20 marks in total)

(A total of 4 sub-questions - examples given below, marks are for loading indication only)

1) A system goes down on average 12 hours in 100 days although it is shut down a day every 100 days for maintenance. What is the availability of this system? Is this system reliable? (3 marks)

(Record your answer here)

2) What are the three features of a process group? (? marks)

(Record your answer here)

3) Words … (5 marks)

4) Words … (5 marks)

END OF EXAMINATION PAPER