


(All words in Black are from the original exam paper, and those in colour are added/replaced for illustration, page No. adjusted)

 <b>EDITH COWAN UNIVERSITY</b> PERTH WESTERN AUSTRALIA		<b>INTERNAL/EXTERNAL</b>  Semester ONE, 2015										
Unit Code and Title	<b>CSP2348 Data Structures</b>											
Student Number	SURNAME/FAMILY NAME	OTHER OR GIVEN NAME/S										
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**Duration**

Reading time	5 minutes
Working time	3 hours
Total time	3 hours 5 minutes

**Attempt** **ALL** questions in Sections A and B, and **THREE** out of the **FOUR** questions in Section C (i.e., of 100 marks in total).

**Marks** As indicated on the paper. Total marks: 110.

**Type of Exam** This is a restricted **OPEN BOOK** (one textbook only) exam. The textbook (either *Java Collections*, by D. Watt and D. Brown, or *Data Structures & Algorithms in Java*, by M. Goodrich & R. Tamassia) may contain annotations, but must **not** contain inserted sheets. Unit guide, reference books and notes are not permitted.

- Special Instructions**
- **Answers to Q1 (Multiple Choices) 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 3-page booklet as scratch paper if needed during the examination.
  - **The 3-page booklet MUST be handed in with your exam paper** for recording your exam mark.
  - This examination paper consists of 3 sections.
  - There are a total of 15 pages.
  - Calculator (non-programmable) is optional.

**Students are not permitted to write on the examination paper or any other paper during reading time.**

**Do not commence the examination until you are told to do so.**

**Section A Brief-answer questions** (total of 50 marks)

***This section consists of THREE questions (i.e., Q1 through to Q3). Attempt ALL questions of this section.***

**Q1). Multiple Choices** (30 marks, 1 mark each)

*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 (CAS) 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 (1) on your CAS.*

(1) Which of the following algorithm complexities has the slowest growth rate?

- (A)  $O(1)$
- (B)  $O(\log_2 n)$
- (C)  $O(n^5)$
- (D)  $O(2^n)$

(2) The GCD of two integer numbers, xxx and yyy, is

- (A) 62
- (B) 102
- (C) 22
- (D) 8

(3) Word ...

- (A) Word...
- (B) Word...
- (C) Word...
- (D) Word...

(4) ...

(30) The best case time complexity of ...

- (A) Word...
- (B) Word...
- (C) Word...
- (D) Word...

**Q2). Fill in the missed word/s (or number expression/s) to complete the sentences.**  
(RECORD YOUR ANSWERS in the space reserved on this page, not on the booklet provided). (10 marks, 1 mark each blank)

(1) The notation  $O(n^2)$  means that an algorithm's time (or space) growth rate is proportional to \_\_\_\_\_.

(2) Word ... \_\_\_\_\_.

(3) ...

(4) ...

**Q3). Briefly answer the following sub-questions (e.g., using one or two sentences only).** (10 marks, 2 marks each)

(1) Why is binary search strategy unsuitable for linked lists?

(Reserved area for you to record your answer/s)

(2) Word...

...

(3) Word...

...

(4) Word...

...

(5) Word...

...

**Section B: Algorithms Fundamentals** (total of 20 marks)

*This section has **FOUR** questions (i.e., Q4 through to Q7). Attempt **ALL** questions from this section.*

**Q4).** Manually ... **Workings must be shown.**

[5 marks]

(Reserved area for you to record your answer/s)

**Q5).** Word ... **Workings must be shown.**

[5 marks]

**Q6).** Word ...

[5 marks]

**Q7).** Word ... ...

[5 marks]

**Section C: Algorithms and algorithm analysis** (Total of 30 marks)

*This section has four questions (i.e., Q8 through to Q11). Attempt **THREE** out of the four questions. Each question is worth 10 marks (Note: if you answered all four questions, your solutions to the first three answered questions will be marked /counted, unless you clearly indicated your preference).*

**Q8).** Assume a binary search tree...

- a) Word ... (topic in BST searching/traversal algorithms and their applications);
- b) Analyze your algorithm using big O-notation.

*(Reserved area for you to record your answer/s)*

**Q9).** For an array ...

- (a) Write an algorithm .... (topic in array sorting algorithms and/or their applications)
- (b) Analyse your algorithm using  $O$ -notation.

**Q10).** .....,

- a) ... Write an algorithm .....(topic in variation of array searching/sorting algorithms and/or their applications)
- b) Analyse your algorithm using  $O$ -notation.

**Q11).** If an SLL .....(topic in variation of SLL searching algorithms and/or their applications)

a)

b) ....

### **END OF THE EXAMINATION PAPER**

**LAST NOTES:** enough space is reserved on the exam paper for you to write your answers into – please write your answers onto the space reserved for individual questions, unless you run out of space (only in such a case, may you continue writing your answers in the booklet provided).