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ALUPE UNIVERSITY
COLLEGE
...*Bastion of Knowledge*...

OFFICE OF THE DEPUTY PRINCIPAL
ACADEMICS, STUDENT AFFAIRS AND RESEARCH

UNIVERSITY EXAMINATIONS

2018 /2019 ACADEMIC YEAR

SECOND YEAR FIRST SEMESTER REGULAR EXAMINATION

FOR THE DEGREE OF BACHELOR OF COMPUTER SCIENCE

COURSE CODE: **COM 213**

COURSE TITLE: **PROCEDURAL PROGRAMMING II**

DATE: 11TH DECEMBER, 2018   **TIME: 9.00 AM – 12.00PM**

INSTRUCTION TO CANDIDATES

- **SEE INSIDE**

THIS PAPER CONSISTS OF 4 PRINTED PAGES   **PLEASE TURN OVER**

COM 213: PROCEDURAL PROGRAMMING II

STREAM: BSc (Computer Science)   **DURATION: 3 Hours**

INSTRUCTIONS TO CANDIDATES

   i.   *Answer **ALL** questions from section A and any **THREE** from section B.*

   ii.   *Maps and diagrams should be used whenever they serve to illustrate the answer.*

   iii.   *Do not write on the question paper.*

SECTION A (24 MARKS) COMPULSORY

QUESTION ONE (12 Marks)

a) Define the following terms:

    i.   Shallow equality   (1 Mark)

    ii.   Deep equality   (1 Mark)

    iii. Abstract parameter   (1 Mark)

b) The reason postfix is sometimes useful is that there is a natural way to evaluate a postfix expression using a stack. Sequentially describe how this can be achieved   (6 Marks)

c) Identify three syntax issues associated with class definition   (3Marks)

QUESTION TWO(12 Marks)

a) Write code that takes a Rectangle as an argument and returns a Point that contains the coordinates of the centre of the Rectangle: (4Marks)

b) List three elements of a traverse and count program   (3Mark)

c) The three most common programming paradigms are procedural, functional and object oriented programming. Outline three characteristics associated with object oriented programming   (3 marks)

d) Distinguish between a token and a delimiter   (2 Marks)

SECTION B (36Marks)

QUESTION THREE(12 Marks)

a) Sequentially outline the logic behind the "**findBisect**" search algorithm   (4 Marks)

b) Wanyonyi has a deck of cards in his hands, and decides to physically implement the idea behind the megabit algorithm through the following sequence:

1. Form two subdecks with about 10 cards each and sort them so that when they are face up the lowest cards are on top. Place both decks face up in front of you.
2. Compare the top card from each deck and choose the lower one. Flip it over and add it to the merged deck.
3. Repeat step two until one of the decks is empty. Then take the remaining cards and add them to the merged deck

Provide the pseudocode for the above scenario   (8 Marks)

QUESTION FOUR(12 Marks)

a) Write the code for a program that declares "banana" as a string and counts the number of times the letter 'a' appears in the string   (6 Mark)

b) An operation that can be performed on complex numbers is addition.You can add complex numbers by adding the real parts and adding the imaginaryparts.

(i)   Provide code that will write a class method for the above   (3 marks)

(ii)   Write code that would invoke the code you have written in (i) above   (1 mark)

(iii)   Give the code that would enable you to code the scenario above as an object method   (2 marks)

QUESTION FIVE (12 Marks)

a) Describe the pros and cons associated with pure functions, modifiers and fill-in method (3Marks)

b) Provide a sequential approach for an algorithm for printing a list backwards   (4Marks)

c) What makes a data type abstract i.e. an ADT is the fact that specifies a set of operations (or methods)and the semantics of the operations (what they do) but it does not specify

theimplementation of the operations.   Describe why this is useful   (5 Marks)

QUESTION SIX(12 Marks)

a) Discuss the reason why wrapper classes are considered to be extremely useful in procedural programming   (6 Marks)

b) In the board game Scrabble, each tile contains a letter, which is used to spell words, and a score, which is used to determine the value of a word. Write a definition for a class named Tile that represents Scrabble tiles. The instance variables should be a character named letter and an integer named value.   (6 Marks)

QUESTION SEVEN (12 Marks)

a) Given the Code:

```
class Time {

        int hour, minute;
        double second;

}
```

provide the state diagram for a Time object (5 Mark)

b) To add an element to the stack (push), we can copy a reference to it onto the stackand increment the index. To remove an element (pop) we have to decrement the index first and then copy the element out. Provide a class diagram for this scenario:

(7Marks)

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