

**CHUKA**



**UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**FOURTH YEAR EXAMINATION FOR THE AWARD OF DEGREE OF  
BACHELOR OF SCIENCE IN COMPUTER SCIENCE**

**COMP 400: PROGRAMMING LANGUAGE DESIGN**

**STREAMS: Y4S1**

**DAY/DATE: WEDNESDAY 13/12/2017**

**TIME: 2 HOURS**

**11.30 A.M – 1.30 P.M**

**INSTRUCTIONS:**

- Answer **QUESTION 1** and any other **TWO QUESTIONS** from section **B**.
- This is a **CLOSED BOOK EXAM**, No reference materials allowed in examination room.
- There will be No use of mobile phones, electronic calculators or memory watches.
- Write your answers legibly and use your time wisely.

**Question one (Compulsory): 30 Marks**

- Every variable is created (or allocated) at some definite time and destroyed or deallocated at some later time. This interval period can be referred to as lifetime. Classify variables according to their lifetimes. [4 marks]
- With use of relevant examples, discuss what a type system is. [2marks]
- Explain the meaning of Unified type system and give examples of languages that support it. [4 marks]
- Each and every programming language is an artifact and to be worthy its name, must satisfy certain fundamental requirements. Discuss. [4marks]
- All programming languages have Syntax, semantics and pragmatics. Explain these concepts and highlight why natural languages lack pragmatics. [4 marks]
- What are constructors? Giving an example, show why they are useful in java programming [2 marks]
- What is the purpose of a method parameter? Explain how it differs from method arguments. [4 marks]
- Explain the following programming paradigms: (i) Imperative programming, (ii) functional programming and (iii) logic programming. [6 marks]

**SECTION B : [Answer any two questions from this section]**

**QUESTION TWO:**

- a. Differentiate static from dynamic typing and give examples of languages that are supported by each type. [4marks]
- b. Explain the difference in type-completeness and type equivalence. [4marks]
- c. Differentiate Type checking from type inference [4marks]
- d. With use of sample program, differentiate Objects from classes in high level languages such as java [8marks]

**QUESTION THREE [20 MKS]**

- a. Suppose that you have to design a piece of software to determine the best schedule of courses in your department. You know which courses need to be offered, who can teach what, how many courses does each instructor teach, which classes can each instructor teach, etc. Which is programming language/paradigm would you recommend using and why? [10marks]
- b. Write a procedure and a call to it in block-structured pseudocode such that the execution of the procedure under pass-by-reference and under pass-by-value/result yields different outcomes. Justify your answer. [10 marks]

**QUESTION FOUR 20 MKS**

- a. Name and discuss a programming language of your choice, specify the programming paradigm it belongs to, and evaluate it critically using the dimensions and criteria we presented and discussed in class. [10marks]
- b. Explain the following concepts: (i) values and types, (ii) bindings and scope [4marks]  
  
(ii). Compare the advantages and disadvantages of these two approaches to type checking from the point of view of the language designer, the language Implementer and the programmer. [6 marks]

**QUESTION 5 20 MKS**

- (a). Discuss the advantages and inconvenient of dynamically-typed variables. [10 points]
  - (b). Discuss the feasibility of implementing a in-out parameter-passing method in a programming language that does not allow aliasing. [10 points]
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