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(Knowledge for Development)

KIBABII UNIVERSITY

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UNIVERSITY EXAMINATIONS 2021 / 2022 ACADEMIC YEAR

SPECIAL/SUPPLEMENTARY EXAMINATIONS YEAR THREE SEMESTER TWO EXAMINATIONS

FOR THE DEGREE OF BACHELORS OF SCIENCE (COMPUTER SCIENCE)

COURSE CODE: CSC 324

**COURSE TITLE: PRINCIPLES OF PROGRAMMING
LANGUAGES**

DATE: 23/11/2022

TIME: 11.00 A.M – 01.00 P.M.

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

QUESTION ONE (COMPULSORY) [30 MARKS]

- a. Explain two reasons why pure interpretation is an acceptable implementation method for several recent scripting languages. [4 marks]
- b. Why, in your opinion, do you think new scripting languages appear more frequently than new compiled languages? [4 marks]
- c. Describe the advantages of some programming environment you have used pointing out relevant features. [4 marks]
- d. Draw a neat flow chart of Compilation process. [6 marks]
- e. For the expression $A = B + C * A$, Find the leftmost derivation using unambiguous grammar [4 marks]
- f. Draw a unique parse tree for $A = B + C * A$, using an unambiguous grammar. [4 marks]
- g. Write the Attribute Grammar for any four simple assignment statements. [4 marks]
- h. How can knowledge of programming language characteristics benefit the whole computing community? [4 marks]

QUESTION TWO [20 MARKS]

- a. What is an assertion in axiomatic semantics? [2 marks]
- b. How is the order of evaluation of attributes determined for the trees of a given attribute grammar? [2 marks]
- c. Explain the branch of mathematics on which denotational semantics based? [2 marks]
- d. What is the problem with using a software pure interpreter for operational semantics? [2 marks]
- e. Discuss the concept of Binding, and Binding types with a simple example. [4 marks]
- f. What are Selection Statements? Explain the TWO types of Selection Statements with their design issues. [4 marks]
- g. Discuss the following with respect to subprograms: Design issues and Parameter Passing Methods [4 marks]

QUESTION THREE [20 MARKS]

- a. Which of the following identifier forms is most readable? Support your decision. [3 marks]

FirstName

First_Name

firstname

- b. Some programming languages have static variables. What are the obvious advantages and disadvantages of having static variables? [4 marks]
- c. Using the structures parent(X, Y), male(X), and female(X), write a structure that defines sister(X, Y). [3 marks]
- d. Write a Prolog program to print the Fibonacci series up to the nth term. [4 marks]
- e. Write a simple assignment statement with one arithmetic operator in some language you know. For each component of the statement, list the various bindings that are required to determine the semantics when the statement is executed. For each binding, indicate the binding time used for the language. [6 marks]

QUESTION FOUR [20 MARKS]

- a. Define ADT, give the advantages and its design issues. [4 marks]
- b. Discuss the following with simple code samples wherever required:
- i. Parameterized Abstract Data Types [2 marks]
 - ii. Parameterized ADTs in C++ [2 marks]
 - iii. Parameterized Classes in Java 5.0 [2 marks]
 - iv. Naming Encapsulations [2 marks]
- c. Explain:
- i. Storage structures for instance variables [2 marks]
 - ii. Dynamic binding of messages to methods [2 marks]
- d. Give the general form of exception handlers in Java in detail with an example. [4 marks]

QUESTION FIVE [20 MARKS]

- a. What is principle of programming language and what are its objectives? **[4 marks]**
- b. Explain first LISP interpreter. Give its internal representation two LISP lists. **[2 marks]**
- c. Explain different types of translation and their roles? What is trade's off of translation. **[6 marks]**
- d. Why can concurrency be easier with functional languages than imperative languages? **[2 marks]**
- e. Discuss the key Paradigms of Programming and show why they are necessary part of the current solutions to various problem domains. **[6 marks]**