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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2022/2023 ACADEMIC YEAR
THIRD YEAR, FIRST SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(MATHEMATICS)

Date: 12th April, 2022
Time: 11.30am – 1.30pm

KCS 303 - PROGRAMMING PARADIGMS

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

- a) Distinguish between the following set of terms in programming with relevant examples.
- i) Semantics and syntax (4 Marks)
 - ii) Static semantics and Dynamic semantics (4 Marks)
 - iii) Weak and strong typing (4 Marks)
- b) Describe the properties that are key indicators for automata-based programming. (8 Marks)
- c) Discuss the conditions that must hold for recursion to work in programming paradigms. (8 Marks)

QUESTION TWO (20 MARKS)

- a) Discuss the reasons for Studying Concepts of Programming Languages based on the major Language Evaluation Criteria. (10 Marks)
- b) Discuss five features of functional languages (10 Marks)

QUESTION THREE (20 MARKS)

- a) Explain the difference between compiled languages and interpreted languages giving relevant examples. (8 Marks)
- b) Discuss the following programming paradigms and mention at least two programming languages for each
- i) Functional programming (4 marks)
 - ii) Object oriented programming (4 marks)
 - iii) logic programming languages (4 marks)

QUESTION FOUR (20 MARKS)

a) Describe the following with examples;

- i) Assignment-free language (3 Marks)
- ii) Nonprocedural languages (3 Marks)
- iii) A meta-circular (3 Marks)
- iv) A self-interpreter (3 Marks)

b) Consider this Prolog program .

```
rainy(vancouver).  
rainy(sept_iles).  
cold(sept_iles).  
snowy(X) :- rainy(X), cold(X).
```

Draw the search tree for the query `snowy(C)`.

(8 Marks)

QUESTION FIVE (20 MARKS)

a) An ICT company is currently using a mainframe based technology but wants to move towards a Linux platform that will support a web system. This will require a change of programming language from COBOL to something more suitable. As the IT Manager, you have been asked to produce a short report assessing possible choices of language. Choose two different programming paradigms and assess their strengths and weaknesses for use in such a web-based system.

(10 Marks)

b) Below is a simple grammar, based on [Lisp](#). State what the grammar specifies for each code.

```
expression ::= atom | list  
atom ::= number | symbol  
number ::= [+ -] ? ['0'-'9'] +  
symbol ::= ['A'-'Z' 'a'-'z'].*
```

(6 Marks)

c) Consider the following sentence:

- 'All men are mortal'

We can express this as :

- mortal(X) :- human(X).
- Let us define the *fact* that Socrate is a human.
- mortal(X) :- human(X).
- human(socrate).

Now if we ask to prolog :

- ?- mortal(socrate).

What will prolog respond and why.

(4 Marks)