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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATIONS, 2019/2020 ACADEMIC YEAR
SECOND YEAR, FIRST SEMESTER EXAMINATIONS
BACHELOR OF SCIENCE IN COMPUTER SCIENCE

KCS 303 - PROGRAMMING PARADIGMS

Date: 8th April, 2019
Time: 8.30am – 10.30am

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a) Giving examples where need, explains the following terms as used in programming paradigm;

i) Imperative programming

ii) Functional programming

iii) Structured programming

iv) Event-based

v) Declarative programming

vi) Automata-based programming

vii) Object oriented programming (OOP)

viii) Recursion

ix) A programming paradigm

x) Aspect-oriented programming

b) Outline the general approach to writing a recursive program. (5 Marks)

c) Explain the benefits of functional programming. (4 Marks)

d) Itemize the five conditions that must hold for recursion to work. (5 Marks)

e) Giving examples differentiate between Linear and Tree Recursion. (4 Marks)

f) Outline the software crisis of 1960 in programming. (2 Marks)

QUESTION TWO (20 MARKS)

a) Describe the properties that are key indicators for automata-based programming. (5 Marks)

b) Event driven programming is widely used in graphical user interfaces. The design of the toolkits has been criticized for promoting an over-simplified model of event-action, leading programmers to create error prone, difficult to extend and excessively complex application code. Such an approach is fertile ground for bugs for at least three reasons. Identify the reasons. (3 Marks)

c) Discuss the five features of functional languages. (12 Marks)

QUESTION THREE (20 MARKS)

a) Distinguish between the following set of terms: (10 Marks)

- i) Semantics and syntax
- ii) Static semantics and dynamic semantics
- iii) Strong versus weak typing.
- iv) Static versus dynamic typing
- v) Weak and strong typing

b) There are many approaches to formal semantics which can be grouped to three major classes. Explain them as listed. (6 Marks)

- i) Denotational semantics
- ii) Operational semantics
- iii) Axiomatic semantics

c) Briefly explain prolog programming. (4 Marks)

QUESTION FOUR (20 MARKS)

a) Describe the following with examples; (8 Marks)

- i) Assignment-free language
- ii) Declarative languages (non procedural languages)
- iii) A meta-circular
- iv) A self-interpreter

b) Outline the rules for unification in prolog. (3 Marks)

c) Consider this prolog program (9 Marks)

```
 father (john,ben).     % 1
father (john,steve).   % 2
father (steve,chris).  % 3
father (chris,adam).   % 4
father (steve,tom).    % 5
grandfather r(X,Z) :- father(X,Y), father(Y,Z).
```

Draw the search tree for the query ‘?- grandfather(G,chris).

QUESTION FIVE (20 MARKS)

a) Define the term recursion. (2 Marks)

b) In order to solve a problem recursively, two conditions must be satisfied. (2 Marks)

c) The Fibonacci series has the following form: 0, 1,1,2,3,5,8…. It can be solved recursively fib(n)=fib(n-1) + fib(n-2) i.e the nth fibonacci number is defined as shown b the above expression. Write a function using recursion that calculates the nth recursive number. For instance fib(3) = 1 i.e 1 + 0 and fib(4) = 2 i.e 1 + 1. Tip; The base case: fib(0)=0 and fib(1)=1. Use your function in a main program where you ask the user to a number n and then you output the nth Fibonacci number. (8 Marks)

d) Write a function that converts an input string to uppercase. The argument to the function is a string. The function then returns the string in uppercase. Use your function in a main program where you ask the user to enter a string and then you output the string in uppercase. Do not use the strupr or toupper functions. You have to use a loop. Hint: Characters in C are stored as integers using the American Standard Code for information interchange (ASCII). The lower case characters are given the integers 97 to 122 where ‘a’=97, ‘b’=98,… The uppercase characters are represented by the integers 65 to 95 where ‘A’=65, ‘B’=66…If you have the statement putchar (97) in your program, then the character ‘a’ is output on the screen. Since characters are integers, then it is possible to do some basic mathematics with them e.g’a’+ 2=99 which is equal to c. (8 Marks)