kasneb

CICT PART II SECTION 3

STRUCTURED PROGRAMMING

WEDNESDAY: 27 November 2019. **Time Allowed: 3 hours.**

Answer ALL questions. Marks allocated to each question are shown at the end of the question.

ALL programs written should be in C programming language.

QUESTION ONE

(a) Describe two ways in which you could define a constant in C programming. (2 marks)

(b) (i) Explain the terms "device convergence" in the context of mobile programming. (2 marks)

(ii) List four examples of devices depicted in (b) (i) above. (4 marks)

(c) Consider the mathematical expression given below:

$y = a^0 + a^1 + a^2 + ... + a^n$

Required:

(i) Write a C function that will take values "a" and "n" as parameters and return "y". (6 marks)

(ii) Write a C program that will take values "a" and "n" from a user. The values are then passed to the function in (c) (i) above and results displayed on the command line. (6 marks)

(Total: 20 marks)

QUESTION TWO

(a) (i) Write a C program that prints the first 50 numbers using a Do while loop. (3 marks)

(ii) Rewrite the code in (a) (i) above using recursion function. (5 marks)

(b) Write a C program that requests a user to provide a file name. The program then deletes the file and outputs either; "The file is deleted" or "Unable to delete the file". (6 marks)

(c) You have been provided with an array of five elements as shown below:

[4, 2, 5, 7, 4]

Required:

Write a C program that will sum all the elements in the array using pointers. (6 marks)

(Total: 20 marks)

QUESTION THREE

(a) (i) Sketch a structured programming flow diagram to depict the switch control structure made up of three possible options. (5 marks)

(ii) List two commands used with the switch statement in C programming language. (2 marks)

(b) A college intends to keep track of books in the library. The following attributes of a book are to be captured.

- BookID
- Title
- Author
- Subject

Required

(i) A structure definition for a book. (2 marks)

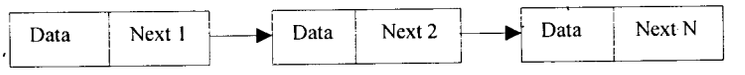
(ii) A program in C language using the structure in (i) above to read the book attributes and output the details on the screen. (4 marks)

(c) Sally wrote a program using monolithic programming approach.

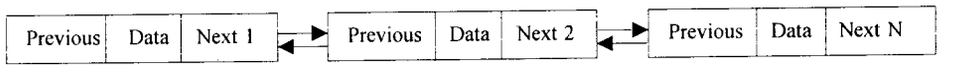
Highlight two challenges that she may have encountered as she wrote the program. (2 marks)

(d) The figure below shows linked lists as used in structured programming.

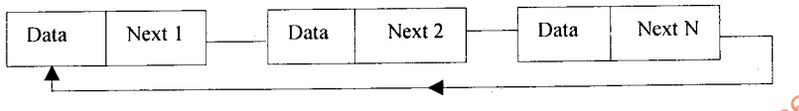
(x)



(y)



(z)



Required:

(i) Identify the type of linked lists x, y and z above. (3 marks)

(ii) Highlight two advantages of linked lists. (2 marks)

(Total: 20 marks)

QUESTION FOUR

(a) Explain each of the following issues faced by modern programmers:

(i) Big data. (2 marks)

(ii) Syntactic noise. (2 marks)

(iii) Multithreading. (2 marks)

(iv) Program closure. (2 marks)

(b) Create a function named "exchange" that demonstrates how arguments are passed by address. The function should accept and interchange two numbers which should then be called in the main program. (8 marks)

(c) List four items that could be added to program documentation to make the details easy to access. (4 marks)

(Total: 20 marks)

QUESTION FIVE

(a) Differentiate between "text file" and a "binary file" in the context of programming. (4 marks)

(b) A programmer has written the following code:

```
#include <iostream>
using namespace std;
int val = 500;
int main ( )
{
  int val = 200;
  cout<<first::val<< '\n';
  return 0;
}
```

Required:
Create the namespace named "first" with a variable "val" initialised to 1000 that will be displayed by the program when the cout statement is executed. (2 marks)

(c) State the purpose of each of the following symbols used in a C program:

(i) [ ] (1 mark)

(ii) { } (1 mark)

(d) Create a function that sorts the numbers of an array in ascending order using pointers. (6 marks)

(e) Write a C program that uses a While loop to count the number of digits in an integer. (6 marks)

(Total: 20 marks)

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