kasneb

**CICT PART II SECTION 3**

**STRUCTURED PROGRAMMING**

**THURSDAY: 29 November 2018.** **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 each of the following variable lifetimes as used in C programming:

(i) Program lifetime. (2 marks)

(ii) Automatic lifetime. (2 marks)

(iii) Dynamic lifetime. (2 marks)

(b) The ratio of the circumference of a circle to its diameter is pi, approximately equal to 3.14159.

**Required:**
Using two declaration methods, declare pi as a constant in C programming language. (4 marks)

(c) Explain two operations that could be performed on a stack. (4 marks)

(d) (i) Explain the term "transfer of control" as used in structured programming. (2 marks)

(ii) Justify the importance of transfer of control in structured programming. (4 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Explain two basic functions of a loader in the context of structured programming. (4 marks)

(b) Distinguish between "const modifiers" and "volatile modifiers" as used in C programming. (4 marks)

(c) Consider the following array:

numbers [4] = {6600, 5500, 4400, 3300}

**Required:**
Write a C program that uses a for loop to display each array element in a separate line. (4 marks)

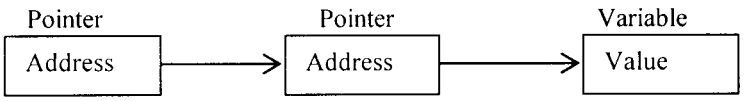
(d) Explain three benefits associated with collaborative application development. (6 marks)

(e) Given that a = 25, evaluate the output of the following structured programming statement:
printf ("%d, %d, %d, %d, %d", a+ +, + +a, – –a, a– –, a); (2 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) Study the diagram below of variable declaration in C programming language:



**Required:**

(i) Explain the implementation depicted by the diagram above. (3 marks)

(ii) Illustrate how a variable named num of integer type could be declared using the implementation shown in the diagram above. (3 marks)

(b) Consider the following C program statement:

```
int a, b, c, d ;
```

**Required:**

Rewrite the C statement in two lines without repeating the word int or changing the meaning. (2 marks)

(c) Outline the function of each of the following header files in C programming language.

(i) <ctype.h> (2 marks)

(ii) <math.h> (2 marks)

(iii) <stdlib.h> (2 marks)

(iv) <stdarg.h> (2 marks)

(d) Identify a type of error which could arise from each of the following scenarios in C programming:

(i) A missing semicolon. (1 mark)

(ii) Erroneous output. (1 mark)

(iii) Program terminated prematurely due to wrong input. (1 mark)

(iv) Error due to certain combinations of data. (1 mark)

**(Total: 20 marks)**



**QUESTION FOUR**

(a) Differentiate between the following terms in relation to structured programming:

(i) Procedure and function. (4 marks)

(ii) "rb+" and "ab+" file modes. (4 marks)

(b) Highlight four main ways that a C programmer could make a code easy to understand and test. (4 marks)

(c) Study the C program extract given below:

```
#include <stdio.h>
int main ( )
{
int   i ;
    for (i = 0; i < = 10; i + +)
        {
            if (i% 3 = = 0)
                {
                  printf ("%d\n", i);
                }
                else continue;
        }
}
```

**Required:**

(i) Write the output of the above program code. (4 marks)

(ii) Write the output of the above program when continue is replaced with break. (2 marks)

(iii) Distinguish between the use of "continue" and "break" keywords in the above program code. (2 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Outline four key features of C programming language. (4 marks)

(b) Write a program that reads a person's height and weight respectively and calculates the body mass index (bmi) using the formula bmi = weight/height$^2$. The program should display the bmi and a corresponding message based on the criteria below:

| **Body Mass Index** | **Output Message** |
|---|---|
| Below 20 | Lower than normal weight |
| 20 – 25 | Normal weight |
| 26 – 30 | Overweight |
| 31 – 40 | Obese |
| Above 40 | Extreme obese |

(8 marks)

(c) Study the matrix given below:

| | |
|---|---|
| 0 | 1 |
| 2 | 3 |
| 4 | 5 |

**Required:**

Using two globally declared variables ROWS and COLS respectively, write a multi-dimensional array in C program to display the matrix. (8 marks)

**(Total: 20 marks)**

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