KYAMBOGO UNIVERSITY

FACULTY OF SCIENCE

Department of Computer Science

University Examinations 2018/2019

Second Year, Semester one Examination for Degree in Information Technology and Computing

SCS2104/IT214 : Structured programming

Date: Wednesday, 28th November 2018 **Time: 12.00 p.m – 3.00 p.m**

Instruction to Candidate:

*The paper consists of **six** questions*
*Attempt any **five** questions*
All questions carry equal marks.
Start each Question on a new page

Question 1

(a) Students of a New University have a part of a database with the following selected fields: The student **Surname**, **programme** offered , **fees** paid, and **age** in full years.

(i) **Define** a structure called **student** with the above field names(in bold). Use appropriate data types in real life for each variable name.

(3 marks)

(ii) Use the definition in (a)(i) to declare a structure called **gradstud** reserving memory for **60** graduate students and a pointer to this structure called **undergrad.** ***(3 marks)***

(iii) Write a single correct statement which can be used in the program to assign the 30th "**gradstud**" **BITC** as his programme he is undertaking.

(2 marks)

(b) The piece of program below demonstrates the use of structures in C-language. Given that a structure is equivalent to a record. Answer the question that follow to have a complete working program

```
#include <stdio.h>
#include<stdlib.h>
struct person {
        char name[15];
        float salary;
        int age;
            };
int main(){
struct person *ptr;
int i,n;
printf("Enter number of records n: ");
scanf("%d",&n);
...../*line 1  */
...../* line 2*/
...../*line 3 */
...../* line 4*/
return 0;
}
```

Write a statement

(i) in **line 1** to allocate memory to **n** records using **malloc()** function ***(3 marks)***

(ii) in **line 2** to enter the **name** of the 3rd record from keyboard ***(1 mark)***

(iii) **in line 3** to enter the **age** of the 3rd record from keyboard ***(1 mark)***

(iv) in **line 4** to enter the **salary** of the 3rd record from keyboard ***(1 mark)***

(c)Given that **d, t** and **r** are variables of the type integer.

```
r=(t<d)?( d%t):sqrt(t));
```

(i) Explain clearly the meaning of the above statement as used in C-Language. ***(3marks)***

(ii) Write an equivalent correct C code which will achieve the same purpose. ***(2 marks)***

(iii) What is the value of **r** if **d** is **11** and **t** is **9?** ***(1 mark)***

Question 2

(a) A file contains the following characters as shown. **A** is the first character while **N** is the last character in the same file. This file is opened with the following statement:

fptr=fopen("myfile.txt","r+");

A	B	C	X	E	F	G	H
W	J	K	L	M	N	O	P
Q	R	S	T	U	V	Z	N

(i) What operations can be done to the file. ***(2 marks)***

(ii) Write one correct statement which will move the file pointer to character **J,** assuming this pointer was at **P.** ***(3 marks)***

(iii) Write a simple correct code using, in addition to all of the variables/names given in the "fopen" statement to determine the size of the file (explain your code) . ***(4 marks)***

(iv) Write a simple code which will search a character **M** in the above file and modify it to **T.** ***(6 marks)***

(b) Analyse the code below and answer the questions that follow.

```
#include<stdio.h>
#include <string.h>
main()
{
char  text[18];
FILE   *fpin;
strcpy(text, "yourdata");
fpin=fopen(  text , "w");
fputs(text, fpin);
fclose(fpin);

}
```

(i) Identify the name of the file which can be searched in a computer *(1 mark)*

(ii) Write down the content in that file at the end of running that code. *(2marks)*

(c) What are the uses of the arguments in the **main()** function when used in a program i.e

```
int main(int y, char *z[] )
  {
  ……
  ……..
   }
```

(2 marks)

Question 3

(a) The following working code was used to display some values on the screen. Study it carefully and answer the question that follow.

```
#include<stdio.h>
main()
{
int  k[]={27,53, 69, 37, 55, 98, 49, 65};
int  *m=k;
printf( " %d\n", *(m +4));
printf( " %d\n", m[5]);
printf( " %d\n", *m ++);
printf( " %d\n", *++ m);
printf( " %d\n", m[4]);
}
```

Write down what will be displayed on the screen if it was blank. *(5 marks)*

(b)Explain the following statements:

(i) **int** (*z)[7]; *(2marks)*

(ii) int *z[13]; *(2marks)*

(c) Given the following statements from a working program,

```
int num1  = 328;
int num2  =  28;
int  *data;
data = & num1;
num2 = *data%8;
```

What will be the value of num2 after the last statement has executed? *(3 marks)*

(d) Give two technical differences between the following two assignments if **r** is a variable in C-language.

r= **''S"** and **r= 'S'** *(2marks)*

(e) Given the following C- working programge, where **y, m ,s** are variables of type integer. What will be the values of these variables after the last statement has executed?

```
#include<stdio.h>
main(){
int m=8,s=12, y=72;
s=m++;
y /=24 +  ++s;
s *= s +  ++y;
s= ++y%m+++7;
printf( " %d\n %d\n %d\n ", y,m,s); }
```

(6 marks)

Question 4

(a) Variables, **t, k** and **w** are assigned values shown extracted from a working program.

```
t[6]=635.7;
k=&t[0];
w=k;
……..
```

Write down the possible **correct** declaration statement for each of these variables.

(3 marks)

(b) The program below was intended to display the following numbers exactly on the screen:

20 2 18 4 16 6 14 8 12 10

```
#include<stdio.h>
main()
{
int a,b;
……..
…….
}
```

Use a **for……** control structure and two variables **a** and **b** as declared above to achieve this**.** Assume a single tab space between the numbers displayed *(5 marks)*

(c) The following is a part of a C- code which will be used to enter five numbers randomly and then sort them in ascending order. You are required to complete it using **only** the variables given and appropriate **for….loops** etc,

```
#include<stdio.h>
main()
{
int num[5], temp, x,y,k;
printf(" Please enter five numbers separated by space");
scanf("%d %d %d  %d %d", &num[0], &num[1], &num[2],
&num[3], &num[4]);
for(x=0;x<5;x++)
  ……
……
……
}
```

(8 marks)

(d)Study the following program and answer the questions following

```
#include<stdio.h>
 void main()
  {
 int x,y,z;
  float  mean;
  x=9; y=7; z=4;
  mean =(float)(x+y+z)/3;
  printf( "The mean value  is given as %4.4f ", mean);
  }
```

(i) What is the output of the program above? *(2 marks)*

(ii) What will be the output if **(float)** is **not** in the code and why? *(2marks)*

Question 5

(a) With the help of an example/illustration, explain the following:

(i) Pass arguments to a function by **value** ***(2 marks)***

(ii) Pass arguments to a function by **reference** ***(2 marks)***

(b) Study the following program below written in C. It is supposed to add two numbers (**value1, value2**) , increment them using a function **sum(),** and then produce and display their resultant sum using the printf() statement indicated in the main() function.

```
#include <stdio.h>
… ……..          /* write your prototype here */

void main()
{
int value1, value2, total;
value1=13;
value2=62;
total= sum (…….);                    /* fill in the missing parameters */
printf("\n%d plus %d equals %d",value1, value2,total);
}

int sum (……)/* fill in this gap also and write the whole function*/
{
……  /* insert here any number of statements you require to achieve the results*/
…….
}
```

You are required to complete and write a correct C-function called **sum()** with three variables **value1 ,value2** and **total** so that the printf() statement can display the following statement on the screen i.e

46 plus 74 equals 120

(Do not change values of **value1** and **value2** statements i.e. **13** and **62** etc, simply add what is appropriate in the gaps indicated with dotted lines ***(10 marks)***

(c) Write a program using a single –subscribed variable to evaluate the following expressions: Aim at having a correct code.

$$\text{Total} = \sum_{i=1}^{10} X_2^2$$

the values of x_1, x_2, ... are read from the keyboard

(6 marks)

Question 6

(a) Given the following C-Code, study it and answer the questions that follow:

```
#include<stdio.h>
void main(){
   int m=21;
    int y=45;
   if( !(++y && ++m))
    {
    printf("%d  and %d",y,m);
    }
 else
   {  printf("%d  ",y+m); } }
```

(i) If the screen is blank, what will be displayed after running the above code? ***(3 marks)***

(ii) What will be displayed if '**&&**' is replaced by '**||**' **?** ***(2 marks)***

(iii) Explain how you get the final values of **y** and **m** in (a) (ii). ***(3 marks)***

(b) Study the following code below and answer the question that follows:

```
#include<stdio.h>
int main(){
double s=21.85;
   printf("%d\t",sizeof(long));
   printf("%d\t",sizeof(s));
  printf("%d\t",sizeof('Q'));
   return 0;
}
```

Write down the output of the above C – code and explain each of your results if it was run on a 32-bit computer? ***(3 marks)***

(c) Study the following code below and answer the question that follows:

```
#include<stdio.h>
int main(){
   const int *y;
   int t=64;
   y=&t;
   printf(" %x  %d ", *y,++t);
   return 0;
}
```

(i)What will be the output when you execute C- code above? ***(2 marks)***

(ii) Explain your results. ***(4 marks)***

(d) Analyse the code below.

```
#include<stdio.h>
const enum numeric{  a=3, b=6,  c, d}k=24;
int main(){
enum numeric x,y;
x= a++;
y= b;
 printf("%d",x+y-k);
return 0; }
```

Indicate a statement in the above code which has an error and explain why it is so.

(3 marks)