KYAMBOGO UNIVERSITY

FACULTY OF SCIENCE

Department of Computer Science

University Examinations 2016/2017

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

IT214 :Programming & Programming Methodology I:

Date: Wednesday, 30th November 2016 **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) Analyse the following declaration statement in C-language.

typedef enum{mon, tue=4,wed,thur,fri=10,sat,sund=3,true, fr, sun}list;

What will be displayed on the screen when the following statement is executed in a program containing the above declaration?

printf("%d, %d, %d, ", mon, thur, sun); ***(3 marks)***

(b) A file called **alphabet.txt** contains the following characters as shown. **T** is the first character while **X** is the last character in the same file.

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

(i) Write **one** correct statement that will open the file **alphabet.txt** in read and write mode, given that **fptr** is declared as a pointer to it. ***(2 marks)***

(ii) Write down the character where the file pointer is after (a)(i). ***(2 marks)***

(iii) Write **one correct** statement which will move the file pointer to character **K,** assuming this pointer was at **M.** ***(3 marks)***

(iv) Write a simple correct code/program that will determine and display the value of **numb** where **numb** is the size in bytes of that file.(explain your code) . ***(4 marks)***

(v) Write a simple code which will search a character **N** in the above file and modify it to **Y.** ***(6 marks)***

Question 2

(a) With the help of an example/illustration, explain the following: ***(4 marks)*** :

(i) Formal argument in a function
(ii) Actual argument in a function
(iii) pass parameters by value
(iv) pass parameters by reference

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

```
#include <stdio.h>
 … ……..          /* write your prototype here */
void main()
{
int value1,value2,total;
value1=24;
value2=18;
total=calculatetotal(…….);          /* fill in the missing parameters */
printf("\n%d plus %d equals %d", value1, value2,total);
}

int calculatetotal (…….……) /* fill in this gap possible parameters*/
{
*r =  *r+4;
.*z = *z+3;
return(…….);/* fill in this gap possible parameters*/
}
```

(i) Fill in the **gaps/ missing parameters** in the two codes ***(4 marks)***

(ii) Write down the expected display on the screen . ***(2 marks)***

(c) Students of BITC/2 have a database with the following **selected** fields: The student's **indexnum**, **surname**, **fees**, and **age(** in full years.)

(i) Declare a structure called **student** with the above field names. Use appropriate data types in real life for each variable name. ***(3 marks)***

(ii) Use the structure in (c)(i) above to declare two variable structures, one(**graduate)** which is a pointer to it , and a second one(**undergraduate)**that is ***not*** a pointer**.** ***(2 marks)***

(iii) Write down three correct statements that can be used to prompt a user to enter the "**graduate" s fees, surname** ,and **age** ***(3 marks)***

(iv) Write a correct statement to assign **fees** a value of 6789.83 to any "**undergraduate"** . ***(2 marks)***

Question 3

(a) Four variables **name, qse**, **str** and **raf** are appearing in the statements in the following C-program.

```
#include <stdio.h>
#include <string.h>
int main ()
{
int  n, x;
……..
name=&raf;
raf[2]=946.45;
qse=fopen("myfile","a");
strncpy(str[3],"MATHEW",4);
n=strlen(str[3]);
x=strcmp("MARIA","HURRY");
printf("  %d \n",x);
printf("  %s  %d \n",str[3],n);
return(0);
}
```

(i) Write down the possible **correct** declaration statement for **name, qse**, **str** and **raf** in the dotted space. ***(4 marks)***

(ii) What will be displayed by the statement **printf(" %s %d "\n",str[3], n);**? ***(2 marks)***

(iii) Give and explain the **possible value** of the variable **x** ?. ***(2 marks)***

(b) **fwrite()** function allows us to write blocks of data to a file. For example

fwrite (**a,b,c,d**);

Explain what each parameter represents in this function when used in the program. ***(4 marks)***

(c) Given the following piece of C-Code where **lette**r, is a variable and **fptr** is a pointer to a file . It tests whether the end of file is reached when reading character by character from the file pointed to by **fptr.**

```
……..
……..
while(!feof(fptr))
        {
        letter =getc(fptr);
        putchar(letter);
        }
……..
……..
```

Re-write the code using **EOF** instead of **feof** in your code to achieve the same purpose. ***(2 marks)***

(d) A BITC/2 student designed a program to solve the two real values of any quadratic equation of the form $\mathbf{ax^2 + bx + c = 0}$ where **a, b, c** are real values**,** write the possible code for it to achieve it. **Aim at nearly writing the correct code that may need minimal or no correction to run.** ***(6 marks)***

Question 4

(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  numbers[]={20 ,42, 66, 85, 53, 75, 48, 92};
int  *ex=numbers;
printf( " %d\n", ex [5]);
printf( " %d\n", *( ex +4));
printf( " %d\n", *ex ++);
printf( " %d\n", *++ ex);
}
```

Write down what will be displayed on the screen by each printf() statement if it was blank. ***(4 marks)***

(b) Explain the following C-statements clearly:

(i) **int** (*value)[5]; ***(2marks)***

(ii) **int** *token[6]; ***(2marks)***

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

```
#include<stdio.h>
main()
{
int x,y,z;
 float  mean;
 x=10;
 y=7;
 z=12;
 mean=(float)(x+y+z)/3;
 printf( "The average value  is given as %3.6f ", mean);
 }
```

(i) What will be displayed on the screen by the program above? ***(2 marks)***

(ii) What is the importance of the term **(float)** in the statement **(float)(x+y+z)/3**? ***(2marks)***

(iii) If **(float)** is not used, what will be displayed as the value of **mean?** ***(2marks)***

(d) Given the following statements as part of a C- working program, where **yea, mon, sum** are variables of type integer. What will be the values of these variables after the last statement has executed?

```
#include<stdio.h>
void main()
 {
int yea, mon,  sum;
 yea=72;
 mon=4;
 sum=6;
 sum=mon++;
 yea /=20 +  sum;
 sum *= sum +  ++yea;
 sum=++yea%mon++;
 printf( "The  values are %d  %d  %d ", sum, yea, mon  );
 }
```

(6 marks)

Question 5

(a) Write a simple working C program (using a **for…loop control** structure in your program) that will display the following numbers exactly on the screen i.e from 12 to 26 **excluding** 17 and 21

12 13 14 15 16 18 19 20 22 23 24 25 26 . ***(5 marks)***

(b) Given the following C - program,

```
#include<stdio.h>
main()
{
int y,t,s;
for(y=15,t=60; t; t=t-y)
   {
    printf("\n The value of t is: %d", t);
    s=t;
    }
}
```

(i) Re-write it using a **while....loop** to produce the same results**.** ***(3 marks)***

(ii) What will be the values of **s** and **t** when the loop ends ? ***(2 marks)***

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

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

(6 marks)

(d) Study carefully the following C-program.

```
#include<stdio.h>
  main()
{
char day;
printf(" which day?");
day=getchar();
if (day = = 'S')
      printf("weekend");
else if (day = = 'M')
      printf("week day");
else if (day = = 'T')
      printf("week day");
else if (day = = 'W')
      printf("week day");
else if( day = = 'F')
      printf("week day");
else
printf("Not a day");
 }
```

Replace the **if…else** with the **switch…case** control structure to achieve the same results ***(4 marks)***

Question 6

(a) Given that **z, t** and **r** are variables of the type integer, and the following statement is extracted from a working program:

r=(z>t)?(t%z):sqrt(t-z);

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

(ii) What is the value of **r** if **z** is 5 and **t** is 54? ***(2 marks)***

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

```
#include<stdio.h>
void main(){
   int x=24;
    int y=16;
   if(++y||++x)
    printf("%d  %d",y,x);
}
```

(i) What will be displayed on the screen after running the above code? ***(2 marks)***

(ii) Explain how you obtain the correct answer in (a) (i). ***(2 marks)***

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

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

```
#include<stdio.h>
int main(){
float A=78.43;
char x='K';
   printf("%d\t",sizeof(x));
   printf("%d\t",sizeof(57392));
   printf("%d",sizeof(A));
   return 0;
}
```

(i) What will be the output when you run the above C - code? ***(3 marks)***

(ii) Explain each of the displayed value. ***(3 marks)***

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

```
#include<stdio.h>
int main(){
   int *x;
   int y=74;
   x=&y;
   ++y;
   printf("%d",*x);
   return 0;
}
```

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

(e) Analyse the code below.

```
#include<stdio.h>
 const enum numeric{  x, y=3,  z, k}p=10;
int main(){
enum numeric a,b;
a= x;
b= z;
 printf("%d",a+b-k);
return 0; }
```

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