KYAMBOGO UNIVERSITY

FACULTY OF SCIENCE

Department of Computer Science

University Examinations 2017/2018

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

SCS2104/IT214 : Structured programming

Date: Wednesday, 29th November 2017 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) Modify appropriately the C-code below in order to display the following numbers exactly on the screen i.e **with numbers 23 and 27 not in the list**.
18 19 20 21 22 24 25 26 28 29 30 31 32.

```
#include<stdio.h>
int main(){
int k=18;
while(k<33)
   {
        printf(" %d  ",k);
        k=k+1;
        }
  return 0;
}
```

(4 marks)

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

20 11 19 12 18 13 17 14 16 15

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

Use a **for……** control structure and two variables **s** and **t** as declared above to achieve this**. Assume a single tab** spacing between the numbers displayed ***(6 marks)***

Q1(c) Given the following portion of a working program,

```
x=5;
t=30;
while(t)
        {
        printf("The value of t is: %d\n", t);
        r = t;
        t = t-x;
        }
```

(i) Re-write it using a **for....loop** to produce the same results. ***(2 marks)***

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

Q1(d) 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 the variables given and appropriate **for….loops** etc,

```
#include<stdio.h>
main()
{
int num[5], temp, i,j,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(i=0;i<5;i++)
  ……
……
……
}
```

(6 marks)

Question 2

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

```
#include<stdio.h>
void main(){
   int r=56;
    int b=42;
   if(  b++  &&  ++r)
     {
    printf("%d  and %d",b,r);
    }
 else
   {  printf("%d  ",b+r); } }
```

(i) If the screen is blank, what will be displayed after running the above code? ***(2 marks)***

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

(iii)Explain how you get the final values of **b** and **r** in (a) (ii). ***(2 marks)***

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

```
#include<stdio.h>
int main(){
double r=24.31;
      printf("%d\t",sizeof(char));
      printf("%d\t",sizeof(276787));
      printf("%d",sizeof(r));
      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(){
 int *w;
 int a=15;
 w=&a;
 printf("%d, %x ", ++a, *w);
 return 0;
}
```

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

(d) Analyse the code below.

```
#include<stdio.h>
const enum numbers{  a=6, b=8,  c, d}n=23;
int main(){
enum numbers x,y;
x= a++;
y= b;
 printf("%d",x+y-n);
return 0; }
```

Indicate a statement in the above code which has an error and explain why it is so. ***(2 marks)***

(e) Given the following C- working programge, where **w, x ,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 w=72,s=12,x=8;
s=x++;
w /=24 +  ++s;
s *= s +  ++w;
s= ++w%x++  + 7;
printf( " %d\n %d\n %d\n ", w, x, s); }
```

(6 marks)

Question 3

(a) The following is a working program Study it carefully and answer question below it;

```
#include <stdio.h>
int main () {
int y = 2, x, i, k = 1, r = 2, d, total = 0, number [] = {0, 7, 5,- 6, 8, 4};
int   *xptr, *yptr;
xptr = &y;
x =  *xptr;
k *=  y + x;
yptr = &r;
for (i = *yptr; i < k; i++)
total += number[i%2];
printf("The total is %d\n", total);
r--;
printf("The value of r is %d\n", r);
printf("The value of k is %d\n", k);
return 0;
}
```

What will be displayed on the screen if it was clear ***(3 Marks)***

(b) 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  s[]={49,16 ,38, 88, 62, 82,  73, 44};
int  *q=s;
printf( " %d\n", *(q + 4));
printf( " %d\n", *++q);
printf( " %d\n", *q++);
printf( " %d\n", q[5]);}
```

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

(c) Explain the following statements:

(i) **int** (*b)[8]; ***(2marks)***

(ii) **int** *a [7]; ***(2 marks)***

(d) Study and analyse the code below.

```
#include<stdio.h>
void main() {
 int mynum[8] = {13,  28,  15,  14, 1, 9, 79, 51};
 int *fpin = mynum  + 3;
 printf("%d and %d  \n", fpin[3] , *fpin++);}
```

What will be displayed when the sample code above is executed? ***(4 marks)***

(e) Complete/write, in the code below, the missing statements that will allocate memory for **any** number of integer elements **n** to be entered. And also test if memory to be allocated is available

```
#include <stdio.h>
#include <stdlib.h>
int main()
{
 int n,*p;
printf("Enter number of elements: ");
scanf("%d",&n);
……
……
   {
        printf("memory is available to be allocated\n");
    }
        return 0;
}
```

(3 marks)

(f) If **k** is a variable declared in a C-program and assigned to any of the two values below (i) or (ii), Give two technical differences between the two possible assignments to **k** .

(i) k= **''M"** (ii) k=**'M'** ***(2marks)***

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Question 4

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

(i) Pass arguments to a function by value

(ii) Pass arguments to a function by reference**(4 marks)**

(b) Study the following program below written in C. It is supposed to add two numbers (**num1,num2**) , increment them using a function **total(),** and then produce and display their resultant sum using the **printf()** statement indicated in the main() function.

```
#include <stdio.h>
int total(int a,int b);

void main()
{
int num1,num2,sum;
num1=62;
num2=78;
sum=total(num1,num2);
printf("\n%d plus %d equals %d",num1, num2,sum);
}

int total(int x, int y)
{
x=x+4;
y=y+12;
return(x+y);
}
```

(i) Write down exactly the output of the ***printf()*** statement in the above code.*(2 marks)*

(ii)Re-write it using the method in 4(a)(ii) to achieve a **meaningfull display** *(4 marks)*

(c) Below is a working program. Study it and answer the questions that follow.

```
#include <stdio.h>
 void value()
 {
 static int a = 0;
 static int b = 0;
 a++; b++;
 printf( "%d - %d   ", a, b );
 }

  int main()
  {
  value();
  value();
  return 0;
  }
```

(i) Identify the name of a user defined function in the above program. ***(1 mark)***

(ii) Write down what will be the output of the program ***(2 mark)***

(iii) Explain how you get your results in (ii) above. ***(2 mark)***

(d)Write **<u>one correct statement</u>** in the dotted line to complete the Program that find whether a given number is even or odd.

```
#include<stdio.h>
void main()
{
int  n;
printf("enter any no: ");
scanf("%d",&n);
……….
printf("no. is even");
else
printf("no. is odd");
 }
```

(3 marks)

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

```
#include<stdio.h>
 void main()
  {
 int x,y,z;
  float  average;
  x=15;
  y=20;
  z=12;
  average=(x+y+z)/3;
  printf( "The mean value  is given as %.4f ", average);
  }
```

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

Question 5

(a) You are provided with an incomplete program which is supposed to prompt a user to enter the values of the given structure fields using a declared pointer of **your choice** to it and then display the total amount (**totalamount**)

```
#include <stdio.h>
struct stockitem
{
   char   itemName[30];
   int    quanty;
   float  price;
   float  totalamount;
};
int main()
{
…… /*declare here a pointer of your choice of structure
                    stockitem*/
……
   return 0;
 }
```

Complete the full program as per instruction above ***(5 marks)***

(b) Three variables, **y**, **b** and **z** are assigned the following values shown in a working program.(not shown here)

```
……..
y[6]=8956.45;
b=&y[2];
z=b;
……..
```

Write down the possible **correct** declaration statement for each of these variables. ***(3 marks)***

(c) The variables **x** and **y** have their decimal values as **11** and **13** respectively. I f **a=x&y;** and **b=y<<3;** are valid C-statements ,what will be the **octal** values of **a** and **b.** Show your method ***(5 marks)***

(d) Given an equation of the form $ax^2 + bx + c = 0$, where ***a***,***b***, and ***c*** are real constant values and

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

You are required to write a program in C- language that will prompt the user to enter the values of ***a, b*** and ***c*** in order to find **only** the real values of ***x*** for any given equation of the above form.

Note: Inform the user if the values of ***x*** are complex. **Aim at having a correct code** ***(7 marks)***

Question 6

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

fpiop=fopen("letter.txt","r+");

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

(i) In which mode was the file opened and what operations can be done to the file? ***(2 marks)***

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

(iii) Write a **full simple** working code which will search a character **N** in the above file and modify it to **T** assuming the above file content is invisible. ***(6 marks)***

(b) Write a full **simple correct** program that can be used to determine the size of the file or number of bytes in the file. Assume the name of the text file considered is **bict2.txt** ***(4 marks)***

(c) While working with file, it is better to test the end of file when reached otherwise the program may crash. One of the code that can be used is :

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

where **fptr** is a pointer to the file and **letter** is the variable containing the character read. Re-write this code using **EOF** and **while()** to achieve the same purpose. ***(2 marks)***

(d) The following code was intended to declare variables, then open a file and finally closes the file opened.

```
#include<stdio.h>
#include <string.h>
main()
{
char  text[10];
FILE   fpin;
strcpy(text, "myfile");
fpin=fopen(  text , "w");
fclose(text);
}
```

Study the code fully and identify any two (2) possible errors **with a reason** that can be rectified to make it run or compile without any error. ***(3 marks)***