UNIVERSITY OF GHANA, LEGON
COLLEGE OF BASIC AND APPLIED SCIENCES
SCHOOL OF ENGINEERING SCIENCES
SECOND SEMESTER EXAMINATIONS, 2014/2015
LEVEL 100: BACHELOR OF SCIENCE IN ENGINEERING
FAEN 112: C PROGRAMMING (2 Credits)

TIME ALLOWED: *ONE-AND-HALF ($1^1/_2$) HOURS*

INSTRUCTION: *Answer ALL questions from Sections A, B, C and D. Write your answers in the spaces provided on the pages of the question paper. Please ensure that your index number and signature are written on all pages of the question paper.*

INDEX NUMBER.....***SIGNATURE***.....

SECTION A [25 marks]

Answer ALL questions in this section. Write your answers in the spaces provided on the pages of the question paper.

State whether the following statements, A1 to A13, are *True* or *False*.

A1. The statement **printf (\n\n\n)** ; will create 3 blank lines. .....

A2. The statement **printf ("\nnn")** ; will create 3 blank lines. .....

A3. The statement **printf ("\n\n\n")** ; will create 3 blank lines. .....

A4. The statement **printf ("\n \n \n")** ; will create 3 blank lines. .....

A5. The statement **printf ("\ n\ n\ n")** ; will create 3 blank lines. .....

A6. A C comment line may appear on the first line of a program. .....

A7. A C comment line may not appear on the last line of a program. .....

A8. You could write a comment at the end of a C statement. .....

A9. You could write a comment line that contains 120 characters. .....

A10. At times, C allows us to write a comment within another comment. .....

A11. A C program must begin with a **MAIN( )** statement. .....

A12. A C statement is location insensitive but case sensitive. .....

A13. The two statements that follow are identical: .....

```
int ABC, DEF;  int abc, def;
```

Using the following C programme, state whether statements A14 to A16 are *True* or *False*:

```
void Add (float a, int *b);
void main (void)
{
                    float x=100.057;
                    int m=99;
                   Add(x+200.043, &m)
.....

}
```

A14. The *Add ( )* function is of void type, therefore, it can never be used to return a value to the *main( )* function. .....

A15. The float variable *a* in the function *Add ( )*, can be used to transfer a value from *Add ( )* to *main( )* function. .....

A16. Without using a return statement, the *Add ( )* function can return a value to *main( )* function.

State whether the statements A17 to A25 are *True* or *False*.

A17. The statement **printf ("%-3d", 123)** ; displays -123. .....

A18. The statement **printf ("%+2d", 123)** ; displays +12. .....

A19. The statement **printf ("%-2f", 123)** ; displays 12.0. .....

A20. The format specification **5d or %8D** are legal for **int** type variables or constants: .....

A21. The format specification **6.3f or %10.1F** are legal for **float** type variables or constants: .....

A22. The statement **printf ("ABC\a\a\a")** ; will display ABC \a\a\a. .....

A23. The statement **printf ("ABC\b\b")** ; will display ABC only. .....

A24. The following **int** type variable names are illegal: .....

1twoupper, 2Ghanacedis, 3lower, %currency

A25. The following **float** type variable names are legal: .....

ghanagdp, cprogram2, sandiegpa4, minwage

SECTION B [20 marks]
Answer ALL questions in this section. Write your answers in the spaces provided on the pages of the question paper.

Find error(s), if any, in statements B1 to B3 and correct them:

B1. `#DEFINE PI 3.1416`.....

B2. `#define Pi 3.146;` .....

B3. `#define PI=3.14;More_AccuratePI=3.1416;`.....

.....

.....

Find error(s), if any, in statements B4 to B5 and correct them (assume *month* and *day* are *int* types)

B4. `for month=1,3,1` .....

B5. `for (day=1, day<3, day++)`.....

Given the following function prototypes and variable declarations, find error(s), if any, in statements B6 to B7 and correct them:

```
double function1 (void);
int function2(int n, double x);
double function3 (double, int, double,int);
double function4 (int a, int n, int b,int c);
void main(void)
{
     int a, b, c, d, e;
     double r, s, t, u, v;
     .....
}
```

B6. `a = function1 ( );`.....

.....

B7. `b = function2 (a,b );`.....

.....

Find error(s), if any, in statements B8 to B10, and correct them (assume *i[5]* is an *int* type array, *f[6]* is a *float* type array and *in* is a file pointer):

B8. `fscanf (in,"%d %d",i[2],i[4];`.....

B9. `fprintf (in,"%d %d",i[2],i[4];`.....

B10. `fscanf  in,"%d %d",f[2],f[4];`.....

SECTION C [30 marks]

Answer ALL questions in this section. Write your answers in the spaces provided on the pages of the question paper.

C1. Write down the output of *ProgrammeC1* below. [12 marks]

ProgrammeC1

```
#include <stdio.h>
void function1(int a,int b, double r, double s, int *c, double *t);
main()
{
     int           i=5,      j=6,      k;
     double        x=10.56,  y=22.3,    z;
     printf("i=%d \n\r j=%d \n\r x=%1f \n\r y=%1f \n\n",i,j,x,y);
     function1(i,j,x,y,&k,&z);
     printf("k=%d \n\r z=%1f \n\n",k,z);
     system("pause");
}

void function1(int a, int b, double r, double s, int *c, double *t)
{
     float highlevel;
     *c = a+b;
     *t = r+s+(*c);
     highlevel=(*c)+(*t);
     printf("*c=%d\n\r\ *t=%1f highlevel=%1f\n\n",*c,*t,highlevel);

}
```

C2. Write down the content of file *C6_Output.txt* after *PogrammeC2* has run?

[18 marks]

ProgrammeC2

```
#include <stdio.h>
#include <math.h>
main(void)
   {
   int i,j,k,num_elem;
   int x[20],y[20],z[20];
   FILE *infile, *outfile;
   infile = fopen ("D:\\C6_Input.txt","r");
   outfile = fopen ("D:\\C6_Output.txt","w");
   k = fscanf(infile,"%d%d",&x[0],&y[0]);
   fprintf(outfile,"k=%d\n",k);
   fprintf(outfile,"Value of EOF=%d\n",EOF);
   i=1;
   while (fscanf(infile,"%d%d",&x[i],&y[i])!=EOF) i++;
   num_elem=i;
   fprintf(outfile,"x[i]   y[i]   z[i]\n");
   for (j=0;j<num_elem;j++)
      {
      z[j]=sqrt(x[j]*x[j]+y[j]*y[j]);
      fprintf(outfile,"%d\t%d\t%d\n",x[j],y[j],z[j]);
      }
   fclose(infile);
   fclose(outfile);
   printf("GREAT!\n");
   system("pause");
   }
```

The content of file *C6_Input.txt* is shown below:

3 4
6 8
9 12

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SECTION D [25 marks]

Answer ALL questions in this section. Write your answers in the spaces provided on the pages of the question paper.

D1. Write an interactive C programme **that calculates a customer's bill for** a department, in an engineering company, responsible for drilling boreholes. There are two types of customers: *private* and *commercial*. There are two rates for calculating a bill: one for *private customers* and one for *commercial customers*. For *private customers*, the following rates apply:

- Bill processing fee: GHC4.50
- Basic service fee: GHC20.50
- Drilling charge: GHC70.50 per metre of borehole.

For *business customers*, the following rates apply:

- Bill processing fee: GHC15.00
- Basic service fee: GHC150.00 for the first 5 metres, GHC50.00 for each additional metre of borehole.
- Drilling charge: GHC500 per metre of borehole for any depth of borehole.

The programme should prompt a user for an account number (an integer) and a customer code. Assume that a customer code 101 stands for a *private customer*, and 102 stands for a *commercial* customer.

Input: The **customer's account number, customer code,** depth of borehole in metres to which the customer requests.

Output: **Customer's** account number and the billing amount.

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