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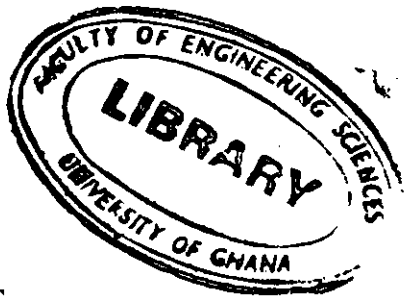

UNIVERSITY OF GHANA

BACHELOR OF SCIENCE IN ENGINEERING

SECOND SEMESTER EXAMINATIONS: 2015/2016

DEPARTMENT OF COMPUTER ENGINEERING

FAEN 112: C PROGRAMMING (2 Credits)

INSTRUCTIONS:
ANSWER ALL QUESTIONS. WRITE YOUR ANSWERS ON THE QUESTION PAPER. ENSURE THAT YOUR INDEX NUMBER IS WRITTEN ON ALL PAGES OF THE QUESTION PAPER.

TIME ALLOWED: ONE-AND-HALF (1½) HOURS

SECTION A [20 marks]

Find error(s), if any, in statements 1 to 3 and correct them:

1. `#DEFINE PI 3.1416`.....
2. `#define Pi 3.146;` .....
3. `#define PI=3.14; More_AccuratePI=3.1416;`.....
   .....
   .....

Find error(s), if any, in statements 4 to 5 and correct them (assume *month* and *day* are *int* types)

4. `for month=1,3,1` .....
5. `for (day=1, day<3, day++)`.....

Based on the statements `int cat, dog;double weight;` find error(s), if any, in statements 6 to 8, and correct them:

6. `scanf("%d %d"),cat,dog;` .....
7. `scanf(%d %d,cat,dog);`.....
8. `scanf("%d %f",cat,dog);`.....

Find error(s), if any, in statements 9 to 10, and correct them (assume *i[5]* is an *int* type array, *f[6]* is a *float* type array and *in* is a file pointer):

9. `fscanf (in,"%d %d",i[2],i[4];`.....
10. `fprintf (in,"%d %d",i[2],i[4];`.....

SECTION B [30 marks]

11. Write down the output of programme ***ReturnMultiple*** below. **12 marks]**

RetrunMultiple

```
#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);

}
```

12. Write down the content of file ***C6_Output.txt*** after ***Pogramme12*** has run?

[18 marks]

Programme12

```
#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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Student ID.....

SECTION C [50 marks]

13. Assuming the Ghana Atomic Energy Commission (GAEC) runs a nuclear reactor at the Atomic Hills to produce electricity for Ghana. Imagine that the nuclear reactor should run all the time (without stopping) to supply electricity. Write a C program which never stops beeping a sound to demonstrate the indefinite running of the reactor.

[10 marks]

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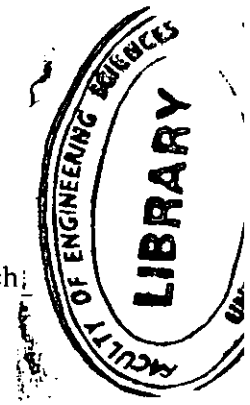
14. Write an interactive **C** program that calculates a customer's bill for a mobile telecommunication company. There are two types of customers: *residential* and *business*. There are two rates for calculating a cable bill: one for *residential customers* and one for *business customers*. For *residential customers*, the following rates apply:

- Bill processing fee: GHC4.50
- Basic service fee: GHC20.50
- Premium channels: GHC7.50 per channel.

For *business customers*, the following rates apply:

- Bill processing fee: GHC15.00
- Basic service fee: GHC75.00 for the first 10 connections, GHC5.00 for each additional connection
- Premium channels: GHC50 per channel for any number of connections.



The program should ask the user for an account number (an integer) and a customer code. Assume that a customer code **1001** stands for a residential customer, and **1002** stands for a business customer.

Input: The customer's account number, customer code, number of premium channels to which the user subscribes, and , in the case of business customers, number of basic service connections. **[8 marks]**

Processing: The program should use the following functions to calculate and return the billing amount.

✓ `ResidentialBill`: This function calculates and returns the billing amount for residential service. **[10 marks]**

✓ `BusinessBill`: This function calculates and returns the billing amount for business service. **[12 marks]**

Output: Customer's account number, the type of service and the billing amount. **[6marks]**

Your entire program should run nine hundred and ninety nine (999) times. [4marks]

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