Index Number: __UE20026915__   Programme: _____

UNIVERSITY OF ENERGY AND NATURAL RESOURCES, SUNYANI, GHANA

SCHOOL OF ENGINEERING

DEPARTMENT OF COMPUTER AND ELECTRICAL ENGINEERING

LEVEL 200: END OF FIRST SEMESTER EXAMINATION, 2016/2017

Bachelor of Science (Electrical and Electronic Engineering)

Bachelor of Science (Computer Engineering)

CENG 205: COMPUTER PROGRAMMING FOR ENGINEERS

December, 2016   Time: 2 Hrs : 30 mins

Materials required: Non-programmable calculator, pen, pencil and eraser

Instructions: This paper consist of TWO SECTIONS (A and B).

Answer all questions in SECTION A and TWO (2) from SECTION B.

SECTION A - Shade correctly the letter corresponding to the correct option on the Answer sheet provided. 1 mark per any correct answer.

1. What action is taken when the following line(s) of code is reached in program execution?

```
while (radius != 0) { scanf("%f", radius);}
```

   A. The code will not run except radius = 0
   B. The code will run once immediate radius = 0
   C. The code will run continuously until radius = 0
   D. None of these

2. A function that returns no value requires _____ data type.
   A. int
   B. byte
   C. bool
   D. void

3. What is the default data type that is returned if a programmer forgets to specifies the return data type of a function?
   A. void
   B. byte
   C. int
   D. float

4. In the `return (expression)` statement of a function definition, the expression must evaluate to a value of _____ for the return value.
   A. The type specified in the function header
   B. The type specified by the parameter(s)
   C. The type specified by the main function
   D. Both B and C

5. The content of file will be lost if it is opened in _____
   - A. w mode
   - B. w+ mode
   - C. a mode
   - D. a+ mode

6. Which of the following is not a conditional branching?
   - A. break
   - B. switch
   - C. continue
   - D. goto

7. Which of the following is true about a call by value method of function call?
   - I.   The value of the variable is passed the function as parameter
   - II.   Same memory is allocated for both actual and formal parameters
   - III.   The value of the actual parameter cannot be modified by the formal
   - IV.   The formal parameter can be modified by the actual before passing

   - A. I, II and IV
   - B. III and IV
   - C. I, II and IV
   - D. I and III

8. A variable whose lifetime or "extent" extends across the entire run of the program is called _____
   - A. Private variable
   - B. Global variable
   - C. Static variable
   - D. Local variable

9. `char *fgets(char *buf, int n, FILE *fp);`
   The function above `fgets()` reads up to _____ from the input stream referenced by fp.
   - A. n - 1 characters
   - B. n + 1 characters
   - C. n characters
   - D. n(n - 1) characters

10. Which of the following is the correct syntax for variable definition?
   - A. `dataType   variableName  =  value;`
   - B. `dataType   variableName;`
   - C. `dataType   variableName  =  value`
   - D. `variableName  =  value;`

11. Which of the following is not a procedural language?
   - A. C/C++
   - B. C#
   - C. JavaScript
   - D. SQL / SAVY RETRIEVER (for use with databases)

12. Which one of these is perfectly describe the process of building quality software program as stated by Niklaus Wirth?
    - A. Algorithm = Program + Data
    - B. Algorithm = Program - Interrupt
    - C. Program = Algorithms + Data
    - D. Program = Algorithms - Psuedocode

13. _____ is/are required before computer will understand the codes or instructions within a programme source code.
    - A. Dev-Cpp IDE
    - B. A command prompt (MS-DOS) windows
    - C. Compiler
    - D. A and B

Use **Figure 1** to complete question 14 to 18. Fill in the blank spaces the correct label A to E from the diagram that fit the description given in question 14 to 18.
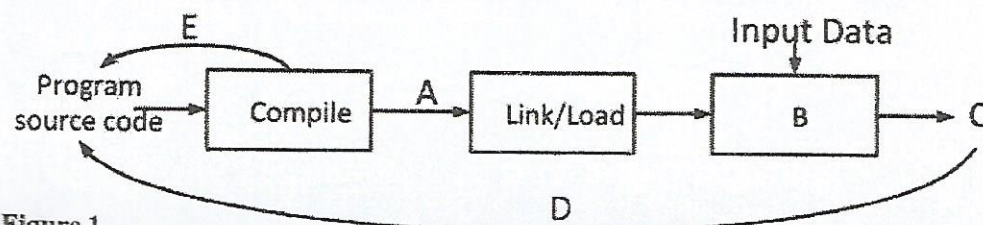

Figure 1

14. _____D_____   Correct logic errors
15. _____A_____   Execute
16. _____B_____   Object program
17. _____E_____   Correct syntax errors
18. _____C_____   Program output

19. What is the correct output of the code snippet below if it is run?

```
...
int a = 5;
printf("\n a = %d", a);
{
int b = 10;
printf("\n b = %d", b);
}
printf("\n b = %d", b);
...
```

    - A. b = 5
    - B. b = 10
    - C. b = -0798578E
    - D. variable b not declared

20. What is the value of c after the code below is run?

```
...
int a = 10, b = 5, c = 15;
c = a < b ? a : b;
...
```

    A. c = 5

    B. c = 10

    C. c = 15

    D. Compilation error, check function main

21. _____ is an expression to which a value can be assigned.

    A. Rvalue

    B. Identifier

    C. Lvalue

    D. Static variable

22. In C programming what is the meaning of the semicolon character do " ; "?

    A. A terminator

    B. Pre-process

    C. Function limiter

    D. None of these

23. What will be the output of the following C program?

```
...
int ABC = 10;
printf("%d", abc);
...
```

    A. 10

    B. 0

    C. 5

    D. Compilation error

24. Which of these is invalid in typecasting?

    A. short int = (short)char;

    B. float = (float)long int;

    C. double = (double)float;

    D. int = (double)float;

25. Consider the code, Celsius = 5*(fahr - 32)/9; What does the equals to " = " character stand for?

    A. Bitwise Operator

    B. Conditional Assignment Operator

    C. Logical Operator

    D. Assignment Operator

26. What statement will you add in the following program to make it work correctly?

    . . .

    ```
    printf("%f\n", log(36.0));
    ```

    . . .

    A. #include <conio.h>

    B. #include <math.h>

    C. #include <stdlib.h>

    D. #include <logr.h>

27. Consider the following statement

    ```
    int j, k, p;
    float q, r, a;
    a = j/k;
    p = q/r;
    ```

    If q = 7.2, r = 2.0, j = 3, k = 2. The value of a and p is _____

    A. a = 1.5, p = 3.6

    B. a = 2, p = 3

    C. a = 1.5, p = 4

    D. a = 1, p = 3

28. Which header file is used for screen handling function in a console app?

    A. IO.H

    B. STDLIB.H

    C. CONIO.H

    D. STDIO.H

29. A single character input from the keyboard can be obtained by using the function.

    A. printf( )

    B. scanf( )

    C. putchar( )

    D. getchar( )

30. If x = 5, y = 6, z = 4, and w = 3.5, which of the following statements evaluation is possible?

    A. (x + y) % w

    B. (x + z) % y

    C. (x * z) % y

    D. (y % z) % x

31. If a, b and c are integer variables with the values a = 8, b = 3 and c = -5. Then, what is the value of the arithmetic expression: 2 * b + 3 * (a-c) ?

    A. 45   16 + 3 × 13

    B. 6   39

    C. 16   16

    D. 1   51

32. What is the return type of a `printf()` function?
    - A. void
    - B. int
    - C. float
    - D. None of these

33. Which of the following is the odd one out?
    - A. `j = j + 1;`
    - B. `j =+ 1;`
    - C. `j++;`
    - D. `j += 1;`

34. What is the correct usage of the built-in function for finding square roots?
    - A. square(x)
    - B. sqr(x)
    - C. sqrt(x)
    - D. #include <math.h>

35. If x is one dimensional array, then, which of the following is correct?
    - A. `*(x + i)` is same as `&x[i]`
    - B. `*&x[i]` is same as `(x + i)`
    - C. `*(x + i)` is same as `x[i] + 1`
    - D. `*(x + i)` is same as `*x[i]`

36. If a function is declared as `void fn(int *p)`, then which of the following statements is valid function call of `fn` ?
    - A. `fn(x);` where x is defined as `int x;`
    - B. `fn(x);` where x is defined as `int *x;`
    - C. `fn(&x);` where x is defined as `int *x;`
    - D. `fn(*x);` where x is defined as `int *x;`

37. What is the output of the following C program?

```
...
int a, b = 0;
static int c[10] = {1,2,3,4,5,6,7,8,9,0};
for (a = 0; a < 10; ++a)
if ((c[a] % 2) == 0) b += c[a];
printf ("%d", b);
...
```
    - A. 20
    - B. 25
    - C. 45
    - D. 90

38. The function used to read a character from a file that has been opened in read mode is _____
    A. putc()
    B. getc()
    C. getchar()
    D. putchar()

39. What C statement(s) will prompt the user to input two integer numbers?
    A. scanf("Enter two interger numbers", &num1, &numb2);
    B. printf("Enter two integer numbers %d %d", &num1, &numb2);
    C. scanf("%d %d", &num1, &numb2);
    D. printf("Enter two integer numbers");

40. The output of the following code segment will be _____

```
...
char x = 'B';
switch (x) {
case 'A': printf("a");
case 'B': printf("b");
case 'C': printf("c"); break; }
...
```
    A. a
    B. b
    C. abc
    D. bc

Reside

41. To declare an array S that holds a 5-character string, you would write _____
    A. char S[5]
    B. string S[5]
    C. char S[6]
    D. String S[6]

42. What is the value of e after the following code snippet is run?

```
...
int a = 3, b = 4;
int c = (a % b) * 6;
float d = c / b;
int e = (a + b + c + d) / 4;
...
```

$3 + 4 - 6 - \frac{6}{4} \times \frac{4}{4}$

$7 - 12 - \frac{5}{16}$

    A. 0
    B. 7.0000000
    C. 7
    D. Compile error

43. What is the output of the following program?

```
...
int i=4, z=12;
if(i=5 || z>50)
printf("hello");
else
printf("hye");
...
```

A. hello

B. bye

C. syntax error

D. hellohye

44. Convert the following statement to C. If the number is even, add it to evenSum, otherwise add it to oddSum.

```
A. if (n%2 == 0) evenSum += n; else oddSum += n;
B. if (n is even) evenSum += n; else oddSum += n;
C. if (n%2 == 0) evenSum =+ n; else oddSum += n;
D. if (!n == 0) evenSum += n; else oddSum += n;
```
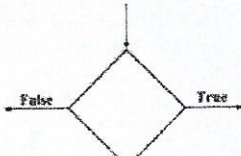
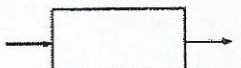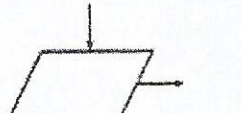45. What is the output of the program below?

```
...
int A = 45, B = 5;
if ( A/B <= 5 ) {
    printf ("Red"); }
else if (A/B >= 5) {
    printf ("Blue");
else { printf("Green"); }
...
```

A. Green

B. Red

C. Blue

D. None of these

46. Which of these is a representation for process in flowchart diagram?

A.

B.

C.

D.

SECTION - B
Answer **ONE (1)** question **EACH** from **PART I** and **PART II** in this section.

PART I

QUESTION ONE   [5 Marks]

Newton's law states that the force, F, between two bodies of masses M_1 and M_2 is given by

$$F = k\left(\frac{M_1 M_2}{d^2}\right)$$

Where k is gravitational constant and d is the distance between the bodies.

The value of k is approximately 6.67×10^{-11} Nm^2/kg^2. Write a C program that prompt the user to input masses of bodies (in kg) and distance between the bodies. The program should then output the force existing between the bodies. **Employ a return type user defined function in your code.**

QUESTION TWO   [5 Marks]

The program source code below is a program written in C that computes the compound interest on a principal amount using a for control structure. The program asks the user to enter the principal amount P, the annual interest rate R, and the number of years Y, over which interest is applied. It then prints for each year, the year number, the amount on deposit, and the interest gained thus far. The amount on deposit, A, is calculated using the formula below.

Copy and complete the source code by filling the blank spaces indicated by " __ ". **Underline the answers you provide in place of the blank spaces.**

$$A = P(1+R)^Y$$

```
1:  /*Underline the answers you provide in place of the blank spaces*/
2:  #include < _____ >
3:  _____ main (void) // C main function
4:  {
5:      float I, A = 1, R, P;
6:      int Y, i = _____;  //Y declared. i declared with initial value
7:      printf("Enter value for Rate, R: ");
8:      scanf("%f", _____ ); //Get input data from user
9:      printf("\nEnter value for Year, Y: ");
10:     scanf("%d", &Y); //Get input data from user
11:     printf("\nEnter value for Principal, P: ");
12:     scanf("_____", &P); //Get input data from user
13:     R = R/100; //converting to decimal
14:     printf("Yr\tA\tP\tI\n"); //header of formatted output
15:     _____ dummy = 1; //dummy variable definition
16:     //looping to calculate each year A, P, & R
17:     for (i = 1; i <= _____; i++){
18:         dummy *= (1 + R); //temp variable to hold data
19:         A = _____ * dummy; //calculating amount deposited per year
20:         I = A - P; //calculating interest per year
21:         //Printing formatted output of A, P, I
22:         printf("\n _____ \t%.2f\t%.2f\t%.2f\n", i, A, P, _____ ); }
23:     return ( _ ); }
```

S. Tweneboah-Koduah

PART II

QUESTION THREE   [10 Marks]

Write a C program making use of a **user defined return type function** to calculate the standard deviation of individual series using arrays. Set maximum data size, N to 150.

Use the equation below.

$$SD = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}$$

Where μ is population mean.

Allow your program to be interactive and presentable to the user.

QUESTION FOUR   [10 Marks]

You're contacted by a reputable local TV cable company to build a program in C to calculates customer's bill for the company. The company typically deals with two types of customers: residential and business. Per the company's specifications, 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: ¢4.50
- Basic service fee: ¢20.50
- Premium channels: ¢7.50 per channel

For business customers, the following rates apply:

- Bill processing fee: ¢15.00
- Basic service fee: ¢75.00 for first 10 connections, ¢5.00 for each additional connection
- Premium channels: ¢50.00 per channel for any number of connections

The company wants the program to ask users for an account number (an integer) and a customer code. Customer are *R* or *r* for a residential customer, and *B* or *b* 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.
Output: Customer's account number and the billing amount.

Sample Run: In this sample run, the user input is bold.
```
This program computes a cable bill.
Enter account number (an integer): 12345
Enter customer type: R or r (Residential), B or b (Business): b
Enter the number of basic service connections: 16
Enter the number of premium channels: 8

Account number: 12345
Amount due: Ghc520.00
```