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(KNOWLEDGE FOR DEVELOPMENT)

**KIBABII UNIVERSITY
(KIBU)**

**UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR**

**SPECIAL/SUPPLEMENTARY EXAMINATIONS
YEAR ONE SEMESTER TWO EXAMINATIONS**

**FOR THE DEGREE OF
BACHELORS OF SCIENCE
(COMPUTER SCIENCE)**

COURSE CODE : CSC 125

COURSE TITLE : PROCEDURAL PROGRAMMING

DATE: 12/02/2021

TIME: 8.00 A.M. – 10.00 A.M.

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

QUESTION ONE [COMPULSORY] (30 MARKS)

- a. Define the following terms [3 Marks]
- Algorithm
 - Program
 - Function
- a. Discuss the differences between procedures oriented programming and object oriented programming languages. [4 marks]
- b. Find the output if any from the following C++ code [2 marks]

```
int a[]={1,5,9};
int *p=a;
cout<<*p+1<<*++p<<*++*p<<*(p+1);
```

- c. There are two simple ways in C++ to define constants. Using relevant examples, identify the two ways. [3 Marks]
- d. What would happen to X in this expression: X += 20; (assuming the value of X is 6)? [2 Marks]
- e. Explain the difference between actual and formal parameters. [2 Marks]
- f. Define an array and explain its importance in programming. [3 Marks]
- g. Write down a typical declaration for an array in C++ that can store 20 values of type char. [1 Mark]
- h. There are a number of syntax errors in the following program. Fix the errors and rewrite the program. [4 Marks]

```
/* What's wrong with this program? */
#include iostream
int main();
}
int a, b, c /* Three integers */
a = 3
b = 4
c = a + b
cout<<"The value of c is %d" << C);
return 0;
}
```

- i. Suppose a, b, and c denote the lengths of the sides of a triangle. Then the area of the triangle can be calculated using the formula:

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{where } s = \frac{a+b+c}{2}$$

Write a C++ program to compute the area of a triangle. [6 Marks]

QUESTION TWO (20 MARKS)

- a. Distinguish between object code and source code. [2 Marks]
- b. State any FOUR functions of language translators. [2 Marks]
- c. The following matrix represents the scores of 4 students (rows) in 5 tests (columns).

80	45	59	63	40
9	72	63	48	50
69	70	81	63	50
62	72	59	61	70

Initialize the above scores into a two-dimensional array called studentMarks. [2 Marks]

- d. In a class, there are 10 students each taking 5 subjects:
 - i. Write a function that will receive a one dimensional array for marks of each student, calculate and return the sum. [4 Marks]
 - ii. Write a function that will receive a one dimensional array for marks of each student, calculate and return the average for the student. [3 Marks]
 - iii. Write the main function to receive each student's marks from the keyboard and populate an array before calling the functions defined in (i) for sum and (ii) for average. Write each student marks, sum and average to a file named marks.docx. Sample file output is shown in Table 1.

Table 1: Sample Output in File – showing 2 students out of 10

NAME	COM1	COM2	COM2	COM3	COM4	TOTAL	MEAN
Akinyi Ebenezer	82	76	56	75	66	355	71.00
Muyobo Allans	90	56	81	67	91	385	77.00

[5 Marks]

QUESTION THREE (20 MARKS)

- a. Identify the two types of control structures in programming and explain the difference between them. [4 Marks]
- b. Using a loop construct of your choice, write a code excerpt that will give the output below. [4 Marks]

```

0 1 2 3 4 5
  1 2 3 4 5
    2 3 4 5
      3 4 5
        4 5
          5
```

- c. Write a program that prompts the user to input a positive integer. It should then output a message indicating whether the number is a prime number. A prime number is a number that is evenly divisible only by itself and 1. [4 Marks]
- d. Write a program that takes balance of a user's account as input. It should then ask the user how much amount he wants to withdraw from his account. The program should take this amount as input and deduct from the balance. Similarly it should ask the user how much amount he wants to deposit in his account. It should take this amount as input and add to the balance. The program shall display the new balance after amount has been withdrawn or deposited.

Sample Output:

```

Welcome!
Enter your balance: 1234
-----
Select an option:
1. Withdraw Amount
2. Deposit Amount
3. Exit
-----
How much amount you want to withdraw from your account?
Amount: 1233
Your new balance is: 101
How much amount you want to deposit in your account?
Amount: 100
Your new balance is: 101
Thank you for using the system!

```

Note: Your program should have a check on balance and amount being withdrawn. Amounts greater than balance cannot be withdrawn i.e. balance cannot be negative. [8 marks]

QUESTION FOUR (20 MARKS)

- a. i. What is a variable? [1 Mark]
 ii. Discuss the rules of naming a variable in C++. [3 Marks]
- b. "It is a good programming practice to initialize variables properly". Discuss. [2 Marks]
- c. Describe the use continue statement in for loops and while and do...while loops. [2 Marks]
- d. Explain function prototyping, function definition and function calling using a suitable C++ examples. [6 Marks]

- e. Write a function named `areaRectangle` that takes length, width as parameter and returns the area of rectangle. Write a program that demonstrates the function by calling it and displays the return value. [4 Marks]

QUESTION FIVE (20 MARKS)

- a. Explain modular programming. [2 Marks]
 b. Identify any four advantages of modular programming. [4 Marks]
 c. Consider the following algorithm for converting an integer to binary.
 Algorithm to convert decimal representation to binary

1. Divide the number by 2
2. Store quotient and remainder
3. Use quotient as the new number
4. Go back to Step 1 till quotient is 0
5. Read remainders from bottom to top to get binary representation

- i. Write a program that allows the user to convert decimal numbers (base 10) to binary. [4 Marks]
- ii. Now define a function called `convert` to do the conversion so that you call the function from main passing an array to the function and the number to convert. [4 marks]
- d. The marks obtained by a student in 5 different subjects are input through the keyboard. The student is award a division as per the following rule.

<i>Mean Percentage (%)</i>	<i>Division</i>
<i>Above or equal to 70</i>	<i>First Class Honors</i>
<i>Between 60 and less than 70</i>	<i>Second Class Upper division</i>
<i>Between 50 and less than 60</i>	<i>Second Class Lower division</i>
<i>Between 40 and less than 50</i>	<i>Pass</i>
<i>Between 0 and less than 40</i>	<i>Fail</i>

Write a C++ program the will prompt the user for mean percentage of a student and award the student accordingly. [6 marks]