



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

SECOND YEAR SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

EMM201: PROGRAMMING I

DATE:

TIME:

INSTRUCTIONS

This paper consists of FIVE questions

*Answer **question one** and other **two questions** in this paper*

QUESTION ONE

- a) Identify and correct the errors in each of the following statements (8 marks):
- i) `printf( "The value is %d\n", &number );`
 - ii) `scanf( "%d%d", &number1, number2 );`
 - iii) `if ( c < 7 );{printf( "C is less than 7\n" );}`
 - iv) `if ( c ==> 7 ) {printf( "C is equal to or less than 7\n" );}`
- b) Write C program that requires the user to input three integers. The program should then calculate and output the product of the integers. Use comments to make your program readable. (4 marks)
- c) Briefly explain the meaning of the following program design tools (6 marks)
- i) Algorithms
 - ii) Pseudocode
 - iii) Recursive function

- d) C programming language provides three types of selection structures in the form of statements. Name and explain these three structures. (6 marks)
- e) Write a statement (or comment) to accomplish each of the following: (6 marks)
- Declare variables x, y, z and result to be of type int.
 - Prompt the user to enter three integers and then read three integers from the keyboard and store them in the variables x, y and z.
 - Compute the product of the three integers contained in variables x, y and z, assign the result to the variable result and print the product;

QUESTION TWO

- a) Write a statement or a set of statements to accomplish each of the following tasks:
- Sum the odd integers between 1 and 99 using a *for* statement. Assume the integer variables sum and count have been defined. (2 marks)
 - Print the value 333.546372 in a field width of 15 characters with precisions of 1, 2, 3, 4 and 5. Left justify the output. What are the five values that print? (3 marks)
 - Calculate the value of 2.5 raised to the power of 3 using the *pow* function. Print the result with a precision of 2 in a field width of 10 positions. What is the value that prints? (2 marks)
 - Print the integers from 1 to 20 using a while loop and the counter variable x. Assume that the variable x has been defined, but not initialized. Print only five integers per line. [Hint: Use the calculation $x \% 5$. When the value of this is 0, print a newline character, otherwise print a tab character.] (3 marks)
- b) Describe the following data structures as used in programming. (4 marks)
- Binary tree
 - List
- c) Andrew wants to write a C program that will print A for exam grades greater than or equal to 90, B for grades greater than or equal to 80, C for grades greater than or equal to 70, D for grades greater than or equal to 60, and F for all other grades. Write a pseudocode statement for the program. (6 marks)

QUESTION THREE

- a) One of the most popular games of chance is a dice game known as “craps.” The rules of the game are simple:
- A player rolls two dice. Each die has six faces. These faces contain 1, 2, 3, 4, 5, and 6 spots. After the dice have come to rest, the sum of the spots on the two upward faces is calculated. If the sum is 7 or 11 on the first throw, the player wins. If the sum is 2, 3, or 12 on the first throw (called “craps”), the player loses (i.e., the “house” wins).

- If the sum is 4, 5, 6, 8, 9, or 10 on the first throw, then that sum becomes the player's "point." To win, you must continue rolling the dice until you "make your point." The player loses by rolling a 7 before making the point.

Using C programming language, write a program to simulate the game of craps. (10 marks)

- Giving an example in each case, describe any three types of operators used in C programming. (6 marks)
- Explain two methods used for searching elements in an array (4 marks)

QUESTION FOUR (20 MARKS)

- In C programming, the scope of an identifier in a function refers to the portion of the program in which the identifier can be referenced. Outline the four identifier scopes used in C program functions: (4 marks)
- Describe bubble sort technique as used in arrays. (2 marks)
 - Outline one virtue and one limitation of bubble sort technique. (2 marks)
- Distinguish between interpreters and compilers as used in programming. (4 marks)
- A parking garage located in Machakos charges a Ksh. 200.00 minimum fee to park for up to three hours and an additional Ksh 50 per hour for each hour or part thereof over three hours. The maximum charge for any given 24-hour period is Ksh 1000. Assume that no car parks for longer than 24 hours at a time. Write a program that will calculate and print the parking charges for each of three customers who parked their cars in this garage yesterday. You should enter the hours parked for each customer. The program should print the results in a neat tabular format, and should calculate and print the total of yesterday's receipts. The program should use the function calculateCharges to determine the charge for each customer. Your outputs should appear in the following format: (8 marks)

Car	Hours	Charge
1	1.5	2.00
2	4.0	2.50
3	24.0	10.00
TOTAL	29.5	14.50

QUESTION FIVE

- Show two different methods of initializing character array vowel with the string of vowels "AEIOU". (4 marks)
- Write a program that inputs a character from the keyboard and tests the character with each of the functions in the character-handling library. The program should print the value returned by each function. (6 marks)

- c) Give the function header for each of the following functions. (8 marks)
- i. Function hypotenuse that takes two double-precision floating-point arguments, side1 and side2, and returns a double-precision floating-point result.
 - ii. Function smallest that takes three integers, x, y, z, and returns an integer.
 - iii. Function instructions that does not receive any arguments and does not return a value. [Note: Such functions are commonly used to display instructions to a user.]
 - iv. Function intToFloat that takes an integer argument, number, and returns a floating point result.
- d) Highlight two benefits of having portable computer programs. (2 marks)