Kirinyaga University

UNIVERSITY EXAMINATIONS 2022/2023

EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN SOFTWARE ENGINEERING

SPE 2101 Introduction to Programming and Problem Solving Year I Semester I

Date: Thursday, 8th December 2022 Time: 4.00pm – 6.00pm

INSTRUCTIONS

Answer Question One and Any Other Two questions

QUESTION ONE (30 MARKS)

a) Differentiate between keyword and identifier as used in C programming language **(2 marks)**

b) The following is a C program to compare numbers entered by a user. Identify and re-write the code without errors **(6marks)**

```
#include stdio.h
main
int number;
 printf ("enter an integer number")
 scanf("%",&number
 if(number<100
  printf "your number is smaller than 100"
else
printf("your number contains more than two digits")

}
```

c) Create a **function** named *product* that returns product of two numbers (**4 marks)**

d) Given that the value of a variable X is 90. State the output when each of the following statements is executed in C programming language. **(4 marks)**

i. X += 25

ii. X *= 2

iii. X-= 42

iv. X%=3

e) Write a C program that reads the radius of a sphere and calculate the volume.

Where volume =4/3 Πr^3. **(6 marks)**

f) With the help of examples, explain two types of comments in c programming language. **(4 marks)**

g) Describe the use of the following escape characters and format specifiers used in C language **(4 marks)**

i. \n

ii. \t

iii. %d

iv. %f

QUESTION TWO: (20 MARKS)

a) Write a program in C to store elements in an **array** and print it. **(6 marks)**

Input 10 elements in the array:

element - 0 : 1

element - 1 : 1

element - 2 : 2

Expected Output :

Elements in array are: 1 1 2 3 4 5 6 7 8 9

b) C has various standard data types that are used to define the operations possible on them and the storage method for each of them. Explain three data types used in structured programming. **(6 marks)**

c) Kirinyaga University has hired you to write a program that will help implement a grading system for students. The examination department has provided you with the rules for grading as shown in the table below. Write a C program to help implement the grading system. **(8 marks)**

Grades	Score
A	70-100
B	60-69
C	50-59
D	40-49
E(Fail)	Below 39

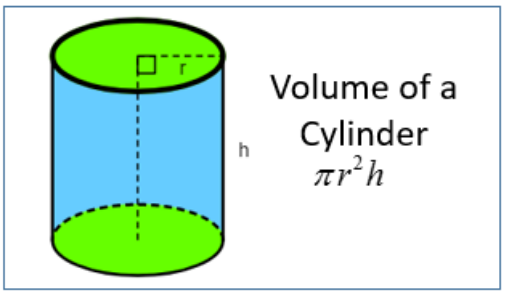
QUESTION THREE: (20 MARKS)

a) In an athletics competition, athletes were awarded money based on the ranking as shown below.

Rank	**Amount Allocated**
1	1000000
2	500000
3	250000
Any Other	0

Draw a flow chart and write the pseudocode to represent the algorithm. **(6 marks)**

b) Volume of a cylinder is given by the formula below. Write a C **function** to find the volume of the given cylinder. Prompt the user to enter radius and height. **(8 marks)**



c) A company requires a program to enter employee name, hours worked and rate per hour of an employee then calculate basic pay= hours worked multiplied with rate per hour. Tax is calculated on basic pay as follows:

Basic pay	Tax
Over 50000	20% of basic pay
Between 20000 and 50000	10% of basic pay
Below 20000	No discount

Write a C program that will enable the user to enter the above details and calculate basic pay, tax and net pay = basic pay – tax. **(6 marks)**

QUESTION FOUR: (20 MARKS)

a) Write a program in C to add two numbers using **pointers.** **(5 marks)**

b) Study the list of C Programming Structure and Union codes below.

```
#include <stdio.h>
struct sample
{
   int a=0;
   char b='A';
   float c=10.5;
};
int main()
{
   struct sample s;
   printf("%d,%c,%f",s.a,s.b,s.c);
   return 0;
}
```

What will be the output of the following program? with explanation **(2 marks)**

c) Explain three types of loops used in programming using the C syntax (**3 marks)**

d) Write a C program to input a number and check whether number is **even** or odd using Conditional/Ternary Operator? **(5 marks)**

e) An electric motor rotates 1000 times in a minute. every time it rotates it moves a robot 2cm from its current location. Write a C program that will show distance in M that the robot will have covered one hour after the motor started rotating. **(5 marks)**

QUESTION FIVE: (20 MARKS)

a) Using examples, state the role of pre-processor directives in a C program

(2 marks)

b) Indicate whether the following C statements are syntactically correct. Give reasons for your answer. **(3 marks)**

a) int numero1== 23;
b) float 17lab;
c) n+13 = number1;

c) Write a C program that prints the perimeter of a rectangle by receiving its height and width as input from a user. **(7+marks)**

d) Evaluate the following statement and indicate what it will return given that

X=10, Y=15, Z= 20 . **(3 marks)**

i. (X!=5) && (Y==Z)

ii. X<=5 || Y>15

e) Write a C program to display the total amount of tax paid by a customer if he buys sugar and bread at 100 and 40 shillings respectively. Assume VAT is 16%.

(5 marks)