00165

The Open University of Sri Lanka
Faculty of Engineering Technology

Study Programme	:	Bachelor of Technology Honours in Engineering
Name of the Examination	:	Final Examination
Course Code and Title	:	**MEK3170 C Programming**
Academic Year	:	2015/2016
Date	:	09th of December 2016
Time	:	2.00pm – 5.00pm
Duration	:	3 hours

General instructions

1. Read all instructions carefully before answering the questions
2. This paper consists of six questions. Answer **four** questions including **Question 1.**
3. **Question 1 is compulsory** and carries 40 marks.
4. Answer three more questions which carry 20 marks each.
5. This is a **closed book** examination.
6. All your programs should have validation codes where ever needed and comments as applicable.

Question 1 (Compulsory) **(40 Marks)**

a) **[10 Marks]**

Write a complete C/C++ program which will display the following output.

```
* * * * *
* * * *
* * *
* *
*
```

NOTE: Use ***nested loop/s*** to write your program

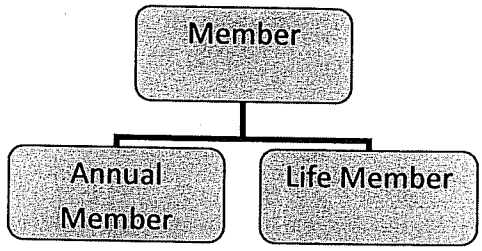
b) **[10 Marks]**

Write a complete C/C++ program to print the largest and smallest number from an integer array where the array size is 100.

NOTE :- Do not use <math.h> header file for any form of calculation.

c) **[20 Marks]**

Consider the following class hierarchy of a Video club, to answer the questions from i to iii



All Video club members have a *member ID, name and age*. The following data are also important and need to consider when answering the questions

- For Annual member :- *Annual Deposit*
- For Life member :- *year registered*

Sathuta is an annual member and *Jaya* is a life member of this video club.

i. Name the objects involved in the above case
ii. Declare the base class using C++ coding
iii. Write C++ coding for the following on the main function
   a. Assuming values for the data members, create an instance (Sathuta) of the class *annual member* and assign values to it.
   b. Assuming values for the data members, create an instance (Jaya) of the class life member and assign values to it.
   c. Display the details of Sathuta and Jaya by calling a function named *print_details* as appropriate.

Question 2 **(20 Marks)**

a) Explain recursion with respect to algorithms using a suitable example

b) Write a C++ program to calculate the electrical resistance (r) of a copper wire that is 38m long with a cross sectional area of $153m^2$. Note that the resistivity of copper is 0.000000017 at 20° C.

The electrical resistance (r) of a metal wire in **Ωm** is given by the following formula

$$r = \frac{ml}{a}$$

Where m is the resistivity of the metal
l is the length of the wire in **m**
a is the cross sectional area of the wire in $\mathbf{m^2}$

Write separate functions to

- Calculate the electrical resistance
- Print the output with an appropriate message

Question 3 **(20 Marks)**

Write a C/C++ program to calculate the sum and average of integer numbers between M and N using **pointers**. You are supposed to get the values of M and N from the user at run time through the keyboard.

For example your program may display as following:-

"This program is written in C++ language to find the sum and average between two positive integers M and N."

Please enter a positive integer for the 1st number(M):- 1
Please enter a positive integer for the 2nd number(N):- 5
Sum of the two numbers are:- 6
Average of the two numbers are:- 3

Question 4 **(20 Marks)**

Write a complete C++ program to calculate the Net salary of employees attached to a construction company. A file is maintained to store the daily salary of all permanent employees. The C++ program should allow the user to enter at least three (3) records of new employee data to the file *salary.text*

The C++ program should accept *employee number, employee* name, *Basic Salary, insurance premium and* should output the *Net Salary.*

NOTE: The formula required to calculate the *Net Salary* is

Net Salary = Basic salary — insurance premium

Question 5 **(20 marks)**

Develop a C++ program using an **array of structures** to maintain Music Albums stored at a radio station. It should contain the **title, artist,** and **year released.**

The program should let the user view the details of Music Albums whenever necessary.

Question 6 **(20 Marks)**

The Library of *XYZ College* has more than 200 members registered under two categories, student members and staff members. Library management last year took a decision to adopt a new method to find the fine for overdue books. The lending period of any book is two weeks for both the categories. The fines for overdue books are as follows.

- For student members:-

  Fine = Rs. 10.00 per book per day

- For staff members:-

  Fine = Rs. 10.00 per book per day + Rs.50.00

Write a complete C++ program using the object oriented concepts to calculate the Fine for the 4 members whose information is given in Table Q6.

Please note the following: You should use base classes, derived classes, constructors, destructors, functions and other object oriented concepts to develop the program.

Member Name	Member Type	No of Days overdue	No of books
Rose	student member	14	4
Jane	student member	5	2
Abdul	staff member	2	4

Table Q6

END