The Open University of Sri Lanka
Faculty of Engineering Technology

Study Programme	:	Diploma in Technology (Engineering)
Name of the Examination	:	Final Examination
Course Code and Title	:	**MEK3170 C Programming**
Academic Year	:	2012/2013
Date	:	19th August 2013
Time	:	9.30am – 12.30pm
Duration	:	3 hours

General instructions

1. Read all instructions carefully before answering the questions
2. This paper consists of 6 questions.
3. Answer four(4) questions including **Question 1.**
4. **Question 1 is compulsory** and carries 40 marks.
5. Answer 3 more questions which carry 20 marks each.
6. This is a **close book** examination.
7. 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.

```
1
12
123
1234
12345
```

NOTE: Use nested loop/s to write your program

b) **[10 Marks]**

Write one complete C/C++ program for the following tasks.

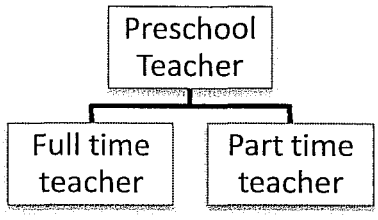
i. Declare two arrays named intArray[] and squareArray[] with size of 5 of ***int*** data type.

ii. Assign the values given below to the intArray[] using a ***pointer.***
8, 10, 12, 14, 16

iii. Initialize the elements of the array, squareArray[] to 64,100,144,196 and 256.
iv. Display both the arrays using pointers or loops or using both methods.

c) **[20 Marks]**

Consider the following class hierarchy of preschool teachers of ABC school, to answer the questions from i to iv.



All Preschool teachers have a *teacher ID, name, age* and *Highest qualification*. A full time teacher has a fixed *monthly salary*. He/She has to necessarily contribute to the *EPF*(Employee Provident Fund) and a *monthly fee* for the sports club, which is deducted from his/her *monthly salary*. A part time teacher does not contribute to the EPF or to the Sports club and He/She is paid a *daily salary*.
Piyal is a Full time teacher and Amara is a Part time teacher assigned to the school.

i. Identify appropriate data members for the base and derived classes according to the description given above.
ii. Declare the base class using C++ coding.
iii. Implementing a function named print_details() in both the derived classes, declare the derived classes using C++ coding. The function must be implemented so that it demonstrates **polymorphism**.
iv. Write C++ coding for the following on the main function
    a. Assuming values for the data members, create an instance (Piyal) of the class Full time teacher and assign values to it.
    b. Assuming values for the data members, create an instance (Amara) of the class Part time teacher and assign values to it.
    c. Display the details of Piyal and Amara by calling the function print_details() as appropriate.

Question 2 **(20 Marks)**

Write a C++/C program including header files to calculate the **Volume** and the **Surface Area** of a Cylinder and display their values. The program should let the user enter the **Height** and **Radius** of the cylinder. If a user enters a negative value for any of the inputs then an error message should be displayed stating "Please enter a valid positive number". Use **globally defined constants** as applicable.
The formulas necessary for calculations are as follows.

- Volume = π radius × radius × height
- Surface Area = (2 π radius × height) + (2 π radius × radius)

Please note the following:

- For π use the approximated value 3.14159 .
- Do not use <math.h> header file for any form of calculation

Question 3 **(20 Marks)**

a) **[8 Marks]**

Write a C++/C program including header files using **switch** statements to display the name of the month, when the user enters the number of the month through the keyboard. If the user enters a value less than 1 or greater than 12 then an error message should be displayed.

example :- If the user enters number 2, the program should display "February".

b) **[12 Marks]**

Write a C/C++ program including header files to calculate the area of a circle using a function named **calc_Area()**.The function should accept the radius of the circle and return the area to the **main( )** function, where the area of the circle is displayed. Use a **pointer to call the function** from the main function.

The formulas necessary for calculations are as follows.

- Area = π radius × radius

Please note the following:

- For π use the approximated value 3.14159 .
- Do not use <math.h> header file for any form of calculation

Question 4 **(20 Marks)**

A file is required to record the daily temperatures of a city for one week from Monday to Sunday. Write a C/C++ program to enter the daily temperatures along with the name of the day, read the file, compute the average temperature for the week and display it. The final output of the program should be as follows.

Monday	31
Tuesday	32
Wednesday	33
Thursday	36
Wednesday	32
Thursday	31
Friday	32

Average Temperature :- 32.4

Question 5 **(20 Marks)**

Write a C/C++ program using an **array of structures** to create a telephone directory. The telephone directory should contain **Person's name, Residence telephone number** and **Mobile number.** The user should be provided with facility to view the telephone directory whenever necessary.

Question 6 **(20 Marks)**

"Magic Video Center" is a video rental company which rent outs Movies and Music videos to its customers. The rental fees for the Videos are calculated as follows.

- For Movie Video:-
  Rental fee = (Number of Days * Fee per day) + Extra Charge
- For Music Video:-
  Rental fee = (Number of Days * Fee per day)/2

The Fee per day for any video is Rs. 200.00 and the Extra Charge is Rs.1000.00

Write a complete C++ program using the Object oriented concepts to calculate the Rental fee for the 3 videos issued to 3 customers.

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

Item Number	Name of the Video	Video Type	No of days
10012	ABC	Music	5
10090	XYZ	Movie	3
10096	MNO	Music	9

Table Q6

END