NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF ELECTRONIC ENGINEERING

TEE2232 COMPUTER ENGINEERING

MAY 2013 EXAMINATION PAPER

DURATION OF EXAMINATION: 3 HOURS

INSTRUCTIONS TO CANDIDATES:

1. Answer any FIVE questions only.
2. Each question carries equal marks.
3. Show all your steps clearly in any calculations.
4. Start each new question on a fresh page.

Q1   a)   Write a C/C++ program to calculate the sum of the following series

$$1+\frac{2}{2!}+\frac{3}{3!}+\frac{4}{4!}+\ldots\ldots\ldots+\frac{n}{n!}$$ [7]

   b)   Using a flowchart show the booting process of an 80286 computer running

   MSDOS as its Operating System.   [7]

   c)   Write a C/C++ program which can find the lowest common multiple (LCM) and

   highest common factor (HCF) of at least two numbers.   [6]

Q2 a) Draw the internal structure and explain the functions of CPU and each structure. Briefly   explain the importance of a **control bus** in a microcomputer system.

[10]

   b) With the aid of a diagram explain the "Waterfall Model" approach to developing software projects. Describe what activities must be undertaken in each of the eight stages.   [10]

Q3   a) Explain why a computer's configuration is called BIOS or CMOS setup when it is known that, BIOS refers to ROM and CMOS refers to RAM. Also give their relationship.   [10]

b) i. Design a memory bank using 512Kbits x 2 memory ICs to give a memory bank

   of 16 bit   data.   [5]

   ii. Give total capacity of one chip.   [2]

   iii. Give total capacity of the memory bank.   [3]

Q4
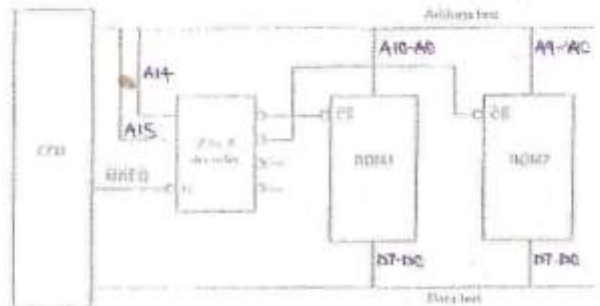
a)   Using the diagram shown above

   i.   Calculate the address range of ROM1.   [3]

   ii.   Find the storage capacity of ROM2.   [2]

   iii.   Show the memory mapping of the two ROM ICs.   [5]

b) Write a series of MSDOS commands that can allow you to accomplish the following tasks:

   i.   Copy a file called "computer.doc" from a sub-directory of root called "engineer" to another sub-directory of root called "Marks".

   ii.   Create a directory called "EngSoft" as a sub-directory of "engineer".

   iii.   Change from any directory including sub-diretories to root

   iv.   Protect the file "computer.doc" with read only attributes.   [10]

Q5   a)   Explain the following terms as used in microcomputer system:

          i.   Real and protected mode
          ii.   Transient and Utility programs   [6]

    b)   The Pythagoras' theorem is given by the formula $r^2 = x^2 + y^2$,

        where **r = hypotenuse, x and y are adjacent sides to the right-angle.**
        Write a C/C++ program which prompts on screen for the values of x and y.
        The calculates the value of r and display it.   [6]

    c)   Using appropriate examples to illustrate, what do you understand by the
        following terms as used in C++?
         i.   Pointer and Pointer dereferencing
         ii.   Inheritance.
         iii.   Encapsulation
         iv.   Polymorphism   [8]

Q6   a)   Explain how the presence of CACHE memory improves the speed of a

        computer system. State and explain the caching schemes.   [7]

    b)   Write a C/C++ program to find whether a given number is a prime number or
        not.   [7]

    c)   Write a C/C++ program which can multiply three by three matrices.[6]

Q7   a) List the precautionary steps taken when opening a computer system unit for
        maintenance.   [7]

    b)   Describe the steps you would take to troubleshoot a computer that fails to boot-

        up.   [7]

    c)   How are error codes used in troubleshooting? Illustrate with examples. [6]

Q8
A factory has a dual heating system, gas and electricity. To minimize heating costs, a
microprocessor – based temperature control system is introduced. The computer is to operate
in a continuous cycle of taking in temperature reading, displaying this temperature on a
suitable readout, and switch ON and OFF the gas and electricity according to the following
rules:
        i.   If the temperature is above 25 degrees, all heating should be OFF;
        ii.   If the temperature is at or between 10 and 25 degrees, the gas heating should
         be ON but not electric.
        iii.   If the temperature is below 10 degrees all heating should be ON.
Draw the flow chart using appropriate symbols for the program, which enables the computer
to perform this task. Write a C/C++ code for this operation.   [20]

END OF PAPER