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| **National University of Computer and Emerging Sciences, Lahore Campus** | | | | |
| C:\Users\saif\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\final design.jpg | **Course Name:** | **COAL Lab** | **Course Code:** | **CL-327** |
| **Program:** | **BS(Computer Science)** | **Semester:** | **Spring 23** |
| **Duration:** | **90 min** | **Total Marks:** | **30** |
| **Paper Date:** | **31 Mar-2023** | **Weight** | **30%** |
| **Section:** | **L** | **Page(s):** | **2** |
| **Exam Type:** | **Mid** |  |  |
| **Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Roll No.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Section:\_\_\_\_\_\_\_** | | | | |
| **Instruction/Notes:** | **READ ALL INSTRUCTIONS CAREFULLY. Only book is allowed, no notes or rough sheets.**  1. Understanding the question paper is also part of the exam, so do not ask any clarification. Make suitable ASSUMPTIONS.  2**.** Final Submissions should be done in your respective section folder on Classroom.  3. Your cell phones/smart watches should be turned off and placed upside down.  4. It is your responsibility to protect your code and save it from being copied. If you don’t protect it, all matching codes will be considered copy/cheating cases. **No leniency on plagiarism.**  5. Any kind of code, if found in your PC will result in immediate disqualification from the Exam and at least a ‘**F’** as final grade in COAL Lab. So, make sure you delete everything from Desktop of your windows as well as Ubuntu. Also delete all the files permanently from Recycle Bin and Trash respectively for Windows and Ubuntu. Delete all files from your Drives before starting the exam.  6. You are immediately disqualified from the exam if:  i. You are seen talking, whispering, borrowing or looking at someone’s PC  ii. A USB is found attached to your PC  iii. You are seen using cell phone/smart watch.  iv. You are caught accessing internet | | | |

**(Marks: 30)**

**Submission:** You have to submit yourcode **(Roll-No.asm)** in the folder as described above

**Math Rules**

You were in a hurry for your exam and forgot your calculator at home. You ran to the book shop to get a new one. Since you needed it for just a few hours you asked for the cheapest one.

After the exam you find out that your formulas were correct but the final answers you got were different.

Unfortunately, the cheap calculator did not obey the **BODMAS** rule. You explained the problem to your teacher. The teacher asked you to make a code on 0x88 architecture that takes an array with the expressions in it.

E.g.

Expression: 2,B,+,3,A,\*,4,\*,6,0,-,5,C,+,E

2B+3A\*4\*60-5C+E

= 2B+3A\*180-5C+E = 2B+5700-5C+E = 2B+5700-4E = 2B+56B2 = 56DD

Your code should place the final result in AX and/or BX. Add comments regarding the use of registers.

To do the process above you are to make **3 sub-routines:**

1. Multiplication
2. Addition
3. Subtraction

**No credit for code without sub-routines**

You may also use the stack where ever it fits. You may also use one additional array to help you through. An efficient code will get extra credit.