

<b>Savitribai Phule Pune University</b> <b>Second Year of Computer Engineering (2015 Course)</b> <b>210257: Microprocessor Lab</b>		
<b>Teaching Scheme:</b> <b>PR: 04 Hours/Week</b>	<b>Credit</b> <b>02</b>	<b>Examination Scheme:</b> <b>TW: 25 Marks</b> <b>PR: 50 Marks</b>
<b>Guidelines for Instructor's Manual</b> <p>The instructor's manual is to be developed as a hands-on resource and reference. The instructor's manual need to include prologue (about University/program/ institute/ department/foreword/preface), University syllabus, conduction &amp; Assessment guidelines, topics under consideration concept objectives, outcomes, set of typical applications/assignments/ guidelines, and references.</p>		
<b>Guidelines for Student's Lab Journal</b> <p>The laboratory assignments are to be submitted by student in the form of journal. Journal consists of prologue, Certificate, table of contents, and write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, software &amp; Hardware requirements, Date of Completion, Assessment grade/marks and assessor's sign, Theory- Concept, instructions/features used, test cases, conclusion/analysis and references).</p> <p>Program codes with sample output of all performed assignments are to be submitted as softcopy. As a conscious effort and little contribution towards Green IT and environment awareness, attaching printed papers as part of write-ups and program listing to journal may be avoided. Use of DVD containing students programs maintained by lab In-charge is highly encouraged. For reference one or two journals may be maintained with program prints at Laboratory.</p>		
<b>Guidelines for Lab /TW Assessment</b> <p>Continuous assessment of laboratory work is based on overall performance and lab assignments performance of student. Each lab assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.</p>		
<b>Guidelines for Practical Examination</b> <p>Both internal and external examiners should jointly set problem statements. <u>During practical assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation of the problem statement.</u> The supplementary and relevant questions may be asked at the time of evaluation to test the student for advanced learning, understanding of the fundamentals, effective and efficient implementation. So encouraging efforts, transparent evaluation and fair approach of the evaluator will not create any uncertainty or doubt in the minds of the students. So adhering to these principles will consummate our team efforts to the promising start of the student's academics.</p>		
<b>Guidelines for Laboratory Conduction</b> <p>The instructor is expected to frame the assignments by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. The assignment framing policy need to address the average students and inclusive of an element to attract and promote the intelligent students. The instructor may set multiple sets of assignments and distribute among batches of students. It is appreciated if the assignments are based on real world problems/applications. Use of open source software is encouraged.</p>		

In addition to these, instructor may assign one real life application in the form of a mini-project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus.

Operating System: Latest 64-bit Version and update of Microsoft Windows 7/ Windows 8 Operating System onwards or 64-bit Open source Linux or its derivative.

Programming Tools: Preferably using Linux equivalent or MASM 64x or equivalent, Microsoft Visual Studio x64 Intrinsic.

#### Suggested List of Laboratory Assignments (Any 12)

1.	Write X86/64 ALP to count number of positive and negative numbers from the array
2.	Write X86/64 ALP to perform non-overlapped and overlapped block transfer (with and without string specific instructions). Block containing data can be defined in the data segment.
3.	Write X86/64 ALP to convert 4-digit Hex number into its equivalent BCD number and 5-digit BCD number into its equivalent HEX number. Make your program user friendly to accept the choice from user for: (a) HEX to BCD b) BCD to HEX (c) EXIT. Display proper strings to prompt the user while accepting the input and displaying the result. (wherever necessary, use 64-bit registers)
4.	Write X86/64 ALP to perform multiplication of two 8-bit hexadecimal numbers. Use successive addition and add and shift method. (use of 64-bit registers is expected)
5.	Write X86 ALP to find, a) Number of Blank spaces b) Number of lines c) Occurrence of a particular character. Accept the data from the text file. The text file has to be accessed during Program_1 execution and write FAR PROCEDURES in Program_2 for the rest of the processing. Use of PUBLIC and EXTERN directives is mandatory.
6.	Write X86/64 ALP to switch from real mode to protected mode and display the values of GDTR, LDTR, IDTR, TR and MSW Registers.
7.	Write X86 program to sort the list of integers in ascending/descending order. Read the input from the text file and write the sorted data back to the same text file using bubble sort
8.	Write X86 menu driven Assembly Language Program (ALP) to implement OS (DOS) commands TYPE, COPY and DELETE using file operations. User is supposed to provide command line arguments in all cases.
9.	Write x86 ALP to find the factorial of a given integer number on a command line by using recursion. Explicit stack manipulation is expected in the code.
10.	Write 80387 ALP to find the roots of the quadratic equation. All the possible cases must be considered in calculating the roots.
11.	Write 80387 ALP to plot Sine Wave, Cosine Wave and Sinc function. Access video memory directly for plotting.
12.	Write 80387 ALP to obtain: i) Mean ii) Variance iii) Standard Deviation Also plot the histogram for the data set. The data elements are available in a text file.
13.	Write a Terminate but Stay Resident (TSR) program for a key-logger. The key-presses during the stipulated time need to be displayed at the center of the screen. <b>OR</b> Write a TSR to generate the pattern of the frequency tones by reading the Real Time Clock (RTC). The duration of the each tone is solely decided by the programmer.
14.	Write 80386 ALP to implement multitasking. Where each task is supposed to change the color of the text displayed at the center of the screen