List of Semester Projects allotted for Computer Organization

October 3, 2013

Guidelines: Each project is to be done by a *group of two students*. The projects are to be implemented in any of the programming language: C, C++, Java. Some projects are theoretical work. Each project work carries documentation in the form of a project report to be submitted in printed form - A4 size with soft binding. The project report structure is:

1. **Title**

2. **Objective:** (The objective describes the goal of the project work.)

3. **Theory:** (The theory is formal design comprising descriptions, essential mathematics, formulas, drivations, etc.)

4. **Design:** (The design part comprises flow-charts, algorithms, tables, diagrams, derivations, etc.)

5. **Implementation:** (The implementation is description of functional modules of code, hierarchical relationship, coding with built-in documentation, list of system requirements, like compilers, operating system, etc.)

6. **Debugging-Test-run:** (The Test-run and result part of the report contains detailed method of testing, assuring that the code is fool-proof and fully debugged.)

7. **Results analysis (if any):** (The Analysis part should discuss other aspects, like complexity of algorithms in terms of average and worst case complexity for time and space, robutsness of the approach used, finer technical details, etc.)

8. **Conclusion and Future Improvements:** (The conclusion and future aspect should summarize the project in brief, what improvements can be possible which could not be considered due to time limits, limitations (if any in the design and implementation), various applications of this design, etc.)

9. **Bibliography:** The bibliography section should provide the detailed list of references of books, journals, websites, conferences, and others in the standard accepted formats.

The report should have a front cover in the standard form, generally used for seminar/dissertation, giving project title, class, name of student, guide, name of Institution, year, and month & year of submission, all in standard acceptable formats.

   Note: Some of the projects may be done totally theoretical, and no coding be done. But, they should be exhaustive in mathematical and descriptive part.

List of Projects:

1. Design and computer architecture: Design a processor with minimum number of instructions, so that it can do the basic arithmatic and logic operations.

2. Design a serial interface to connect the 8085 micro-processor with a keyboard for that on pressing of enter key of keyboard, it can receive the characters typed. **(10002, 10003)**

3. Design and pipeline architecture for 2,3,4 stages pipeline.**(10005)**

4. Using microprogram as instructions directly: Consider that there is no "instruction set", no program counter (but microprogram counter), no instruction fetch in the normal sense. Your machine and "program" is THE microprogram itself. You have to add some fields into microprogram word such as : ADD R0, R1, R2 which hold the appropriate values.

5. Give a comparative study of 8085, 6502, and NSC micro-processors **(10006,10009)**

6. Design a Turing machine using java, to implement basic operations of TM.**(10029,10030)**

7. Write program to generate assembly code from prefix code**(10001, 10024)**

8. Simulate a word multiplier.**(10033, 10044)**

9. Simulate a word divider.

10. Suggest a high speed addition method and logic for 4-bit addition.

11. Microprocessor-based automatic door opener.**(10011, 10012)**

12. Microprocessor based furnance temperature controller.**(10015,10040)**

13. Microprocessor based water level controller in domestic water storage tank (when water goes above a height, it switches off the pump motor, and when it goes below some level, it switches ON the pump motor).**(10022)**

14. Microprocessor based automatic attendance recorder (make use of RFID: a unique for each student).**(10041,10042)**

15. Microprocessor based ECG recorder.

16. Design and implement an arbitrary precision four function calculator.**(10013)**

17. Stack machine ISA : Design a stack machine, its instruction set must be stack oriented (no register!).**(10027)**

18. Implement quick sort using 8085 assembly language.**(10014,10031), (10019,10032,)(10025)**

19. Implemet binary search using 8085 assembly language.**(10034, 10035)**

20. Implement matrix multiplication using 8085 assembly language.**(10017,10028), (10023,10039)**

21. Design a instruction set for a limited functionality machine having all instructions of 8-bits fixed length only, including opcode and operands.

22. Write/create a tool for bench-marking of a hardware (CPU).**(10018)**

23. Suggest and design a minimal cpu architecture for controlling the washing machine.

24. Simulate modern traffic controlsystem.**(10004,10043)(10020,10038)**

25. Project for piano sound generation.**(10021,10026)**

26. Quantum Compters.

27. DNA Computers.

28. Construct an interpretor written in C language to interpret an assembly language based on the following basic instructions for a machine having only one register, which is accumulator, and all the operands are in mem-

ory: **(10036, 10037),(10007,10008)**

Opcode, operand	comment
ADD X	Add memory location x into acc.
SUB X	Substract X from Acc.
MUL X	Multiply X with Axcc.
DIV X	Divide acc. by X.
AND X	And X with acc.
NOT X	Complement acc.
OR X	Or X with acc.
LD X	Load memory location X at acc.
ST X	Store acc. at memory location X