

--	--	--	--	--	--	--	--	--	--

Fourth Semester M.Tech. Degree Examination, June/July 2017
Advanced Computer Architecture

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1
 - a. State and explain the significance of Amdahl's law. (04 Marks)
 - b. Implementations of floating point (FP) square root (SR) vary significantly in performance. FPSR is responsible for 20% of execution time. Compare these two design alternations – One tries enhancing FPSR hardware and speed up the operation by a factor of 10. The other tries to make all FP instructions run faster 1.6 times. FP instructions are responsible for half the execution time of the application. Design team believes that they can make all FP instructions run 1.6 times faster with the same effort as required for the fast SR. (04 Marks)
 - c. What is the relevance of benchmarks in comparing computer performance? (06 Marks)
 - d. The rated MTTF of disks is 1,200,000 hours or almost 140 years – so the disks practically never fail – which is certainly not the case, hence which would be a more useful measure of performance? Explain. How much would it be for 1 year for 1000 disks with 1,000,000 hr MTTF? (06 Marks)
- 2
 - a. List out the 3 types of dependences describing data dependence in particular. (06 Marks)
 - b. Draw and explain the basic implementation of a pipeline with registers for stalls as in a MIPS processor. (07 Marks)
 - c. How can one reduce branch costs with prediction? Describe the simplest dynamic branch prediction scheme. (07 Marks)
- 3
 - a. Analyse and comment on the architecture of Intel Pentium 4 and how the performance has been improved, using an illustration or block schematic diagram. (10 Marks)
 - b. What are the assumptions made for a processor in order to investigate the limits of ILP (list)? Also explain what are the factors that affect and limit the usage of ILP that can be exploited efficiently. (10 Marks)
- 4
 - a. Discuss in detail the following optimizations for enhanced cache performance :
 - i) Merging write buffer to reduce miss penalty.
 - ii) Compiler optimization to reduce miss rates. (10 Marks)
 - b. How can processes be protected from each other via i) virtual memory ii) virtual machines? (10 Marks)
- 5
 - a. Discuss the different levels in RAID. (10 Marks)
 - b. Derive the average time waiting in the queue in terms of average service time and server utilization, assuming Poisson distribution. Modify to accommodate for an M/M/I model ; list out of the assumptions made for an M/M/I system. (10 Marks)
- 6
 - a. Explain the significance of finding dependences and illustrate, with the use of GCD test. (10 Marks)
 - b. Explain hardware support for exposing parallelism via predicated instruction, with an example. (10 Marks)
- 7
 - a. Explain the characteristics of FFT Kernel and LU decomposition. (10 Marks)
 - b. Explain the custom cluster approach in Blue gene/L computing node with an illustration. (10 Marks)
- 8
 - a. Explain the steps in radix – 2 multiplication and division for unsigned integers. (10 Marks)
 - b. Explain the process of floating point addition operation, with an example. (10 Marks)
