

CS501 Advanced Computer Architecture

Final Term Examination - February 2005

Time Allowed: 150 Minutes

Please read the following instructions carefully before attempting any of the questions:

1. Attempt all questions. Marks are written with each question.
2. Do not ask any questions about the contents of this examination from anyone.
 - a. If you think that there is something wrong with any of the questions, attempt it to the best of your understanding.
 - b. If you believe that some essential piece of information is missing, make an appropriate assumption and use it to solve the problem.
 - c. Write all steps, missing steps may lead to deduction of marks.
3. Exam is Closed Book. No handouts or extra material is allowed in exam hall other than rough sheet which will be provided by the examiner.

****WARNING: Please note that Virtual University takes serious note of unfair means. Anyone found involved in cheating will get an 'F' grade in this course.**

Total Marks: 100

Total

Questions: 7

Question No. 1

Marks : 15

Assume that three I/O devices are connected to a 32-bit, 10 MIPS CPU. The first device is a hard drive with a maximum transfer rate of 2MB/sec. It has a 32-bit bus. The second device is a floppy drive with a transfer rate of 30KB/sec over a 16-bit bus, and the third device is a keyboard that must be polled thirty five times per second. Assuming that the polling operation requires 15 instructions for each I/O device, determine the percentage of CPU time required to poll each device.

Question No. 2

Marks : 15

Give control signals for the **add** instructions.

Note: Fill the given table only. If you require other control signals to complete the table, do it as rough work. Marks will be given only for the required fields in the table.

Question No. 3

Marks : 10

Write different schemes related to virtual memory organization.

Question No. 4

Marks : 15

Suppose we have 10 magnetic tapes, each containing 20GB. Assume that there are enough tape readers to keep any network busy. How long will it take to transmit the data over a distance of 3Km? The choices are category 5 twisted-pair wires at 100Mbps/sec, multimode fiber at 1500Mbps/sec and single-mode fiber at 3000Mbps/sec.

Question No. 5

Marks : 15

Given a 16-bit parallel output port attached with the FALCON-A CPU as shown in the figure below. The port is mapped onto address 65h of the FALCON-A's I/O space. Sixteen LED branches are used to display the data being received from the FALCON-A's data bus. Every LED branch is wired in such a way that when a 1 appears on the particular data bus bit, it turns the LED on; a 0 turns it off.

- (a) Which LEDs will be ON when the instruction **out r1, 101** Executes on the CPU? Assume r1 contains AA79h. Briefly explain your answer.

- (b) Identify the changes needed to map the above output port at address C0h and C1h of the FALCON-A's I/O space (instead of 65h and 66h)

Question No. 6

Marks : 15

Explain all categories in classification of hazards.

Question No. 7

Marks : 15

Convert the following decimal numbers to IEEE single precision floating- point numbers. Report the results as hexadecimal values. You need not extend the calculations of the significant value beyond its most significant 8 bit. **-0.5625**