JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2016

B.Tech VI Semester

COURSE CODE: 10B11CI613 MAX. MARKS: 15

COURSE NAME: Computer Organization & Architecture

COURSE CREDITS: 04 MAX. TIME: 1 HR

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Vague answers will credit to zero marks*

---

1. Justify the following statements with suitable reasoning, examples, diagrams and mathematical formulas
   a. Computer architecture is different from computer organization.
   b. Hardwired control logic is faster than micro programmed control logic.
   c. RC delay is one of the drawbacks of contemporary computer design.
   d. Scale out approach of processor design is better than scale up approach
   e. Amdahl's law imposes upper bound on performance of multi core systems. [5]
2. Imagine that you are the lead architect on a team assigned to design a new multiprocessor computer. The goal for this new product is for it to be a cost performance leader within the server computing market. The marketing team has already specified that the total cost of the machine must fall somewhere within the range of the $50,000 - $100,000 that is typical of high-end server machines, and that furthermore it ought to be as close as possible to the low end of this range, so as to best attract the value-seeking customer. You expect that the purchasers in the market for this particular product will not care very much about power consumption, as long as it is less than about 50 kW.
   You are trying to choose between two different types of processors to base your system design on. Chip A costs $2,750, performs at a throughput level of 80 work units (database transactions) per second in a benchmark application, and consumes 100W of power. Chip B costs $1,600, completes 50 work units per second, and consumes 50W of power. (For this problem, neglect the cost and power consumed by other components.)
   In the following, use these variables: Csys,min = The minimum cost of the system, Csys,max = The maximum cost of the system, Psys,max = The maximum power consumption of the system, CX = Cost of a chip of type X (where X = A or B) (And similarly with P (power) and T (throughput) of chips A and B) nchips = Number of chips of the selected type in the system.
   (a) Identify the design constraints that our system design must satisfy. Also, assuming that power will not end up being the limiting factor in the design, identify the quantities that we should be trying to maximize and/or minimize in this design scenario.
   (b) Now, formulate analytical expressions, in terms of the variables given above,
   for:(i) the constraints that our design must satisfy (ii) the quantity that we should be maximizing in our design (figure of merit) (iii) the quantity that we should be minimizing in our design (figure of demerit)
   (c) Answer the following questions and show your work.
   (i) Which type of chip (A or B) does a better job of maximizing the figure of merit? (ii) How many copies of this chip should we include in our system design? That is, what is the optimal value of nchips, within the design constraints? (iii) Does the chip that you chose in part (i) also minimize the figure of demerit, within the design constraints? [5]
3. Explain different methods to fill up the performance gap between processors and memory systems with suitable reasoning and examples. [5]