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06CS81

Eighth Semester B.E. Degree Examination, June 2012
Advanced Computer Architecture

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Define computer architecture. Illustrate the seven dimensions of an ISA. (08 Marks)
 b. Explain in brief measuring, reporting and summarizing performance of computer system. (08 Marks)
 c. Assume a disk subsystem with the following components and MTTF:
 ▪ 10 disks, each rated at 1000000 - hour MTTF.
 ▪ 1 SCSI controller, 500,000 – hour MTTF.
 ▪ 1 power supply, 200,000 – hour MTTF.
 ▪ 1 fan, 200,000 – hour MTTF.
 ▪ 1 SCSI cable, 1,000,000 – hour MTTF.
 Using the simplifying assumptions that the lifetimes are exponentially distributed and that failures are independent, compute the MTTF of the system as a whole. (04 Marks)

- 2 a. Explain how pipeline is implemented in MIPS. (06 Marks)
 b. Explain different techniques in reducing pipeline branch penalties. (06 Marks)
 c. What are the major hurdles of pipelining? Explain briefly. (04 Marks)
 d. Consider the unpipelined processor in RISC. Assume that it has a 1 ns clock cycle and that it uses 4 cycles for ALU operations and branches and 5 cycles for memory operations. Assume that the relative frequencies of these operations are 40%, 20% and 40% respectively. Suppose that due to clock skew and setup, pipelining the processor adds 0.2 ns of overhead to the clock. Ignoring any latency impact, how much speedup in the instruction execution rate will we gain from a pipeline? (04 Marks)

- 3 a. What are the basic compiler techniques for exposing ILP? Explain briefly. (08 Marks)
 b. Explain Tomarulo’s algorithm, sketching the basic structure of a MIPS floating point unit. (08 Marks)
 c. Explain true data dependence, name dependence and control dependence with an example code fragment. (04 Marks)

- 4 a. Explain exploiting ILP using dynamic scheduling, multiple issue and speculation. (08 Marks)
 b. Explain Pentium 4 pipeline supporting multiple issue with speculation. (08 Marks)
 c. Suppose we have a VLIW that could issue two memory references, two FP operations and one integer operation or branch in every clock cycle, show an unrolled version of the loop $x(i) = x(i) + s$, for such a processor. Unroll as many times as necessary to eliminate any stalls. Ignore delayed branches.

MIPS	Code
Loop: L. D	F ₀ , O(R ₁);
ADD.D	F ₄ , F ₀ , F ₂ ;
S.D	F ₄ , O(R ₁);
DADDUI	R ₁ , R ₁ , #-8;
BNE	R ₁ , R ₂ , Loop

(04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

PART – B

- 5 a. Explain basic schemes for enforcing coherence. (08 Marks)
 b. Explain performance of symmetric shared memory multiprocessors. (08 Marks)
 c. Suppose we have an application running on a 32-processor multiprocessor, which has a 200 ns time to handle reference to a remote memory. For this application, assuming that all the references except those involving communication hit in the local memory hierarchy, which is slightly optimistic. Processors are stalled on a remote request, and the processor clock rate is 2 GHz. If the base CPI (assuming that all references hit in the cache) is 0.5, how much faster is the multiprocessor if there is no communication versus if 0.2% of the instructions involve a remote communication reference? (04 Marks)
- 6 a. Explain the six basic cache optimization techniques. (10 Marks)
 b. Given the data below, what is the impact of second level cache associativity on its miss penalty?
 ❖ Hit time L_2 for direct mapped = 10 clock cycles
 ❖ Two way set associativity increases hit time by 0.1 clock cycles to 10.1 clock cycles.
 ❖ Local miss rate L_2 for direct mapped = 25%
 ❖ Local miss rate L_2 for two-way set associative = 20%
 ❖ Miss penalty L_2 = 200 clock cycles. (06 Marks)
 c. What are the techniques for fast address translation? Explain. (04 Marks)
- 7 a. Explain any 3 advanced cache optimization techniques. (08 Marks)
 b. Explain memory technology and optimizations. (06 Marks)
 c. Assume that the hit time of a two-way set associative first level data cache is 1.1 times faster than a four-way set associative cache of the same size. The miss falls from 0.049 to 0.044 for an 8 KB data cache. Assume a hit is 1 clock cycle and that the cache is the critical path for the clock. Assume that the miss penalty is 10 clock cycles to the L_2 cache for the two-way set associative cache, and that the L_2 cache does not miss. Which has the faster average memory access time? (06 Marks)
- 8 a. Explain detecting and enhancing loop level parallelism for VLIW. (06 Marks)
 b. Explain Intel-IA 64 architecture with a neat diagram. (06 Marks)
 c. Explain hardware support for exposing parallelism for VLIW and EPIC. (08 Marks)

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06CS82

Eighth Semester B.E. Degree Examination, June 2012

System Modelling and Simulation

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. List any three situations when simulation is the appropriate tool and not appropriate tool. (06 Marks)
- b. Define the following terms used in simulation: (06 Marks)
- i) Discrete system ii) Continuous system iii) Stochastic system
- iv) Deterministic system v) Entity vi) Attribute
- c. Draw the flowchart of steps involved in simulation study. (08 Marks)

- 2 a. Consider the grocery store with one checkout counter. Prepare the simulation table for eight customers and find out average waiting time of customer in queue, idle time of server, and average service time. The inter arrival time (IAT) and service time (ST) are given in minutes.

IAT : 3, 2, 6, 4, 4, 5, 8
ST (min) : 3, 5, 5, 8, 4, 6, 2, 3

Assume first customer arrives at $t = 0$.

(10 Marks)

- b. Suppose the maximum inventory level M is 11 units and the review period N is 5 days, estimate by simulation, the average ending units in inventory and number of days when a shortage condition occurs. Initial simulation has started with inventory level of 3 units and an order of 8 units scheduled to arrive in two days time. Simulate for three cycles (15 days). The probability for daily demand and lead time is given in table.

Demand	0	1	2	3	4
P	0.1	0.25	0.35	0.2	0.1

Lead time	1	2	3
Probability	0.5	0.3	0.2

RD for demand: 24, 35, 65, 25, 8, 85, 77, 68, 28, 5, 92, 55, 49, 69, 70.

RD for lead time: 5, 0, 3.

(10 Marks)

- 3 a. Define the term used in discrete event simulation: (06 Marks)
- i) System state ii) List iii) Event
- iv) FEL v) Delay vi) System.
- b. Six dump trucks are used to haul coal from the entrance of a small mine to railroad. Each truck is loaded by one of two loaders. After loading truck moves to scale, to be weighed. After weighing a truck begins a travel time and then returns to loader queue. It has been assumed that five of trucks are at loader and one at scale at time 0. By using event scheduling algorithm find out busy time of loader and scale and stopping time E is 64 minutes.

Loading time	10	5	5	10	15	10	10
Weighing time	12	12	12	16	12	16	-
Travel time	60	100	40	40	80	-	-

(14 Marks)

- 4 a. The number of Hurricanes hitting the coast of India follows Poisson distribution with mean $\alpha = 0.8$ per year. Determine:
- The probability of more than two hurricanes in a year
 - The probability of only one hurricane in a year. (06 Marks)
- b. Explain terms used in queuing notations of the form A/B/C/N/K. (06 Marks)
- c. List the steady state parameters of M/G/1. (08 Marks)

PART – B

- 5 a. Using multiplicative congruential method, generate random numbers to complete cycle. Explain maximum density and maximum period. $A = 11$, $m = 16$, $X_0 = 7$. (10 Marks)
- b. Using suitable frequency test find out whether the random numbers generated are uniformly distributed on the interval $[0, 1]$ can be rejected. Assume $\alpha = 0.05$ and $D_\alpha = 0.565$. The random numbers are 0.54, 0.73, 0.98, 0.11, 0.68. (10 Marks)

- 6 a. Develop a random variate generator for X with pdf given by

$$f(x) = \begin{cases} x, & 0 \leq x \leq 1 \\ 2 - x, & 1 < x \leq 2 \\ 0, & \text{otherwise} \end{cases}$$

(06 Marks)

- b. Explain with an example, importance of data distribution using histogram. (06 Marks)
- c. The following is set of single digit numbers from a random number generator. Using appropriate test, check whether the numbers are uniformly distributed. $N = 50$, $\alpha = 0.05$ and $X_{0.05,9}^2 = 16.9$.

6, 7, 0, 6, 9, 9, 0, 6, 4, 6, 4, 0, 8, 2, 6, 6, 1, 2, 6, 8, 5, 6, 0, 4, 7
1, 3, 5, 0, 7, 1, 4, 9, 8, 6, 0, 9, 6, 6, 7, 1, 0, 4, 7, 9, 2, 0, 1, 4, 8

(08 Marks)

- 7 a. Records pertaining to the monthly number of job related injuries at an underground coalmine were being studied by federal agency. The values of past 100 months are as follows:

Injuries/month	0	1	2	3	4	5	6
Frequency of occurrence	35	40	13	6	4	1	1

Apply the chi-square test to these data to test the hypothesis that the distribution is Poisson with mean 1.0 and $\alpha = 0.05$ and $X_{0.05,3}^2 = 7.81$. (10 Marks)

- b. Differentiate between terminating and steady state simulation with respect to output analysis with an example. (10 Marks)
- 8 a. Explain with a neat diagram verification of simulation model. (10 Marks)
- b. Describe with a neat diagram iterative process of calibrating a model. Which are three steps that aid in the validation process? (10 Marks)

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06IS81

Eighth Semester B.E. Degree Examination, June 2012

Software Testing

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Distinguish between errors, faults and failures. Mention examples of errors in various fields of human endeavor. (10 Marks)
 b. Explain with a neat diagram, a test and debug cycle. (10 Marks)

- 2 a. What is control flow graph? Explain how to construct CFG for the following program:
 1. begin
 2. int x, y, power ;
 3. float z ;
 4. input (x, y) ;
 5. if (y < 0)
 6. power = -y ;
 7. else
 8. power = y ;
 9. z = 1
 10. while (power != 0) {
 11. z = z * x ;
 12. power = power - 1 ;
 13. }
 14. if (y < 0)
 15. z = 1/z ;
 16. output (z) ;
 17. end(10 Marks)
 b. Explain various types of testing depending on the life cycle phase of the software development in which various activities occur. (10 Marks)

- 3 a. List informal and rigorously specified requirements test selection techniques. (04 Marks)
 b. Explain the systematic procedure for equivalence partitioning by considering a boiler control system. (10 Marks)
 c. What is category-partition method? Write a diagram which illustrates the different steps in the category-partition method. (06 Marks)

- 4 a. What is cause-effect graphing? Give the generic procedure for the generation of tests using cause-effect graphing. (06 Marks)
 b. Explain missing or extra Boolean variable faults by giving an example. (06 Marks)
 c. Give a procedure for generating a minimal constraint set from a predicate possibly containing non singular expressions. (08 Marks)

PART – B

- 5 a. Explain the following testing concepts used in structural testing:
i) Statement testing (10 Marks)
ii) Branch testing. (10 Marks)
- b. What is cyclomatic complexity? Explain path testing by considering binary search logic. (10 Marks)
- 6 a. Explain data flow testing criteria by considering your own example. (10 Marks)
- b. Explain data flow analysis with arrays and pointers, with relevant examples. (10 Marks)
- 7 a. What is adequacy criterion? Explain how adequacy criteria are just imperfect but useful indicators of inadequacies by giving your own project example. (10 Marks)
- b. What is scaffolding? Explain generic versus specific scaffolding by giving relevant examples. (10 Marks)
- 8 a. Explain core steps of SRET by giving block diagram. (10 Marks)
- b. Discuss and compare system, acceptance and regression testing. (10 Marks)

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06CS/IS831

Eighth Semester B.E. Degree Examination, June 2012
Mobile Computing

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, selecting atleast TWO questions from each part.

PART – A

- 1 a. Bring out the limitations of mobile devices. Explain any one, in detail. (08 Marks)
b. Define handover, give different types of handover and also describe the process of call handover when a mobile station moves. (12 Marks)
- 2 a. Consider a dat with FEC is transmitted through a channel at the rate of 12.6 kbps. If redundant data is inserted is 4 times more than the original data, calculate the rate at which the receiver actually receives the relevant data. (04 Marks)
b. Describe the medium access control problem of receiving distinctly, the signals from exposed and hidden terminals. (08 Marks)
c. Explain protocol layers between WCDMA uplink terminal and downlink equipment, with neat diagram. (08 Marks)
- 3 a. Explain DHCP protocol. How does a DHCP server bind a mobile node with a IP address. (10 Marks)
b. Describe indirect TCP, explain the modifications of indirect TCP as the selective repeat protocol and mobile end transport protocol. (10 Marks)
- 4 a. An ideal window size, W_{ideal} with which the TCP data stream should be sent depending on the link capacity, which is the band width available at the given instance between the TCP_A and TCP_B layers. Assume that the link capacity is 1024 kbps. Calculate W_{ideal} . Assume RTT delay in acknowledgement is 15,622 μ s. (04 Marks)
b. With a neat diagram, explain the four-tier client server architecture. (06 Marks)
c. Explain how to maintain data cache in mobile Environments. (10 Marks)

PART – B

- 5 a. Explain DAB transmission unit architecture, with a neat diagram. (10 Marks)
b. Describe online scheduling algorithm and offline scheduling algorithm. (10 Marks)
- 6 a. What are the different types of synchronization? Mention the applications of each. (08 Marks)
b. Explain with neat diagram, the client and server frame work and also give synchronization of mobile device in syoncML protocol architecture. (12 Marks)
- 7 a. Describe the functions of mobile agent along with its characteristics and advantages. (10 Marks)
b. Explain the functions of radio and baseband in Bluetooth. (10 Marks)
- 8 a. Explain the DOM model of an XMI document. (06 Marks)
b. Explain the SAX model of an XML document. (06 Marks)
c. Mention the characteristic features of Java. (08 Marks)

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06CS/IS834

Eighth Semester B.E. Degree Examination, June 2012
Network Management System

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1
 - a. What is network management? Explain three major groups of network management functions, with necessary diagrams. (10 Marks)
 - b. Explain telephone network model. (05 Marks)
 - c. What are the challenges in network management? (05 Marks)
- 2
 - a. List and explain network management standards. (06 Marks)
 - b. Explain TLV encoding structure. (04 Marks)
 - c. List the components of network management model and explain information model in detail. (10 Marks)
- 3
 - a. Explain two - tier, three tier and proxy server models of organization model. (10 Marks)
 - b. Explain SNMP architecture, with neat diagram. (10 Marks)
- 4
 - a. Explain any 3 MIB groups in detail. (10 Marks)
 - b. Explain SNMP operations of MIB in detail. (10 Marks)

PART - B

- 5
 - a. Explain RMON1 groups and functions. (05 Marks)
 - b. What is remote monitoring? With neat diagram, explain network configuration. (05 Marks)
 - c. With neat diagram, explain ATM remote monitoring. (10 Marks)
- 6
 - a. Write a note on virtual LAN. (05 Marks)
 - b. Briefly explain virtual path – virtual circuit concept. (05 Marks)
 - c. Explain ATM LAN emulation in detail. (10 Marks)
- 7
 - a. Explain the role of ADSL access network in an overall network. (05 Marks)
 - b. Explain ADSL architecture, with neat diagram. (05 Marks)
 - c. Briefly explain HFC networks. (05 Marks)
 - d. Write 2 modes of ADSL configuration profiles. (05 Marks)
- 8 Write short notes on :
 - a. Firewall.
 - b. Client server architecture system.
 - c. State transition graph model.
 - d. Fault management. (20 Marks)

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06CS/IS841

Eighth Semester B.E. Degree Examination, June 2012
Ad-Hoc Network

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
atleast TWO questions from each part.**

PART – A

- 1 a. Differentiate between cellular networks and ADHOC networks. (10 Marks)
b. Explain any six issues of ADHOC wireless networks. (10 Marks)
- 2 a. Define soft reservation. Explain soft reservation multiple access with priority assignment (SRMA/PA), using frame structure. (10 Marks)
b. Briefly explain the five phase reservation protocol (FPRP) with frame structure. (10 Marks)
- 3 a. Describe the working mechanism of MAC protocol, using directional antennas. Also in brief, explain one protocol in this category. (14 Marks)
b. Discuss about the classification of channel based on their usage in multichannel MAC protocol. (06 Marks)
- 4 a. Explain route establishment in DSDV (Destination Sequenced Distance – Vector Routing Protocol) with an example. (10 Marks)
b. List the characteristics of an ideal routing protocol for an ADHOC wireless network. (10 Marks)

PART – B

- 5 a. Explain any one hierarchical routing protocol. (12 Marks)
b. Discuss the advantages and disadvantages of zone routing protocol and zone-based hierarchical link state routing protocol. (08 Marks)
- 6 a. Discuss briefly any five reasons. Why TCP does not perform well in ADHOC wireless networks? (10 Marks)
b. Briefly explain the state transition diagram for ADHOC – TCP sender (ATCP). (10 Marks)
- 7 a. Briefly discuss the network layer attacks. (10 Marks)
b. Explain the key management in ADHOC wireless networks. (10 Marks)
- 8 a. Explain the issues and challenges in providing QoS in ADHOC wireless networks. (10 Marks)
b. Explain QoS – enabled ADHOC on-demand distance vector routing protocol. (10 Marks)

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06CS842

Eighth Semester B.E. Degree Examination, June 2012
Software Testing

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1 a. Explain with a supporting flow graph the concept of errors, faults and failures in the process of programming and testing. (10 Marks)
- b. Explain the types of metrics used in software testing and their relationships. (10 Marks)
- 2 a. Explain the elements of static testing and distinguish between walkthroughs and inspections. (10 Marks)
- b. Explain how saturation effect is observed during the testing of complex software systems with supporting figure. (10 Marks)
- 3 a. List the techniques for test selection from informal and rigorously specified requirements and with an example explain any one technique from this list. (10 Marks)
- b. Explain the steps in the category-partition method. (10 Marks)
- 4 a. Explain the procedure for generating a decision table from a cause-effect graph. (10 Marks)
- b. Explain fault propagation by giving example. (10 Marks)

PART – B

- 5 a. Explain different elements in control flow, discuss them with regard to testing, adequacy criterion and coverage. (15 Marks)
- b. Write short notes on procedure call testing. (05 Marks)
- 6 a. Define the following by giving necessary examples: i) Use of a variable; ii) Definition of a variable; iii) Direct data dependency; iv) Definition of clear path. (08 Marks)
- b. Define the various data flow testing criteria. (08 Marks)
- c. Write a short note on data flow coverage with complex structures. (04 Marks)
- 7 a. Explain the following:
 - i) Test case
 - ii) Test case specification
 - iii) Test suite
 - iv) Adequacy criteria
 - v) Test obligation. (10 Marks)
- b. With reference to test execution, explain the concept of scaffolding and test oracles. (10 Marks)
- 8 a. Explain integration testing strategies. (08 Marks)
- b. Compare system, acceptance and regression testing. (08 Marks)
- c. Write short notes on clean room process model. (04 Marks)

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Eighth Semester B.E. Degree Examination, December 2011
Programming Languages

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting
atleast TWO questions from each part.**

PART – A

- 1 a. Describe any five tools that commonly support the work of a compiler within a larger programming environment. (10 Marks)
- b. List different times – binding times, at which, decisions may be bound. (05 Marks)
- c. Andy and Bob are shopping for groceries. Andy knows how to program prolog and Bob agrees to Andy's suggestion to use the following program to purchase the items :
- likes (andy, twinkies)
likes (andy, cake)
likes (andy, pie)
likes (andy, juice)
likes (bob, pie)
likes (bob, apples)
likes (bob, twinkies)
price (twinkies, 1)
price (cake, 5)
price (pie, 7)
price (juice, 2)
buy (x) : likes (andy, x), /+
likes (bob, x),
price (x, p), p < 3
- For query ? – buy (x), which items x are found on backtracking. (05 Marks)
- 2 a. Explain with examples, the eight major categories of control – flow mechanisms. (10 Marks)
- b. Define deep binding and shallow binding. Describe the difference between them, with examples. (10 Marks)
- 3 a. What is short-circuit Boolean evaluation? Explain its importance, with examples. (08 Marks)
- b. How are tail – recursive functions faster than naïve implementation of recursion? (04 Marks)
- c. Write a recursive function in C and in scheme to implement
- $$\text{fib}(n) = \begin{cases} 1 & \text{if } n = 0 \text{ or } n = 1 \\ \text{fib}(n-2) + \text{fib}(n-1) & \text{otherwise.} \end{cases} \quad (08 \text{ Marks})$$
- 4 a. Define :
- Strongly types language
 - Statically typed language
 - Denotational view of type
 - Constructive view of type. (08 Marks)
- b. With neat diagrams, explain the difference between row – major and column – major layouts for contiguously allocated arrays. (06 Marks)
- c. What is row – pointer layout? Mention its advantages. (06 Marks)

PART – B

- 5 a. Define list. Discuss the fundamental operations on lists in Lisp and ML. (10 Marks)
 b. Write short notes on :
 i) Deep and shallow equality and assignment
 ii) Pointers and arrays in C. (10 Marks)
- 6 a. What are
 i) Subroutine calling sequence
 ii) Prologue
 iii) Epilogue
 iv) Stack pointer. (08 Marks)
 b. With a neat stack frame diagram, explain a typical calling sequence. (12 Marks)
- 7 a. Define abstraction. Explain the three important benefits of abstraction. (08 Marks)
 b. With respect to object oriented programming, explain
 i) Abstract class
 ii) Virtual methods
 iii) Vtables. (12 Marks)
- 8 a. List the common characteristics of scripting languages. (06 Marks)
 b. Define the term, functional programming. List the features of functional languages. (06 Marks)
 c. Given the following code :

```
(define switch (lambda (X a b c)
  (cond (( < X 0 ) a)
        (( = X 0 ) b)
        (( > X 0 ) c ))))
```


 Evaluate the expression :
 (switch – 1(+ 1 2)(+ 2 3)(+ 3 4) in applicative order, in normal order evaluation. (08 Marks)
