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06CS81

Eighth Semester B.E. Degree Examination, June / July 2013
Advanced Computer Architecture

Time: 3 hrs. Max. Marks:100

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

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 - A

1 a. Define Computer Architecture. Illustrate the seven dimensions of an ISA. **(08 Marks)**

b. Assume a disk subsystem with the following components and MTTF.
i) 10 Disk, each rated at 1000000 – hours MTTF ii) 1 SCSI controller 500,000 – hours MTTF iii) 1 power supply 200,000 – hours MTTF iv) 1 Fan 200,000 – hours MTTF v) 1 SCSI cable 1,000,000 – hours MTTF. Using the simplifying assumptions that the life times are exponentially distributed and that failure are independent. Compute the MTTF of the system as a whole. **(04 Marks)**

c. We will run two applications on this dual Pentium but the resource requirements are not equal. The first application needs 80% of the resources and the other only 20% of the resources.
i) Given that 40% of the first application is parallelizable, how much speed up would you achieve with that application if run in isolation?
ii) Given that 99% of the second application is parallelizable, how much speed up would this application observe if run in isolation?
iii) Given that 40% of the first application is parallelizable, how much overall system speed up would you observe if you parallelized it?
iv) Given that 99% of the second application is parallelizable, how much overall system speedup would you get? **(08 Marks)**

2 a. What is pipelining? List pipeline hazards. Explain any one in detail. **(10 Marks)**

b. With a neat diagram, explain the classic five stage pipeline for RISC processor. **(10 Marks)**

3 a. Mention the techniques used to reduce branch costs. Explain static and dynamic branch prediction used for same. **(08 Marks)**

b. What is data dependencies? Mention the different types of data dependencies. Explain Name dependencies with example between two instructions. **(06 Marks)**

c. What is correlating predictors? Explain with examples. **(06 Marks)**

4 a. Explain the basic VLIW approach for exploiting ILP using multiple issues. **(08 Marks)**

b. Write a note on value prediction. **(04 Marks)**

c. Mention the key issues in implementing advanced speculation techniques. Explain. **(08 Marks)**

PART - B

5 a. Explain any two hardware primitives to implement synchronization, with example. **(10 Marks)**

b. Explain the basic schemes for enforcing Coherence in a shared memory multiprocessor system. **(10 Marks)**

6 a. Briefly explain four basic Cache optimization methods. **(10 Marks)**

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b. Assume we have a computer where the Clocks Per Instruction (CPI) is 1.0. When all memory accesses hit in the Cache. The only data accesses are loads and stores and these total 50% of the Instructions. If the miss penalty is 25 clock cycles and the miss rate is 2%. How much faster would the computer be if all the Instructions were Cache hits? **(10 Marks)**

7 a. Which are the major categories of advanced optimization of Cache performance? Explain any one in detail. **(10 Marks)**

b. Explain internal organization of 64MB DRAM, with neat figure. **(05 Marks)**

c. Briefly explain how memory protection is enforced via virtual memory. **(05 Marks)**

8 a. Explain in detail the hardware support for preserving exception behavior during speculation. **(10 Marks)**

b. Explain Intel IA – 64 Architecture. **(10 Marks)**

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Eighth Semester B.E. Degree Examination, June/July 2013

System Modeling and Simulation

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Use of simulation table given in Appendix of Text book "discrete-event system simulation" by Jerry Banks is allowed.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – A

1 a. Explain the following component of simulation system with an example of bank system:
i) system ii) entity iii) attribute iv) activity v) event **(06 Marks)**

b. List three situations when simulation is appropriate tool and is not appropriate tool. **(06 Marks)**

c. Develop a manual simulation table for single server queuing system of a grocery shop for 6 customers and find :
i) Average waiting time of customer
ii) Idle time of server
iii) Average time customer spends in system.
Customer arrives at shop randomly from 1 to 8 minutes apart and has equal probability. Service time varies from 1 to 6 min. The random digits for IAT and ST are 425, 913, 727, 15, 948 and 84, 10, 74, 53, 17, 84 respectively. **(08 Marks)**

ST	1	2	3	4	5	6
P	.1	.2	.3	.25	.1	.05

2 a. Explain the terms used in discrete event simulation with an example:
i) Event ii) Event notice iii) FEL
iv) Delay v) Clock vi) System state **(06 Marks)**

b. Develop manual simulation using event scheduling for dump-truck problem and find busy time of loader and scale for period of 1 hour (60 min). Also mention system state and event notices. Six dump trucks are used to haul coal from a mine to railroad. Each truck is loaded by one of two loaders. After loading, the truck immediately moves to scale, to be weighted. Both loaders and scale have first-come-first served queue. After being weighted a truck begins a travel time afterward returns to loader queue. The distribution for various time given below:

Loading time	5	10	15
Probability	.3	.5	.2

Weighing time	12	16
P	.7	.3

Travel time	40	60	80	100
P	.4	.3	.2	.1

It is assumed that five trucks are at loaders and one at the scale at time t = 0. The activity times are given as follow:

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

(14 Marks)

3 a. Explain any two discrete distributions and give equation for probability mass function. Also calculate mean and variance of same. **(08 Marks)**

b. The number of hurricanes hitting the coast of Florida has a Poisson distribution with mean of 0.8.

i) What is probability that more than two hurricanes will hit the Florida coast in a year?

ii) What is probability that only one hurricane will hit the coast in a year? **(06 Marks)**

c. The lifetime of a satellite placed in orbit is given by PDF, $f(x) = 0.4\, e^{-0.4x}$, $x \geq 0$.

i) What is probability that satellite is still alive after 5 years?

ii) What is probability that the satellite dies between 3 and 6 years from the time placed in orbit? **(06 Marks)**

4 a. Explain Kendall's notation for parallel server queuing system A/B/C/N/K and also interprete meaning of M/M/2/∞/∞. **(10 Marks)**

b. Explain steady state parameters of M/G/1 queue. **(10 Marks)**

PART – B

5 a. Generate five random numbers using multiplicative congruential method with $X_0 = 5$, $a = 10$, $m = 64$. **(06 Marks)**

b. The six numbers 0.44, 0.66, 0.82, 0.16, 0.05, 0.92 are generated. Using Kolmogorov-Smirnov test with $\alpha = 0.05$ and check the hypothesis that the numbers are uniformly distributed on the interval [0, 1] can be rejected. **(08 Marks)**

c. For given size of data N = 100, use Chi-square test and check that random numbers are uniformly distributed. Assume $\alpha = 0.01$ and simulation table to check critical value.

Interval	1	2	3	4	5	6	7	8	9	10
Observed value	8	6	10	11	12	8	10	12	12	11

(06 Marks)

6 a. Suggest a step by step procedure to generate random variates using inverse transform technique for exponential distribution. **(06 Marks)**

b. Explain four methods of selecting input models without data. **(06 Marks)**

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

Injuries per 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 underlying distribution is Poisson. Calculate the parameter $\overline{X}$ (mean) and use in the equation. Use level of significance 0.05. **(08 Marks)**

7 a. Briefly explain measure of performance of simulation system. **(10 Marks)**

b. Explain the distinction between terminating or transient simulation and steady state simulation. Give an example. **(10 Marks)**

8 a. Differentiate the processes of verification and validation and model building. **(10 Marks)**

b. With a neat diagram, explain iterative process of calibrating a model. **(10 Marks)**

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06IS81

Eighth Semester B.E. Degree Examination, June/July 2013

Software Testing

Time: 3 hrs. Max. Marks:100

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – A

1 a. Explain in detail the various measures of software quality attributes. **(08 Marks)**
b. With a suitable example, explain how will you specify program bahviour. **(04 Marks)**
c. Briefly explain the concepts of test metrics. **(08 Marks)**

2 a. Explain the concepts of defect management. **(04 Marks)**
b. Explain in detail the several strategies for test generation. **(08 Marks)**
c. With a neat sketch, explain the elements of model checking. **(08 Marks)**

3 a. Briefly explain the concepts of unidimensional versus multidimensional partitioning. **(06 Marks)**
b. Name and explain the four steps which are helpful in creating the equivalence class. **(06 Marks)**
c. With a neat sketch, explain in detail the steps involved in the generation of tests using the category-partition method. **(08 Marks)**

4 a. Explain the procedures which are used for the generation of tests using cause-effect graphing. **(05 Marks)**
b. With a neat sketch, explain the notation used in cause-effect graphing. **(05 Marks)**
c. Briefly describe the fault model for predicate testing. **(05 Marks)**
d. Explain the usage of predicate testing in practice. **(05 Marks)**

PART – B

5 a. Explain the concepts of statement testing. **(05 Marks)**
b. Briefly explain the concepts of branch testing. **(05 Marks)**
c. Explain in detail the concepts of path testing with a suitable example. **(10 Marks)**

6 a. What do you mean by definition – use pairs? **(05 Marks)**
b. Explain the concepts of data dependence graph with a suitable example. **(05 Marks)**
c. Briefly explain the concepts of data flow analysis. **(05 Marks)**
d. Define data flow testing criteria with respect to DU pairs. **(05 Marks)**

7 a. What are the differences between test case and test case specifications? **(05 Marks)**
b. Define the term adequacy criteria with a suitable example. **(05 Marks)**
c Briefly explain the concepts of scaffolding. **(05 Marks)**
d. Explain the concepts of self-checks as oracles. **(05 Marks)**

8 Write short notes on the following concepts:
a. Memory leaks
b. System testing
c. Acceptance testing
d. Integration testing **(20 Marks)**

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06CS/IS831

Eighth Semester B.E. Degree Examination, June/July 2013

Mobile Computing

Time: 3 hrs. Max. Marks:100

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

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PART – A

1 a. Explain the features of smart phone and multimedia phone. **(06 Marks)**
b. Describe the GSM network architecture with a neat block diagram. **(10 Marks)**
c. Explain the limitations of the mobile devices. **(04 Marks)**

2 a. Describe with an example, exposed and hidden terminal problem in CSMA. **(06 Marks)**
b. What is spread spectrum? Explain the DSSS used in CDMA system. **(08 Marks)**
c. What is OFDM? How does an OFDMA system differ from CDMA system? **(06 Marks)**

3 a. Explain the mobile IP network with a neat block diagram. **(07 Marks)**
b. Explain the tunneling and encapsulation in mobile IP. **(07 Marks)**
c. Explain the working of mobile TCP. **(06 Marks)**

4 a. What is data caching? Explain its maintenance in mobile environments. **(08 Marks)**
b. Explain the n-tier client/server architecture. **(08 Marks)**
c. Describe the ACID rules of transaction models. **(04 Marks)**

PART – B

5 a. Explain the selective tuning and indexing techniques. **(10 Marks)**
b. What is digital video broadcasting (DVB)? List its characteristics. **(10 Marks)**

6 a. What are the synchronization software used in mobile devices? Explain. **(06 Marks)**
b. Explain the SyncML protocol architecture used in the mobile device. **(08 Marks)**
c. Describe the SMIL with sample SMIL message. **(06 Marks)**

7 a. Explain the protocol conversion, transcoding and residential gateway. **(10 Marks)**
b. Discuss on wireless LAN (WIFI) architecture along with brief explanation on protocol layers. **(10 Marks)**

8 a. Explain the DOM model of an xml document. **(08 Marks)**
b. Discuss the features of palmos, with a suitable diagram. **(08 Marks)**
c. What is JAVA card? Explain JAVA card technology. **(04 Marks)**

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06CS/IS833

Eighth Semester B.E. Degree Examination, June/July 2013

Storage Area Networks

Time: 3 hrs. Max. Marks:100

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – A

1 a. Differentiate storage-centric IT architecture from server-centric IT architecture. **(10 Marks)**

b. Briefly discuss the benefits of storage networks on business applications. **(10 Marks)**

2 a. With a neat diagram, explain the architecture of intelligent disk storage system. **(06 Marks)**

b. Describe the I/O techniques used in disk storage system in order to increase fault-tolerance of systems. **(06 Marks)**

c. How RAID 0 + 1 and RAID 1 + 0 are different? Explain. Why RAID 0 is not an option for data protection and high availability? Justify. **(08 Marks)**

3 a. Explain the following functions offered by intelligent disk subsystems:
i) instant copy ii) remote mirroring iii) LUN masking. **(12 Marks)**

b. List the various measures that are considered in disk subsystems to increase the availability of data. **(08 Marks)**

4 a. Explain the various topologies used in realizing fibre channel SAN. **(12 Marks)**

b. With block diagrams, explain the generic layout of NAS hardware and software components. **(08 Marks)**

PART – B

5 a. With a neat sketch, explain the components of network attached storage. **(08 Marks)**

b. Explain how several computers can access files simultaneously using shared disk file systems. **(06 Marks)**

c. Write short notes on DAFS. **(06 Marks)**

6 a. What is storage virtualization? How is it achieved on block level and on file level? Explain. **(10 Marks)**

b. Discuss how storage virtualization is achieved in the network. Explain symmetric and asymmetric storage virtualization. **(10 Marks)**

7 a. Write short notes on fibre channel switch. **(08 Marks)**

b. What is HBA? Explain its basic functions. **(06 Marks)**

c. Explain briefly fibre channel RAID. **(06 Marks)**

8 a. Describe the components of switch operating system, in detail. **(08 Marks)**

b. What is business continuity? Discuss the role of storage network in business continuity. **(12 Marks)**

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06CS/IS834

Eighth Semester B.E. Degree Examination, June / July 2013
Network Management Systems

Time: 3 hrs. Max. Marks:100

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

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PART – A

1 a. What are the goals of network management? Explain the functions of network management. **(10 Marks)**

b. List the problems that are common in network management system. **(04 Marks)**

c. With a neat diagram, explain network management Dumbbell Architecture. **(06 Marks)**

2 a. Explain the salient features of various network management standards. **(06 Marks)**

b. Explain the functional model of network management system. **(08 Marks)**

c. Explain various data types used in ASN - 1. **(06 Marks)**

3 a. Explain Two – tier, Three – tier and proxy server organization model of SNMP. **(08 Marks)**

b. With a neat diagram, explain network management architecture of SNMP. **(08 Marks)**

c. Write a note on history of SNMP management. **(04 Marks)**

4 a. Explain the structure of management information in SNMP. **(06 Marks)**

b. Explain how basic encoding rule (BER) is used in SNMP. **(04 Marks)**

c. What are the types of traps used in SNMP? Explain each with the structure of trap PDU. **(05 Marks)**

d. Explain the Get – Request operation for a system group. **(05 Marks)**

PART – B

5 a. What is remote monitoring? Explain new data types defined in RMON1. **(06 Marks)**

b. Explain the common RMON1 and Ethernet groups. **(10 Marks)**

c. Describe RMON2 conformance group. **(04 Marks)**

6 a. What is the need for ATM LAN emulation? Explain the layered architecture of a LAN emulation. **(08 Marks)**

b. With a neat diagram, explain the role of SNMP and ILMI in ATM management. **(06 Marks)**

c. Describe ATM digital exchange interface management. **(06 Marks)**

7 a. Briefly explain the different broadband access technology. **(05 Marks)**

b. Explain the ADSL system reference model. **(06 Marks)**

c. What are the different parameters used in ADSL fault management? **(04 Marks)**

d. Explain the elements of cable modem management MIBs. **(05 Marks)**

8 a. Write a note on Fault management. **(06 Marks)**

b. Describe the various kinds of client / server authentication systems. **(08 Marks)**

c. With a neat diagram, explain policy – based management. **(06 Marks)**

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06CS/IS835

Eighth Semester B.E. Degree Examination, June/July 2013

Information and Network Security

Time: 3 hrs. Max. Marks:100

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – A

1 a. Explain the following security policy defined by the management according to the NIST's special publication:
   i) Enterprise information security policy
   ii) System-specific security policy. **(10 Marks)**

   b. Describe the components contingency planning. **(10 Marks)**

2 a. What are the four common architectural implementations of firewalls? **(12 Marks)**

   b. Explain the virtual private networks (VPNs). **(08 Marks)**

3 a. Explain network based IDP systems and its advantages. **(10 Marks)**

   b. Explain: i) Honey pots, ii) Honey nets and iii) Padded cell systems and its advantages and disadvantages. **(10 Marks)**

4 a. Explain the following cipher methods:
   i) Vernam
   ii) Hash functions **(06 Marks)**

   b. Describe the following cryptographic tools:
   i) Public-key infrastructure
   ii) Steganography. **(10 Marks)**

   c. What is man-in-the-middle attack and timing attacks? **(04 Marks)**

PART – B

5 a. What are passive and active security attacks? **(10 Marks)**

   b. Describe simple and more secure authentication dialogue, along with hypothetical dialogue. **(06 Marks)**

   c. Explain authentication procedures in X.509 certificate. **(04 Marks)**

6 a. Explain how the PGP (pretty good privacy) provides the following services with a schematic diagram:
   i) Authentication
   ii) Confidentiality. **(10 Marks)**

   b. What is meant by S/MIME? List and explain various functions provided in S/MIME. **(10 Marks)**

7 a. Why do we need IP level security? Explain the benefits and applications of IPSec. **(08 Marks)**

   b. What are transport and tunnel modes of operations in ESP? **(12 Marks)**

8 a. Explain the handshake protocol action in SSL. **(12 Marks)**

   b. Explain the dual signature in SSL. **(08 Marks)**

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06CS/IS841

Eighth Semester B.E. Degree Examination, June/July 2013
AD-HOC Networks

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Give the classification of different wireless networks. **(04 Marks)**

b. What are the major challenges a routing protocol faces in ad-hoc wireless networks? **(08 Marks)**

c. Explain the security threats that exist in wireless networks. **(08 Marks)**

2 a. Mention any five design goals of a MAC protocol for ad-hoc networks. **(05 Marks)**

b. With a neat diagram, explain hidden and exposed terminal problems in wireless networks. **(05 Marks)**

c. Explain in detail, D – PRMA protocol. **(10 Marks)**

3 a. Write a short note on :

i) Distributed laxity based priority scheduling scheme

ii) Directional busytone based MAC protocol. **(14 Marks)**

b. Give the brief explanation of working of a MAC protocol using directional antennas. **(06 Marks)**

4 a. Explain any three design issues of a routing protocol for ad – hoc networks. **(06 Marks)**

b. With an example, discuss the working of

i) DSDV routing protocol

ii) DSR routing protocol. **(14 Marks)**

PART – B

5 a. What are the advantages and disadvantages of CEDAR protocol? **(03 Marks)**

b. Explain zone routing protocol. **(07 Marks)**

c. Give brief explanation of power aware routing metrics of ad-hoc wireless networks. **(10 Marks)**

6 a. Explain any five major reasons for throughout degradation of TCP when used in ad-hoc wireless networks. **(10 Marks)**

b. Discuss the operation of feedback based TCP, with a suitable example. **(10 Marks)**

7 a. Briefly explain the network security requirements for ad-hoc wireless networks. **(04 Marks)**

b. Give the classification of security attacks on ad-hoc wireless networks. **(06 Marks)**

c. List and give brief explanation of network layer attacks. **(10 Marks)**

8 a. Explain the design choice for providing QoS support for ad-hoc wireless networks. **(10 Marks)**

b. Explain Ticket –Based QoS routing protocol. **(10 Marks)**

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06CS842

Eighth Semester B.E. Degree Examination, June/July 2013
Software Testing

Time: 3 hrs. Max. Marks:100

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – A

1 a. Discuss the quality attributes in detail, to determine the software quality. **(08 Marks)**

b. Discuss the types of test metrics used in software testing, in detail. **(12 Marks)**

2 a. Explain with an example, how the testing is classified. **(12 Marks)**

b. Briefly discuss the defect management system. **(08 Marks)**

3 a. Discuss in detail, the systematic procedure for equivalence partitioning method. **(08 Marks)**

b. Explain in detail, category partition method. **(12 Marks)**

4 a. Define cause and effect and discuss the notations used for the cause –effect graph. **(10 Marks)**

b. Define the following terms with examples :
   i) Predicate @ compound predicate
   ii) Singular Boolean expression. **(06 Marks)**

c. Create an abstract syntax tree for the Boolean expression :
   $(a < b) \cap (\neg P) \cup (r > s)$. **(04 Marks)**

PART – B

5 a. Define the following terms :
   i) Statement adequacy criteria and statement coverage
   ii) Condition adequacy criteria and condition coverage
   iii) Path adequacy criteria and path coverage
   iv) Brach adequacy criteria and branch coverage **(12 Marks)**

b. Write short notes on :
   i) Procedure call testing
   ii) The infusibility problem. **(08 Marks)**

6 a. Draw the control dependency tree for the following procedure :

```
Public int ged (int X, int Y) {
Int temp ;Y
While (Y ! = 0) {
Temp = X%Y
X = Y ;
Y = temp
}
Return X;
}
```

(05 Marks)

b. Define the following terms and show where these exists in Q6(a) procedure
   i) Definition of variable ii) Use of variable iii) Kill
   iv) Definition clear path v) Immediate dominator. **(10 Marks)**

c. Briefly discuss inter-procedural analysis. **(05 Marks)**

7 a. Define scaffolding. What is its purpose in testing? **(04 Marks)**

b. Define the following terms in IEEE definition:

i) Test case
ii) Test case specification
iii) Adequacy criterion
iv) Test obligation
v) Test suite
vi) Test execution. **(06 Marks)**

c. Explain the following :

i) Test oracles
ii) Comparison based oracle
iii) Partial oracle. **(10 Marks)**

8 a. Discuss quality goals in software testing. **(04 Marks)**

b. Write short notes (any four)

i) System testing
ii) Acceptance testing
iii) Regression testing
iv) Usability
v) Integration testing strategies. **(16 Marks)**

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06CS846

Eighth Semester B.E. Degree Examination, June/July 2013
Programming Languages

Time: 3 hrs. Max. Marks:100

Note: *1. Answer FIVE full questions, selecting atleast TWO questions from each part.*
2. Draw diagrams wherever necessary.

PART – A

1 a. What is the need for the different programming languages? Explain. **(05 Marks)**
b. Explain compilation and interpretation. Compare the two. **(05 Marks)**
c. Explain the heap – based storage – allocation mechanism. **(06 Marks)**
d. Write a note on :
i) Association – list ii) Central reference table. **(04 Marks)**

2 a. Explain explicit parametric polymorphism, with an example. **(05 Marks)**
b. Explain the terms coercion and overloading. **(04 Marks)**
c. Explain with examples, ordering within expression and short –circuit evaluation. **(08 Marks)**
d. List the major categories of control – flow mechanisms. **(03 Marks)**

3 a. What are the structured alternatives to goto statements? **(06 Marks)**
b. Compare iteration and recursion with example. Write a 'C' code to generate Fibonacci series upto 'n' terms. **(10 Marks)**
c. What is lazy evaluation? Explain promises and memorization. **(04 Marks)**

4 a. Explain the purposes solved by a type in PL. **(05 Marks)**
b. What is the difference between type equivalence and type compatibility? **(10 Marks)**
c. Explain the row major and column major layout for contiguously allocated arrays. **(05 Marks)**

PART – B

5 a. What are dangling references? How are they created? What problems do they result in exception, with an example. **(08 Marks)**
b. What are the advantages and disadvantages of inter operability of pointers and array in 'C' language? **(08 Marks)**
c. Explain the basic list operations in LISP. **(04 Marks)**

6 a. Explain how a calling sequence operates in subroutines with a typical stack frame layout. How do calling sequences differ in RISC and CISC compilers? **(10 Marks)**
b. Explain exception handling mechanism with its implementation. **(06 Marks)**
c. Explain how does display overcomes the disadvantages of static chains. **(02 Marks)**
d. How call-by-value and call-by-reference differ from call-by-sharing? **(02 Marks)**

7 a. Explain cactus stack with its structure and use. **(10 Marks)**
b. Write a on sub-type polymorphism. **(05 Marks)**
c. Explain the 3 benefits of abstraction. **(05 Marks)**

8 a. What are the features of functional programming languages? **(06 Marks)**
b. What is unification? List the unification rules for prolog. **(06 Marks)**
c. What are the characteristics of a scripting language? **(08 Marks)**

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