Fifth Semester B.E. Degree Examination, June/July 2011
Software Engineering

Time: 3 hrs.   Max. Marks:100

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

PART – A

1   a. What is software engineering? What are the differences between generic and customized software products? **(06 Marks)**
     b. With a block diagram, briefly explain the different phases of systems engineering process. **(14 Marks)**

2   a. What are the three main types of critical systems? Explain. **(06 Marks)**
     b. With a neat diagram, describe the waterfall model of software development process. **(10 Marks)**
     c. Explain the most important dimensions of the system dependability? **(04 Marks)**

3   a. Explain the structure of software requirements document? **(08 Marks)**
     b. Explain requirements elicitation and analysis process. **(06 Marks)**
     c. What are the requirements validation techniques? Explain briefly. **(06 Marks)**

4   a. Briefly explain the purpose of each of the sections in a software project plan. **(10 Marks)**
     b. With diagram, briefly explain the components of a CASE tool for structured method support. **(10 Marks)**

PART – B

5   a. With an example, describe the repository model and give its advantages and disadvantages. **(10 Marks)**
     b. Draw and explain sequence diagram and state diagram for a typical weather station. **(10 Marks)**

6   a. Briefly explain the tools that are included in rapid application development (RAD) environment, with a diagram. **(10 Marks)**
     b. With a block diagram, explain the activities of re – engineering process. **(10 Marks)**

7   a. Explain the roles of inspection process and discuss the possible inspection checks. **(10 Marks)**
     b. Explain the different types of interfaces between program components. **(04 Marks)**
     c. Briefly explain with a diagram, clean – room software development. **(06 Marks)**

8   a. Briefly explain the factors that may influence the decision of selecting staff for the project team. **(05 Marks)**
     b. Explain the different cost estimation techniques briefly. **(05 Marks)**
     c. Explain the basic COCOMO model with formula for different types of projects. **(10 Marks)**

* * * * *

Fifth Semester B.E. Degree Examination, June/July 2011
System Software

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. Differentiate between system software and application software. (04 Marks)
   b. Explain the following with reference to SIC/XE machine architecture :
      i)   Instruction formats
      ii) Addressing modes
      iii) Data formats
      iv) Register organization. (10 Marks)
   c. Write an ALP in SIC/XE to add 2 arrays of 100 integers. (06 Marks)

2 a. Explain the different data structures used in designing SIC assembler. (08 Marks)
   b. Discuss pass 1 algorithm of 2 pass assembler. (10 Marks)
   c. What are assembler directives? Give examples. (02 Marks)

3 a. Differentiate between program blocks and control sections. Explain how control sections are processed. (10 Marks)
   b. Differentiate between literal and immediate operand with example. (04 Marks)
   c. Discuss different design options of assembler. (06 Marks)

4 a. What is a loader? List the functions of a loader. Develop an algorithm for a bootstrap loader. (10 Marks)
   b. What is dynamic loading? What are its advantages and disadvantages? Explain with a neat diagram loading and calling of a subroutine using dynamic linking. (10 Marks)

PART – B

5 a. Explain the structure of a text editor. (10 Marks)
   b. Describe interactive debugging system. (10 Marks)

6 a. Explain various data structures required for the design of a macro processor with an example. (10 Marks)
   b. Explain any three m/c independent macro processor features. (10 Marks)

7 a. Explain the structure of LEX specification with example. (10 Marks)
   b. Discuss how lexer and parser communicate. (10 Marks)

8 a. Write YACC specification to recognize nested If control statements and display the number of levels of nesting. (10 Marks)
   b. Differentiate between lex and yacc. (05 Marks)
   c. Define the following terms with examples :
      i)   Non – terminals.
      ii) y.tab.h
      iii) Symbol table
      iv) Pattern
      v)   Lexical analysis. (05 Marks)

* * * * *

Fifth Semester B.E. Degree Examination, June/July 2011
Operating Systems

Time: 3 hrs.   Max. Marks:100

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

PART – A

1   a.   Distinguish among the following terminologies associated with the operating system and explain each of them in detail.
Multi programming systems
Multitasking systems
Multiprocessor systems.   **(12 Marks)**
    b.   With the help of an example, explain the concept of virtual machines.   **(08 Marks)**

2   a.   What is a process? With a state diagram, explain states of a process. Also write the structure of PCB.   **(10 Marks)**
    b.   Consider 4 jobs with (arrival time, burst time) as (0, 5) (0.2, 2) (0.6, 8) (1.2, 4). Find the average turn around time and waiting time for the jobs using FCFS, SJF and RP(q = 1) scheduling algorithms.   **(10 Marks)**

3   a.   What is synchronization? Explain synchronization hardware.   **(04 Marks)**
    b.   What are semaphores? Explain the solution to producer – consumer problem using semaphores.   **(08 Marks)**
    c.   What are monitors? Explain it.   **(08 Marks)**

4   a.   What is a deadlock? Explain the necessary conditions for its occurrence.   **(08 Marks)**
    b.   Consider a system

Process	Allocation	Max	Available
	A B C D	A B C D	A B C D
P_0	0 0 1 2	0 0 1 2	1 5 2 0
P_1	1 0 0 0	1 7 5 0	
P_2	1 3 5 4	2 3 5 6	
P_3	0 6 3 2	0 6 5 2	
P_4	0 0 1 4	0 6 5 6	

Answer the following questions using the Banker's algorithm.
i)   What is the content of the matrix need?
ii)   Is the system in a safe state?
iii)   If a request from process p, arrives for (0, 4, 2, 0), can the request be granted immediately?   **(12 Marks)**

PART - B

5 a. What is paging? Explain it. (07 Marks)
  b. Explain internal and external fragmentation with a neat diagram. (05 Marks)
  c. Consider the following page reference string.
     1, 2, 3, 5, 2, 3, 5, 7, 2, 1, 2, 3, 8, 6, 4, 3, 2, 2, 3, 6.
     How many page faults would occur in the case of
     i) LRU
     ii) FIFO
     iii) Optimal algorithms assuming 3 frames.
     Note that initially all frames are empty. (08 Marks)

6 a. Explain different file access methods. (05 Marks)
  b. Explain various directory structures. (07 Marks)
  c. Explain different disk space allocation methods with an example. (08 Marks)

7 a. Suppose a disk drive has 5000 cylinders numbered 0 to 4999. Drive is currently serving
     request at cylinder 143, and previous request was at cylinder 125, queue of pending requests
     in FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from current
     head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all
     pending request for FCFS, SSTF, LOOK, SCAN disk scheduling algorithms. (10 Marks)
  b. Explain access matrix with examples. (05 Marks)
  c. Explain domain of protection. (05 Marks)

8 Write short notes on :
  a. Components of a Linux system
  b. Inter process communication
  c. Thrashing
  d. Monitors. (20 Marks)

* * * * *

USN ☐☐☐☐☐☐☐☐☐☐   06CS54

Fifth Semester B.E. Degree Examination, June/July 2011
Database Management Systems

Time: 3 hrs.   Max. Marks:100

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

PART – A

1   a.   Discuss the main characteristics of the database approach and how it differs from traditional file system.   **(08 Marks)**
    b.   Discuss criteria used to classify database management system.   **(06 Marks)**
    c.   Define the terms : DDL, DML and DCL. Give examples.   **(06 Marks)**

2   a.   What is the concept of a weak entity used in data modeling? Define the terms owner entity type, weak entity type, identifying relationship type and partial key.   **(08 Marks)**
    b.   A company database needs to store information about employees (identified by ssn, with salary and phone as attributes) departments (identified by the dno, with dname, and budget as attributes), and children of employees (with name and age as attributes). Employees work in departments; each department is managed by an employee; a child must be identified uniquely by name when the parent (who is an employee; assume that only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company. Draw an ER diagram that captures this information.   **(12 Marks)**

3   a.   Discuss the entity integrity and referential integrity constraints. Why is each considered important?   **(05 Marks)**
    b.   Discuss the various types of JOIN operations. Why is theta join required?   **(05 Marks)**
    c.   List the operations of relational algebra and the purpose of each.   **(10 Marks)**

4   a.   Write SQL syntax with example for the following SQL statements :
      i)   CREATE TABLE   ii)   SELECT – statement
      iii) UPDATE command   iv) ALTER TABLE   **(08 Marks)**
    b.   What is a view in SQL, and how is it defined? Discuss the problems that may arise when one attempts to update a view.   **(06 Marks)**
    c.   List the data types that are allowed for SQL2 attributes.   **(06 Marks)**

PART – B

5   a.   How does SQL allow implementation of the entity integrity and referential integrity constraints? Explain.   **(10 Marks)**
    b.   Explain the following : i) Embedded SQL   ii) Database stored procedure.   **(10 Marks)**

6   a.   Summarize the correspondences between ER model constructs and the relational model constructs.   **(05 Marks)**
    b.   What is a functional dependency? Who specifies the functional dependencies that hold among the attributes of a relation schema?   **(05 Marks)**
    c.   Define first, second and third normal forms by taking an example.   **(10 Marks)**

7   a.   What is meant by the attribute preservation condition on decomposition?   **(06 Marks)**
    b.   Discuss the null value and dangling tuple problems.   **(06 Marks)**
    c.   Define fourth normal form. Why is it useful?   **(08 Marks)**

8   a.   Explain the following with suitable example :
      i) The lost update problem   ii) The temporary update (or dirty read) problem.   **(10 Marks)**
    b.   Why is the two-phase locking protocol? How does it guarantee serializability?   **(10 Marks)**

* * * * *

Fifth Semester B.E. Degree Examination, June/July 2011
Computer Networks – I

Time: 3 hrs.   Max. Marks:100

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

PART – A

1   a.   Explain the fundamental characteristics of a data communication system.   (06 Marks)
    b.   What is a physical topology? Describe the four basic topologies.   (08 Marks)
    c.   Assume that fifty devices are arranged in a mesh topology. How many links are needed? How many ports are needed for each device?   (06 Marks)

2   a.   What are the propagation time and the transmission time for a 5–Mbyte message if the bandwidth of the network is 1 Mbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 m/s.   (06 Marks)
    b.   Represent the bit sequence "01001011" using Bipolar schemes AMI and pseudoternary. Explain their characteristics with regard to synchronization and DC component.   (08 Marks)
    c.   Explain a PCM encoder.   (06 Marks)

3   a.   Describe the different transmission modes.   (08 Marks)
    b.   An analog signal has a bit rate of 8000 bps and a baud rate of 1000 baud. How many data elements are carried by each signal element? How many signal elements do we need?   (06 Marks)
    c.   List the multiplexing techniques. Explain the concept of multiplexing using frequency.   (06 Marks)

4   a.   Define FHSS and explain how it achieves bandwidth spreading.   (06 Marks)
    b.   Find the codeword, using CRC given data word "1001" and generator "1011".   (08 Marks)
    c.   Describe the propagation modes in an optical fiber.   (06 Marks)

PART – B

5   a.   Describe a stop–wait protocol with ARQ.   (10 Marks)
    b.   Why bit stuffing and byte stuffing are needed? Explain them with examples.   (10 Marks)

6   a.   Describe the frame format of PPP.   (06 Marks)
    b.   A pure ALOHA network transmits 200–bit frames on a shared channel of 200 kbps. What is the throughput if the system produces 1000 frames per second?   (06 Marks)
    c.   Describe CSMA /CA protocol with a neat flow diagram.   (08 Marks)

7   a.   Describe 802.3 MAC frame.   (10 Marks)
    b.   Describe Bluetooth architectures.   (06 Marks)
    c.   How does a VLAN reduce network traffic?   (04 Marks)

8   a.   Describe frequency reuse, handoff and roaming concepts in cellular telephony. (06 Marks)
    b.   Describe STS–1 frame.   (08 Marks)
    c.   Describe the concept of asynchronous TDM.   (06 Marks)

* * * * *

Fifth Semester B.E. Degree Examination, June/July 2011
Formal Languages and Automata Theory

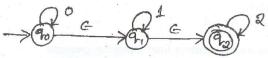Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a.   Define symbols, alphabets, strings and languages, with examples. **(04 Marks)**
   b.   Construct a DFA to accept strings over {a, b}, such that every block of length five contains at least two a's. Use extended transition of function to trace a string W = aabba. **(08 Marks)**
   c.   Prove that if $D = (\theta_D, \Sigma, \delta_D, \{q_0\}, F_D)$ is the DFA constructed from NFA $N = (\theta_N, \Sigma, \delta_N, \{q_N\}, F_N)$ by subset construction then $L(D) = L(N)$. **(08 Marks)**

2 a.   Define $\in$ - NFA. What are the steps involved in converting $\in$ - NFA to DFA. Convert following $\in$ - NFA to DFA. **(08 Marks)**

Fig. Q2(a)

   b.   Write regular expression for
      i) $L = \{a^n b^m \mid n \geq 4 \text{ and } m \leq 3\}$
      ii) $L = \{a^{2n} b^{2m} \mid n \geq o, m \geq 0\}$. **(06 Marks)**
   c.   Convert the following DFA to regular expression using Kleene's theorem. **(06 Marks)**

Fig. 2(b)(DFA)

3 a.   Construct NFA for the regular expression (a* + b* + c*). **(04 Marks)**
   b.   State and prove pumping lemma for regular languages. Show that $L = \{o^n \mid n \text{ is prime}\}$ is not regular. **(10 Marks)**
   c.   Minimize the following DFA using table filling algorithm. **(06 Marks)**

δ	0	1
→A	B	E
B	C	F
* C	D	H
D	E	H
E	F	I
* F	G	B
G	H	B
H	I	C
* I	A	E

Table Q3 (C)

4 a. Define CFG. Write a CFG for
      i) L = {Strings ofer a's and b's, with equal number of a's and b's }
      ii) L = {$a^n b^n c^i$ | n ≥ 0, i ≥ 1} ∪ {$a^n b^n c^m d^m$ | n, m ≥ o}. **(06 Marks)**
   b. Design a grammar for valid expressions over operator – and /. The arguments of expressions are valid identifier over symbols a, b, 0 and 1. Derive LMD and RMD for string W = (a11 – b0) / (b00 – a01). Write parse tree for LMD. **(10 Marks)**
   c. Show that the following grammar is ambiguous
      S → SS | (S) | ∈ over W = (( )( )( )). **(04 Marks)**

PART – B

5 a. Write block diagram, of PDA with its tuples. What are the two ways of accepting languages in PDA? **(04 Marks)**
   b. Design a PDA for L = {$a^i b^J c^k$ | J = i + k, i, k ≥ o} write transition diagram and ID for string W = abbbcc. **(12 Marks)**
   c. Convert following CFG to PDA.
      S → AS | ∈
      A → OA1 | A1 | 01. **(04 Marks)**

6 a. Remove useless symbols from following grammar
      S → aA | B
      A → aB | B
      B → aB | b | bC
      D → Ea
      E → a /aE | bc. **(06 Marks)**
   b. Define CNF and GNF. Convert the following grammar to CNF
      S → A S B | ∈
      B → S b S | A | bb
      A → aAs | a. **(08 Marks)**
   c. Prove that if L is a CFL and R is a regular language then L ∩ R is a CFL. **(06 Marks)**

7 a. Define Turing Machine and Instantaneous Descriptions (ID) for Turing machine. **(04 Marks)**
   b. Design a Turing machine to add 2 numbers consider input = $0^m 1 \ 0^n$ and output = 0^{m+n}. Write transition diagram and ID for string W = 00/0000. **(12 Marks)**
   c. Write a note on multitape and non – deterministic turing machines. **(04 Marks)**

8 a. Explain the relationship between the recursive, RE and non-RE languages. **(06 Marks)**
   b. If both a language L and its compliment are RE, then prove that L is recursive. **(06 Marks)**
   c. Write a short note on :
      i) Post correspondence problem
      ii) Undecidability of ambiguity for CFG's. **(08 Marks)**

* * * * *

2 of 2