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

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 are the attributes of a good software? **(04 Marks)**
b. Define software engineering. Explain the different types of software products. **(06 Marks)**
c. Explain emergent system properties with examples. **(10 Marks)**

2 a. Explain the different types of critical systems. **(06 Marks)**
b. Explain security terminologies. **(05 Marks)**
c. Describe rational unified process with block diagram. **(09 Marks)**

3 a. Explain the metrics for specifying non-functional requirements. **(06 Marks)**
b. Explain requirement engineering process. **(06 Marks)**
c. Explain the structure of the requirements document. **(08 Marks)**

4 a. List and explain different types of system models. **(10 Marks)**
b. What are project management activities? Explain. **(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 state diagram for a typical weather station. **(10 Marks)**

6 a. Explain the principles of agile methods. **(06 Marks)**
b. What is pair programming? Explain its advantages. **(06 Marks)**
c. Explain Lehman's laws of program evolution dynamics. **(08 Marks)**

7 a. Briefly explain the roles in inspection process. **(06 Marks)**
b. Explain clean-room software development. **(06 Marks)**
c. Explain general model of testing with the help of block diagram. **(08 Marks)**

8 a. Explain any five factors governing staff selection. **(05 Marks)**
b. What are the factors that influence group working? **(05 Marks)**
c. Explain cost estimation techniques. **(10 Marks)**

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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.

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10CS52

Fifth Semester B.E. Degree Examination, June/July 2013
System Software

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 difference between system software and application software. **(06 Marks)**

b. With respect to Pentium pro architecture, explain the following :
i) Instruction format ii) Data format iii) Registers iv) addressing mode. **(10 Marks)**

c. Write sequence of instruction for SIC to clear 20 bytes strings to all blanks. **(04 Marks)**

2 a. Write the fundamental functions of assembler. **(05 Marks)**

b. Define assembler directive. Explain the different types of directives used in SIC machine. **(07 Marks)**

c. Write and explain the algorithm of PASS – 1 of two – pass assembler. **(08 Marks)**

3 a. Distinguish between literal and immediate operands. How does the assembler handle the literal operands? **(07 Marks)**

b. What is a program block? How does the assembler handle the program blocks? **(10 Marks)**

c. What is the need of pass – 2 algorithms? Give example. **(03 Marks)**

4 a. Write a bootstrap loader algorithm. Explain it. **(08 Marks)**

b. Illustrate linking and relocation with sample programs. **(12 Marks)**

PART – B

5 a. With a neat diagram, explain the structure of text editor. **(10 Marks)**

b. Explain the features of interactive debugging system. **(10 Marks)**

6 a. List machine independent macro processor features. Explain any two with an example. **(10 Marks)**

b. What are the basic functions of macroprocessor? Explain the various data structures used in the implementation of one – pass macroprocessor. **(10 Marks)**

7 a. List and explain the different design options for a macroprocessor. **(12 Marks)**

b. Explain the structure of LEX program. **(05 Marks)**

c. Explain the "communication parser". **(03 Marks)**

8 a. Write a LEX program to count the number of vowels and consonants in a given string. **(06 Marks)**

b. Write a YACC program to recognize the given arithmetic expression containing +, –, /, * operator. **(08 Marks)**

c. What do you mean by ambiguous grammer? How it can be overcome? Illustrate with an example. **(06Marks)**

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10CS53

Fifth Semester B.E. Degree Examination, June/July 2013
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. List and explain services provided by an operating system that are designed to make using computer systems more convenient for users. **(08 Marks)**

b. Is separation of mechanism and policy desirable while designing an operating system? Discuss with an example. **(04 Marks)**

c. With a neat diagram of VM-WARE architecture, explain the concept of Virtual Machine (VM) and the main advantage of using VM architecture. **(08 Marks)**

2 a. What is a Process Control Block (PCB)? What are the different states in which a process can be in its life cycle, discuss with the help of a state transition diagram. **(05 Marks)**

b. Is CPU scheduling necessary? Discuss the five different scheduling criteria used in comparing scheduling mechanisms. **(06 Marks)**

c. Consider the following set of processes, with length of the CPU burst time given in milliseconds:

Process	Arrival time	Burst-time	Priority
P_1	0	10	3
P_2	0	1	1
P_3	3	2	3
P_4	5	1	4
P_5	10	5	2

i) Draw four Gantt charts illusterating the execution of these processes using FCFS, SJF, a non preemptive priority and RR (Quantum = 2) scheduling.

ii) What is the turn around time of each processes for each of the scheduling algorithms in (i).

iii) What is the waiting time of each process for each of the scheduling algorithm in (i). **(09 Marks)**

3 a. Describe an N-process solution to critical section problem which uses test and test ( ) atomic instruction. Also explain how the algorithm satisfies all the requirements of critical section. **(08 Marks)**

b. Servers can be designed to limit the number of open connections. For example, a sever may wish to have only N socket connections at any point in time. As soon as N connections are made, the server will not accept another incoming connection until an existing connection is released. Explain how semaphores can be used by a server to limit the number of concurrent connections. **(04 Marks)**

c. Explain the range of monitors with a schematic view of its structure; write a monitor solution to bounded-buffer problem. **(08 Marks)**

4 a. What is a dead lock? Consider the traffic deadlock depicted in the figure given below, explain that the four necessary conditions for dead lock indeed hold in this example. **(05 Marks)**

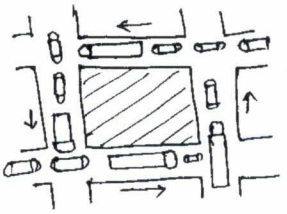

Fig.Q.4(a)

b. Consider the following snapshot of a system:

	Allocation	Max	Available
	ABC	ABC	ABC
P_0	002	004	102
P_1	100	201	
P_2	135	137	
P_3	632	842	
P_4	143	157	

Answer the following questions using Banker's algorithm:
Is the system in a "safe state"?
If a request from process P_2 arrives for (002) can the request be granted immediately? **(10 Marks)**

c. What are the methods used to handle the dead locks? Explain how circular wait condition can be prevented from occurring. **(05 Marks)**

PART – B

5 a. What are the drawbacks of contiguous memory allocation? Given five memory partitions of 100KB, 500KB, 200KB, 300KB and 600KB (in order), how would each of the first fit, best fit and worst fit algorithms place processes of 212 KB, 417 KB, 112KB and 426 KB (in order)? Which algorithm makes the most efficient use of memory? **(06 Marks)**

b. Consider a paging system with the page table stored in memory.
   i) If a memory reference takes 200 nano seconds, how long does a paged memory reference take?
   ii) If we add associative register and 75 percentage of all page table references are found in the associative registers, what is the effective memory access time? (Assume that finding a page table entry in the associative memory/registers takes zero time, if the entry is found). **(04 Marks)**

c. Consider the following page reference string: 7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1 for a memory with three frames. How many page faults would occur for LRU, FIFO and optimal page replacement algorithms? Which is the most efficient among them? **(10 Marks)**

6 a. Explain the various file operations supported by the operating system, also differentiate mandatory lock and advisory lock mechanisms used on files by the operating system. **(05 Marks)**

b. Describe the methods used for implementing the directories. **(08 Marks)**

c. Explain various file protection mechanisms. **(07 Marks)**

7 a. Suppose that the disk drive has 5000 cylinders numbered from 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests in FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from the current (location) head position, What is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk-scheduling algorithms?
   i) FCFS; ii) SSTF; iii) SCAN; iv) LOCK; v) C-SCAN. **(15 Marks)**

b. Discuss the strengths and weaknesses of implementing an access matrix using access lists that are associated with objects. **(05 Marks)**

8 Write short notes on:
a. Portability issues in LINUX
b. Performance of demand paging
c. Multithreading models
d. Network structure in LINUX. **(20 Marks)**

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USN [| | | | | | | | |] **10CS54**

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

Database 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 are the main characteristics of the database approach over the file processing approach? **(08 Marks)**
b. Explain the different categories of data models. **(06 Marks)**
c. Explain the three – schema architecture. **(06 Marks)**

2 a. Explain the different types of attributes that occur in the ER model. Write their corresponding notations. **(08 Marks)**
b. Write the ER diagram for an employee database. The constraints are as follows :
i) An employee works for a department
ii) Every department is headed by a manager
iii) An employee works on one or more projects
iv) An employee has dependents
v) A department controls the projects. **(12 Marks)**

3 a. Write the relational algebra operations to perform the following queries :
i) Retrieve the name and address of all employees who work for the "Accounts" department
ii) Retrieve the names of employees who have no dependents
iii) Find the names of employees who work on all the projects controlled by department number 2. **(12 Marks)**
b. Explain the relational algebra operations from set theory, with examples. **(08 Marks)**

4 a. Explain the different constraints that can be applied during table creation in SQL, with a suitable example. **(08 Marks)**
b. Write the SQL queries for the following database schema
student (USN, NAME, BRANCH, PERCEMTAGE)
faculty (FID, FNAME, DEPARTMENT, DESIGNATION, SALARY)
COURSE (CID, CNAME, FID)
ENROLL(CID, USN, GRADE)
i) Retrieve the names of all students enrolled for the course 'CS – 54'
ii) List all the departments having an average salary of the faculties above Rs 10,000
iii) List the names of the students enrolled for the course 'CS – 51' and having 'B' grade. **(12 Marks)**

PART – B

5 a. Define views. Give an example to create a view. **(08 Marks)**
b. Explain the different approaches for database programming. Explain the problem that arise in some of the approaches. **(12 Marks)**

6 a. List the inference rules for functional dependencies. Write the algorithm to determine the closure of X(set of attributes) under F(set of functional dependencies). **(08 Marks)**

b. Define the 1NF, 2NF and 3NF with a suitable example for each. **(12 Marks)**

7 a. Write the algorithm fro testing non additive join property. **(10 Marks)**

b. Explain the 4NF with a suitable example. **(10 Marks)**

8 a. Explain the ACID properties of a database transaction. **(04 Marks)**

b. Briefly explain the two phase locking protocol used in concurrency control. **(08 Marks)**

c. Explain the three phases of the ARIES recovery model. **(08 Marks)**

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10CS55

Fifth Semester B.E. Degree Examination, June/July 2013
Computer Networks – I

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain OSI reference model. **(10 Marks)**

b. Explain categories of network and differentiate between them. **(10 Marks)**

2 a. Represent the given sequence 01001110 in unipolar, NRZ-L, Manchesters, AMI, Pseudoternary? **(06 Marks)**

b. The loss in a cable defined in debels/km (dB/km). If the signal at beginning of a cable with -3 dB/km has a power of 3 mW. What is the power of the signal at 5 km? **(06 Marks)**

c. Explain the PCM encoder. **(08 Marks)**

3 a. Explain frequency hopping spread spectrum (FHSS). **(10 Marks)**

b. Four 1 Kbps connections are multiplexed together. A unit is 1 bit. Find
i) The duration of 1 bit before multiplexing.
ii) The transmission rate of the link.
iii) The duration of a time slot.
iv) The duration of a frame. **(05 Marks)**

c. Differentiate between circuit switched, datagram networks and virtual circuit networks. **(05 Marks)**

4 a. Explain structure of encoder and decoder for hamming code. **(08 Marks)**

b. Find the codeword, using CRC given dataword 1001 and generator 1011. **(06 Marks)**

c. What is internet checksum? With an example, list the steps undertaken by the sender and receiver for error detection. **(06 Marks)**

PART – B

5 a. Explain stop-and-wait ARQ protocol with neat diagram. **(08 Marks)**

b. What is framing? Explain bit and character stuffing with an example. **(04 Marks)**

c. Write short notes on HDLC. **(08 Marks)**

6 a. Explain CDMA. **(06 Marks)**

b. A slotted ALOHA network transmits 200 bit frames using a shared channel with 200 Kbits/sec bandwidth. Find throughput if system produces i) 1000 frames/sec ii) 500 frames/sec iii) Frames/sec. **(06 Marks)**

c. Explain 802.3 MAC frame format. **(08 Marks)**

7 a. Explain the architecture of IEEE 802.11. **(10 Marks)**

b. Explain connecting devices. **(10 Marks)**

8 a. Draw IPV4 header format and explain. **(08 Marks)**

b. A ISP is granted a block of address starting with 190.100.0.0/16 (655, 536 address). The ISP needs to distribute these addressing to 3 groups of customers.
i) First group has 64 customers each needs 256 address.
ii) Second group has 128 customers each needs 128 address.
iii) The third group has 128 customers each needs 64 address.
Design the subblock and findout. How many addresses are still available after their allocations? **(07 Marks)**

c. Compare between IPV4 and IPV6. **(05 Marks)**

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USN 1KT10CS054 **10CS56**

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

Formal Languages and Automata Theory

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define D.F.A. What are the difference between D.F.A and N.F.A? **(06 Marks)**

b. Construct a D.F.A. to accept strings over {a, b} such that every block of length five contains atleast two a's. **(08 Marks)**

c. Define N.F.A. and construct an N.F.A. that accepts the language 'aa*(a + b).' **(06 Marks)**

2 a. Define ε-NFA. Construct the ε-NFA that accepts 01(0 + 1)*. **(06 Marks)**

b. Let R be a regular expression. Then there exists a finite automaton A = (Q, Σ, δ, q_0, F). Prove the above theorem. **(06 Marks)**

c. Convert the following ε-NFA to DFA. **(08 Marks)**

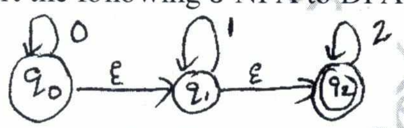

Fig.Q2(c)

3 a. State and prove pumping lemma for the regular language. **(07 Marks)**

b. Obtain the R.E. from the following FA using state elimination method. **(05 Marks)**

Fig.Q3(b)

c. Minimize the following DFA using table filling algorithm. **(08 Marks)**

State	→A	B	*(C)	D	E	F	G	H
0	B	G	A	C	H	C	G	G
1	F	C	C	G	F	G	E	C

4 a. Consider the following grammar:

E → E + E/E – E

E → E ∗ E/E/E

E → (E)

E → a/b/c

i) Obtain the left most derivation for the string (a + b ∗ c)

ii) Obtain the right most derivation for the string (a + b) ∗ c. **(08 Marks)**

b. Prove that the following grammar is ambiguous, using the string "ibtibtaea."

S → $iC_tS/iC_tSeS/a$

C → b **(08 Marks)**

c. Discuss the various applications of context free grammar. **(04 Marks)**

PART – B

5 a. Define PDA. Obtain a PDA to accept the following language:

$L = \{n_a(w) = n_b(w) \text{ where } n \geq 1\}$

Draw the transition diagram for PDA. Also, show the moves made by PDA for the string aabbab. **(12 Marks)**

b. Obtain the PDA for the following grammar:

$S \rightarrow aSa/aa$

$S \rightarrow bSb/bb$ **(08 Marks)**

6 a. What is an unit production? Begin with the grammer:

$S \rightarrow ABC/BaB$

$A \rightarrow aA/BaC/aaa$

$B \rightarrow bBb/a/D$

$C \rightarrow CA/AC$

$D \rightarrow \varepsilon$

i) Eliminate ε - productions.

ii) Eliminate unit productions in the resulting grammar.

iii) Eliminate any useless symbols in the resulting grammar. **(10 Marks)**

b. Obtain the following grammar in CNF:

$S \rightarrow OA/1B$

$A \rightarrow OAA/1S/1$

$B \rightarrow 1BB/OS/O$ **(10 Marks)**

7 a. Design a turing machine to accept the following language:

$L = \{0^n1^n / n \geq 1\}$

Also show the sequence of moves mde by the TM for the string "00001111". **(14 Marks)**

b. Write a note on multitape turing machine and non-deterministic turing machine. **(06 Marks)**

8 Write short notes on:

a. Post correspondence problem

b. Halting problem in TM

c. Universal turing machine

d. Applications of R.E. **(20 Marks)**

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