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10IS51

Fifth Semester B.E. Degree Examination, December 2012
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? Explain. Also list and explain the key challenges facing software engineering. **(10 Marks)**

b. Explain with block diagram, the system engineering process. **(10 Marks)**

2 a. Define the term dependability. List and explain the various dependability properties. **(10 Marks)**

b. What is a software process model? Explain with a block diagram the evolutionary development model. **(10 Marks)**

3 a. Distinguish between functional and non-functional requirements. With a block diagram, explain non-functional requirement types. **(10 Marks)**

b. List at least five stake holders for an automated university examination system. Classify the identified stake holders under different view points. **(10 Marks)**

4 Write short notes on:

a. Context models.

b. Object models.

c. Project scheduling.

d. Risk management. **(20 Marks)**

PART – B

5 Explain the terms:

a. Architectural design decisions.

b. The repository model.

c. Unified modeling language (UML).

d. Sequence models. **(20 Marks)**

6 a. List and explain the principles of agile methods. Also explain the problems with agile methods. **(10 Marks)**

b. Define "Program Evolution Dynamics". Discuss the Lehman laws for program evolution dynamics. **(10 Marks)**

7 a. Explain the various inspection roles and inspection checklists for software inspection process. **(10 Marks)**

b. What is partition testing? Identify equivalence class partitions for automated air conditioning system having at least four partitions. List also the boundary values for each class. **(10 Marks)**

8 a. Define people capability maturity model (PCMM). With a block diagram, explain various P-CMM levels. **(10 Marks)**

b. List and explain various COCOMO cost estimation models. **(10 Marks)**

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10CS52

Fifth Semester B.E. Degree Examination, December 2012

Systems Software

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the instruction formats and addressing modes of SIC/XE machine architecture. **(10 Marks)**

b. Generate the target address for the following object codes:
i) 032600 ii) 010030
Content of X = 000090; Content of B = 006000; Content of PC = 003000 **(04 Marks)**

c. Write a SIC/XE program to read 100 byte record from a device 'F5' into BUFFER. Use immediate and register-to-register instructions. **(06 Marks)**

2 a. With an algorithm, explain pass-1 of a 2-pass assembler. **(10 Marks)**

b. Generate the object code for each statement and write the object programs for the following SIC/XE program.
Given that: CLEAR = B4, LDA = 00, LDB = 68, ADD = 18,
TIX = 2C, JLT = 38, STA = 0C

```
SUM     START   0
FIRST   CLEAR   X
        LDA     #0
        +LDB    #TOTAL
        BASE    TOTAL
LOOP    ADD     TABLE, X
        TIX     COUNT
        JLT     LOOP
        STA     TOTAL
COUNT   RESW    1
TABLE   RESW    2000
TOTAL   RESW    1
        END     FIRST
```

(10 Marks)

3 a. With required data structures and processing logic, explain the implementation of literals within an assembler. **(07 Marks)**

b. What are program blocks? How multiple program blocks are handled by an assembler? **(07 Marks)**

c. Compare a two-pass assembler with a single pass assembler. How forward references are handled in one-pass assembler? **(06 Marks)**

4 a. Define program relocation. Explain the different ways of doing program relocation. **(06 Marks)**

b. With an algorithm, explain pass 1 of a linking loader. **(08 Marks)**

c. Explain the facilities available in MS-DOS linker for program linking. **(06 Marks)**

PART – B

5 a. With a neat diagram, explain the working of typical editor structure. **(08 Marks)**

b. Explain the debugging functions and capabilities of an interactive debugging system. **(08 Marks)**

c. List the four tasks of a document editing process. **(04 Marks)**

6 a. Define MACRO. Briefly explain the various data structures used in the design of MACRO PROCESSOR. **(08 Marks)**

b. With an example, explain generation of unique labels in macros. **(06 Marks)**

c. Explain the advantages and disadvantages of general purpose macro processors. **(06 Marks)**

7 a. With an example, explain the structure of a LEX program. **(07 Marks)**

b. Write regular expressions to identify the following:
i) Identifier ii) Decimal number iii) – ve integer iv) + ve fraction **(08 Marks)**

c. Write a short note on parser-lexar communication. **(05 Marks)**

8 a. Define YACC tools. What are the two types of conflicts in YACC? Give examples. **(08 Marks)**

b. Write a YACC program to evaluate an arithmetic expression involving operators +, –, *, /. **(07 Marks)**

c. Write a short note on shift/reduce parsing. **(05 Marks)**

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10CS53

Fifth Semester B.E. Degree Examination, December 2012
Operating Systems

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is a distributed operating system? What are the advantages of the distributed operating system? **(06 Marks)**

b. What are system calls? With examples explain different categories of system calls. **(07 Marks)**

c. With a neat diagram, explain the concept of virtual machine. **(07 Marks)**

2 a. Explain the process state transition diagram. **(06 Marks)**

b. Explain multithreading models. **(09 Marks)**

c. For the processes listed below, draw Gantt charts using preemptive and non preemptive priority scheduling algorithm. A larger priority number has a higher priority.

Jobs	Arrival time	Burst time	Priority
J_1	0	6	4
J_2	3	5	2
J_3	3	3	6
J_4	5	5	3

(05 Marks)

3 a. What is busy waiting in a critical section concept? How semaphore is used to solve critical section problem? What are the advantages of semaphore? **(10 Marks)**

b. What is a monitor? Explain the solution to the classical dining philosopher's problem, using monitor. **(10 Marks)**

4 a. What is a resource allocation graph(RAG)? Explain how RAG is very useful in describing deadly embrace by considering your own example. **(08 Marks)**

b. System consists of five jobs (J_1, J_2, J_3, J_4, J_5) and three resources (R_1, R_2 R_3). Resource type R_1 has 10 instances, resource type R_2 has 5 instances and R_3 has 7 instances. The following snapshot of the system has been taken :

Jobs	Allocation			Maximum			Available		
	R_1	R_2	R_3	R1	R2	R3	R_1	R_2	R_3
J_1	0	1	0	7	5	3	3	3	2
J_2	2	0	0	3	2	2			
J_3	3	0	1	9	0	2			
J_4	2	1	1	2	2	2			
J_5	0	0	2	4	3	3			

Find need matrix and calculate the safe sequence by using Banker's algorithm. Mention the above system is safe or not safe. **(08 Marks)**

c. Briefly explain the methods for handling deadlocks. **(04 Marks)**

PART – B

5 a. Distinguish between :
   i) Logical versus physical address space
   ii) Paging versus segmentation
   iii) First fit and best fit algorithms. **(07 Marks)**

b. Mention the problem with simple paging scheme. How TLB is used to solve this problem? Explain with supporting hardware diagram and with an example. **(08 Marks)**

c. On a system using simple segmentation, compute the physical address for each of the logical address, logical address is given in the following segment table. If the address generates a segment fault, indicate it as "segment fault".

Segment	Base	Length
0	330	124
1	876	211
2	111	99
3	498	302

i) 0, 9, 9 ii) 2, 78 iii) 1, 265 iv) 3, 222 c) 0, 111. **(05 Marks)**

6 a. Explain briefly different file types. **(04 Marks)**

b. Explain the different types of directory structures, with examples and mention their advantages and disadvantages. **(08 Marks)**

c. With supporting diagrams, explain linked and indexed method of allocating disk space. **(08 Marks)**

7 a. Explain the following disk scheduling algorithms in brief
   i) SSTF ii) SCAN iii) LOOK. **(09 Marks)**

b. Explain in brief, the selection of a disk scheduling algorithm. **(04 Marks)**

c. What is protection? Distinguish between mechanisms and policies. Explain briefly the access matrix with domains as objects. **(07 Marks)**

8 Write short notes on (any four):
a. Linux history
b. Linux design principles
c. Components of a Linux system
d. Optimal page replacement algorithm
e. Steps in handling page fault. **(20 Marks)**

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10CS54

Fifth Semester B.E. Degree Examination, December 2012
Database Management Systems

Time: 3 hrs. Max. Marks:100

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

PART - A

1 a. Define the following with examples: i) Value set ii) Complex attribute iii) Data model iv) Schema v) Metadata. **(10 Marks)**

b. Explain the component module of DBMS and their interactions, with the help of a diagram. **(10 Marks)**

2 a. What are the structural constraints on a relationship type? Explain with examples. **(05 Marks)**

b. What is a weak entity type? Explain the role of partial key in design of weak entity type. **(05 Marks)**

c. Design an ER – diagram for the Movie – database considering the following requirements :
i) Each Movie is identifies by its title and year of release, it has length in minutes and can have zero of more quotes, language.
ii) Production companies are identified by Name, they have address, and each production company can produce one or more movies.
iii) Actors are identified by Name and Date of Birth, they can act in one or more movies and each actor has a role in a movie.
iv) Directors are identified by Name and Date of Birth, so each Director can direct one or more movie and each movie can be directed by one or more Directors.
v) Each movie belongs to any one category like Horror, action, Drama, etc. **(10 Marks)**

3 a. What is meant by integrity constraint? Explain the importance of Referential integrity constraint. How Referential integrity constraint is implemented in SQL? **(10 Marks)**

b. Consider the following schema and write the Relational Algebra.
SAILORS (SID, SNAME, RATING, AGE)
BOATS (BID, BNAME, COLOR)
RESERVE (SID, BID, DAY).
i) Retrieve the sailors names who have reserved red and green boats.
ii) Retrieve the sailors names with age over 20 years and reserved black boat.
iii) Retrieve the number of boats which are not reserved.
iv) Retrieve the sailors names who have reserved green boat on Monday.
v) Retrieve the sailors names who is the oldest sailor with rating 10. **(10 Marks)**

4 a. Consider the following schema and write the SQL queries :
EMP (SSN, NAME, ADDR, SALARY, SEX, DNO)
DEP(DNO, DNAME, MGRSSN)
DEP_LOCN (DNO, DLOCN)
PROJ (PNO, PNAME, PLOCN, DNO)
WORKSON (SSN, PNO, NOHRS)
DEPENDENT (SSN, DEPNTNAME, DEPNTSEX, DEPNTRELATIONSHIP)
i) Retrieve the manager name with atleast 1 dependent.
ii) Retrieve the employee name who work on any of the project that Kumar works.
iii) Retrieve the pno, pname, no of man hours work done on each project.
iv) Retrieve the pname which are controlled by Research department.
v) Retrieve the employee name who work for dept no. 10 and have a daughter. **(10 Marks)**

b. Consider the following schema and write the SQL queries :
STUDENT (STUDENT_ID, SNAME, MAJOR, GPA)
FACULTY (FACULTY_ID, FNAME, DEPT, DESIGNATION, SALARY)
COURSE (COURSE_ID, CNAME, FACULTY_ID)
ENROLL (COURSE_ID, STUDENT_ID, GRADE)
i) Retrieve the student name who is studying under faculties of "Mechanical dept".
ii) Retrieve the student name who have enrolled under any of the courses in which 'Kumar' has enrolled.
iii) Retrieve the faculty name who earn salary which is greater than the average salary of all the faculties.
iv) Retrieve the Sname who are not been taught by faculty 'Kumar'.
v) Retrieve the faculty names who are assistant professors of computer science department. **(10 Marks)**

PART - B

5 a. How is view created and dropped? What problems are associated with updating views? **(08 Marks)**

b. How are triggers and assertions defined in SQL? Explain. **(06 Marks)**

c. Explain the concept of stored procedure in brief. **(06 Marks)**

6 a. Consider R = {A B C D E F} ; FD'S {A → BC, C → E , CD → EF}
Show that AD → F. **(06 Marks)**

b.

Book title	Auth_name	Book_type	Listprice	Affiliation	Publication

FDS {Book_title → Book_type, publication
Auth_name → Affiliation
Book_type → Listprice} Find the key and normalize. **(08 Marks)**

c. What is a set of functional dependencies F said to be minimal? Give an algorithm for finding a minimal cover G for F. **(06 Marks)**

7 a. Consider R = {A B C D E F}
FDS {AB → CD, A → CF, B → F, BGD → F, D → E, DE → F}
Find an irreducible cover for this set of FD's. **(06 Marks)**

b. Explain the properties of Relational Decomposition. **(06 Marks)**

c. Consider R = {A B C D E F}
FDS {AB → C B → E A → DF}
Check weather decomposition is lossless. **(08 Marks)**

8 a. What are ACID properties? Explain. **(06 Marks)**

b. What is a schedule? Explain with example conflict Serializable schedule. **(08 Marks)**

c. What is two – phase locking protocol? How does it guarantee serializability? **(06 Marks)**

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10CS55

Fifth Semester B.E. Degree Examination, December 2012
Computer Networks – I

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is protocol? Define the key elements of protocols? **(05 Marks)**

b. Define network topology, explain ring topology with advantages and disadvantages. **(05 Marks)**

c. Explain the different levels of addressing used in an internet with a suitable example for each level of addressing in TCP /IP? **(10 Marks)**

2 a. Explain the following :
i) Bandwidth
ii) Through put
iii) Transmission time
iv) Latency
v) Jitter. **(05 Marks)**

b. Explain with the block diagram, the causes for transmission impairments. **(09 Marks)**

c. Explain with neat waveform any two polar line coding schemes. **(06 Marks)**

3 a. What is multiplexing? Explain with a neat diagram FDM. **(08 Marks)**

b. Explain how time – division – multiplexing differs from FDM, with a neat diagram? **(04 Marks)**

c. What is switching? Differentiate circuit switch network with packet – switched network. **(08 Marks)**

4 a. What is internet checksum? List the steps undertaken by sender and receiver for error detection. **(06 Marks)**

b. Explain with an example of block coding method for error detection and correction? **(10 Marks)**

c. What is the Hamming distance? Find the minimum Hamming distance of the coding scheme shown in the table. **(04 Marks)**

Data word		Code word				
0	0	0	0	0	0	0
0	1	0	1	0	1	1
1	0	1	0	1	0	1
1	1	1	1	1	1	0

PART – B

5 a. Calculate the time takes to send 2 million bits of data in a system that uses stop and wait protocols, if the distance between sender and receiver is 2000 kms. Assume packet size is 400 bits and propagation speed is 2×10^8 m. No data or control frame is lost. **(10 Marks)**

b. Explain the frame format and transitional phases of Point – to – point protocols. **(10 Marks)**

6 a. Explain why collision is an issue in a random access protocol but not in controlled access or channelizing protocols? **(04 Marks)**

b. Explain any two popular control access methods, with a neat diagram. **(08 Marks)**

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

7 a. Explain the services of IEEE 802.11 standards. **(04 Marks)**

b. Write a short notes on :
   i) Blue tooth
   ii) Cellular telephone. **(10 Marks)**

c. Explain the five standard of IMT – 2000 radio – interface of 3G systems? **(06 Marks)**

8 a. Explain briefly the advantages of IPV6. **(06 Marks)**

b. Find out the netid and hostid of the following IP address?
   i) 111.64.2.6
   ii) 131.57.9.3
   iii) 207.64.52.11
   iv) 225.34.2.1. **(08 Marks)**

c. Write short notes on network address translation (NAT). **(06 Marks)**

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10CS56

Fifth Semester B.E. Degree Examination, December 2012

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 a DFA and the languages accepted by it. **(05 Marks)**

b. Design a DFA to accept a string of a's and b's not ending with abb. **(05 Marks)**

c. Design a DFA which accepts odd number of 0's and odd number of 1's. **(05 Marks)**

d. Convert the following NFA to DFA. **(05 Marks)**

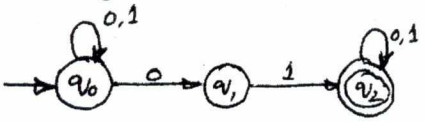

Fig.Q1(d)

2 a. Write a note on applications of finite automata. **(04 Marks)**

b. Define an $\in$ - NFA and $\in$ - closure. **(04 Marks)**

c. Prove that for every regular expression, there exists a finite automation which accepts the same language accepted by the regular expression. **(08 Marks)**

d. Give regular expressions for the following languages:

i) L = {W/W is in {a, b}* and |W| mod 3 = 0}

ii) L = {W/W is a string of even number of 0's followed by odd number of 1's}. **(04 Marks)**

3 a. Prove that regular languages are closed under homomorphism. **(05 Marks)**

b. State and prove pumping lemma of regular languages. **(05 Marks)**

c. Prove that the language L = {WW^R : W $\in$ {a, b}*} is not a regular language. **(05 Marks)**

d. Write a note on table filling method. When two states are equivalent or distinguishable? **(05 Marks)**

4 a. Define the following terms:

i) Leftmost derivation

ii) Rightmost derivation

iii) Sentential form

iv) Yield of a tree

v) Parsing **(05 Marks)**

b. Design a context free grammar for the language L = {W = W^R : W is in {a, b}*} **(05 Marks)**

c. Design a context free grammar for the language L = {$a^n b^m c^k$ where k = m + n, n, m, k $\geq$ 0}. **(05 Marks)**

d. Show how ambiguity in grammars are verified with an example. **(05 Marks)**

PART – B

5 a. Explain the working of a PDA with a diagram. **(05 Marks)**

b. Design a PDA for accepting $a^{2n}b^n$. **(05 Marks)**

c. Define two languages of a PDA. Show that they are equivalent. **(05 Marks)**

d. Convert the following CFG to PDA:

E $\rightarrow$ E + E | E * E | id. **(05 Marks)**

6 a. Define CNF. Give an example. **(05 Marks)**

b. Define the following:
   i) Generating symbol
   ii) Reachable symbol
   iii) Unit production
   iv) Null production
   v) Nullable production **(05 Marks)**

c. Convert the following CFG to CNF:
   $E \rightarrow E + E \mid E * E \mid (E) \mid id.$ **(05 Marks)**

d. Show that $a^n b^n c^n$ is not a context free language using pumping lemma of CFL. **(05 Marks)**

7 a. Define a Turing machine. Explain the working of a Turing machine. **(06 Marks)**

b. Design a Turing machine to accept $a^n b^n c^n$. **(08 Marks)**

c. Show that a multi tape TM is equivalent to a basic TM. **(06 Marks)**

8 a. Write a detailed not on halting problem of Turing machine. **(06 Marks)**

b. Prove that complement of a recursively enumerable language is recursive. **(06 Marks)**

c. Write a note on universal Turing machine and show that simulate a computer. **(08 Marks)**

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