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10IS51

Fifth Semester B.E. Degree Examination, June/July 2014

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. Answer the following frequently asked questions about software engineering:
i) Difference between software engineering and system engineering.
ii) What is a software process model?
iii) What are key challenges facing software engineering? **(06 Marks)**

b. What are emergent system properties? Give examples. Explain the types of emergent properties. **(08 Marks)**

c. Define legacy systems. Explain the layered model of a legacy system. **(06 Marks)**

2 a. What are the types of critical systems? Define. Write a simple safety critical system and explain. **(09 Marks)**

b. Explain the evolutionary development, and its problems. **(06 Marks)**

c. Write Boehm's spiral model of the software process and explain. **(05 Marks)**

3 a. List out the notations for requirement specification with description. **(06 Marks)**

b. Write the roles of the users of a requirement document. **(06 Marks)**

c. What is Ethnography? How ethonography is effective in discovering the types of requirements? **(08 Marks)**

4 a. Draw the state machine model of a microwave oven. **(06 Marks)**

b. What is object aggregation? Write an example showing aggregation, with notation. **(04 Marks)**

c. Following table shows number of activities, durations and dependencies and milestones. Draw an activity chart and a bar chart showing the critical path for the project schedule:

Tasks	Duration (days)	Dependencies
T_1	5	-
T_2	15	T_1 (M_1)
T_3	10	T_1 (M_1)
T_4	3	T_2 (M_2)
T_5	10	T_2, T_3 (M_2)
T_6	8	T_3 (M_2)
T_7	10	T_4,T_5,T_6 (M_3)
T_8	9	T_7
T_9	10	T_7
T_{10}	9	T_7
T_{11}	20	T_8,T_9,T_{10} (M_4)
T_{12}	10	T_{10} (M_4)
T_{13}	5	T_{11} (M_5)
T_{14}	10	T_{13}

(10 Marks)

PART – B

5 a. According to Bas et al. what are the advantages of designing and documenting software architecture? **(05 Marks)**

b. Explain event driven systems. **(07 Marks)**

c. What is a sequence model? Write the sequence model of operations in collecting the data from a weather station and explain. **(08 Marks)**

6 a. Explain the difficulties with iterative development and incremental delivery. **(06 Marks)**

b. Briefly discuss the extreme programming release cycle with a neat diagram. **(06 Marks)**

c. How software maintenance is carries out? Explain briefly. **(08 Marks)**

7 a. Explain V-model with a neat diagram for planning verification and validation process. **(07 Marks)**

b. Explain the characteristics of clean room software development. **(06 Marks)**

c. Explain any one of the approaches to test case design. **(07 Marks)**

8 a. Why people capability maturity model is used? Explain P-CMM model. **(08 Marks)**

b. List the factors that influence the effectiveness of communication. **(04 Marks)**

c. Write a note on project duration and staffing. **(06 Marks)**

d. Name the types of metrics used to estimate productivity. **(02 Marks)**

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10CS52

Fifth Semester B.E. Degree Examination, June/July 2014

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

b. Write a program in both SIC and SIC/XE to copy a character string 'system software' to another character string. **(10 Marks)**

2 a. Explain the data structures and pass-1 algorithm of SIC assembler. **(10 Marks)**

b. Generate the symbol table and write the object program for the following SIC/XE program: (Given that: LDX = 04, LDA = 00, LDB = 68, ADD = 18, TIX = 2C, JLT = 38, STA = 0C, RSUB = 4C).

```
SUM       START   0
FIRST     LDX     #0
          LDA     #0
          +LDB    #TABLE2
          BASE    TABLE2
LOOP      ADD     TABLE, X
          ADD     TABLE2, X
          TIX     COUNT
          JLT     LOOP
          +STA    TOTAL
          RSUB
COUNT     RESW    1
TABLE     RESW    2000
TABLE2    RESW    2000
TOTAL     RESW    1
          END     FIRST
```

(10 Marks)

3 a. What are control sections? Explain how linking is performed between control sections. **(10 Marks)**

b. Explain how multipass assembler handles the following forward reference:

```
1  HALFSZ   EQU   MAXLEN/2
2  MAXLEN   EQU   BUFFEND-BUFFER
3  PREVBT   EQU   BUFFER-1
4  BUFFER   RESB  4096
5  BUFFEND  EQU   *
```

Assume that, when assembler goes to line 4, location counter contains 1034(Hex). **(10 Marks)**

4 a. With source code, explain the working of boot-strap loader. **(10 Marks)**

b. Explain machine dependent features of loader. **(10 Marks)**

PART – B

5 a. Explain the overview of editing process. **(04 Marks)**

b. Explain editor structure with a diagram. **(08 Marks)**

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

6 a. Explain the data structures used in macro processor with example. **(08 Marks)**

b. Explain machine independent features of macro processor. **(12 Marks)**

7 a. What are LEX and YACC? Explain the different sections of LEX with example. **(10 Marks)**

b. What are regular expressions? Explain the characters used in forming regular expressions. **(10 Marks)**

8 a. What is shift/reduce parsing? Explain the parsing of the input "fred = 12 + 13" and represent using parse tree. **(10 Marks)**

b. Explain the ambiguity in arithmetic expression. What is the ambiguity in parsing $2 + 3 \times 4$? Explain the solution for it. **(10 Marks)**

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10CS53

Fifth Semester B.E. Degree Examination, June/July 2014
Operating System

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain multiprogramming and time sharing operating systems. **(08 Marks)**

b. List out the different services that an OS provides? Explain any two. **(06 Marks)**

c. What are the different categories of system program? Explain. **(06 Marks)**

2 a. With neat diagram, explain components of PCB. **(05 Marks)**

b. Explain direct and indirect communication with respect to message passing systems. **(05 Marks)**

c. Consider the following set of processes with CPU burst time (in m secs)

Process	Arrival time	Burst time
P_0	0	6
P_1	1	3
P_2	2	1
P_3	3	4

i) Draw Gantt chart illustrating the execution of above processes using SRTF and non preemptive SJF

ii) Find the turn around time for each processes for SRTF and SJF. Hence show that SRTF is faster than SJF. **(10 Marks)**

3 a. What do you mean by a binary semaphore and counting semaphore? Explain the implementation of wait( ) and signal( ) semaphore operation. **(10 Marks)**

b. What is race condition? List the requirements that a solution to critical section must satisfy. **(05 Marks)**

c. Explain any one synchronization problem for testing newly proposed synchronization scheme. **(05 Marks)**

4 a. Consider the following snapshot of resource allocation at time t_1

	Allocation			Request			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	0	0	0	0	0	0
P_1	2	0	0	2	0	2			
P_2	3	0	3	0	0	0			
P_3	2	1	1	1	0	0			
P_4	0	0	2	0	0	2			

i) Show that the system is not deadlocked by generating one safe sequence

ii) At instance t_2, P_2 makes one additional request for instance of type C. Show that the system is deadlocked if the request is granted. Write down the deadlocked processes. **(08 Marks)**

b. Describe resource allocation graph
i) With deadlock ii) With a cycle but no deadlock. **(06 Marks)**

c. What is wait for graph? Explain how it is useful for detection of deadlock. **(06 Marks)**

PART – B

5 a. Explain internal and external fragmentation, with examples. **(06 Marks)**

b. Consider the following page reference string 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur for the following page replacement algorithms assuming 3 and 5 frames. i) LRU ii) optimal. **(10 Marks)**

c. What is the cause of Thrashing? How does the system detect thrashing? **(04 Marks)**

6 a. What do you mean by free space list? With suitable example, explain any two methods of implementation of free space list. **(08 Marks)**

b. What are the three methods for allocating disk space? Explain with suitable example. **(12 Marks)**

7 a. Suppose that a disk has 50 cylinders named 0 to 49. The R/W head is currently serving at cylinder 15. The queue of pending requests are in order : 4 40 11 35 7 14 starting from the current head position, what is the total distance traveled (in cylinders) by the disk arm to satisfy the requests using algorithms FCFS, SSTF and LOOK. Illustrate with figure in each case. **(12 Marks)**

b. Write a note on :
i) Domain of protection
ii) Access matrix. **(08 Marks)**

8 a. With diagram, explain components of Linux system. **(08 Marks)**

b. Explain in detail, the components that the kernel module support under Linux. **(12 Marks)**

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10CS54

Fifth Semester B.E. Degree Examination, June/July 2014
Database Management Systems

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is database? Explain the implicite properties of database. **(08 Marks)**

b. With neat diagram, explain "three schema architecture". **(08 Marks)**

c. Define the following terms:
i) Data model ii) Schema iii) Metadata iv) Snapshot. **(04 Marks)**

2 a. Explain with sketch the different phases of database design. **(10 Marks)**

b. Write an ER diagram of hospital management system. Assume your own entities (minimum 4), attributes and relations. **(10 Marks)**

3 a. What is constraint? Give the detailed explanation of key constraints. **(10 Marks)**

b. Consider the following schema and writ the relational algebra expressions for the queries given below:
Suppliers (sid : integer, sname : string, address : string)
Parts (pid : integer, pname : string, color : string)
Catalog (sid : integer, pid : integer, cost : real)
i) Find the names of suppliers who supply some red parts.
ii) Find the sids of suppliers who supply some red parts or at 221 packer street.
iii) Find the sids of suppliers who supply some red part and some greenpart. **(10 Marks)**

4 a. Consider the same data given in question 3(b) and write the following queries in SQL:
i) Find the sids of suppliers who supply some red and some green parts.
ii) Find the pairs of sids such that the supplier with first sid charges more for some part than the supplier with second sid.
iii) Find the pids of parts supplied by at least two different suppliers. **(10 Marks)**

b. Write a note on NULL and three valued logic. **(10 Marks)**

PART – B

5 a. Explain insert, delete and update statements in SQL, with example. **(09 Marks)**

b. How is a view created and dropped? What problems are associated with updating of views? **(11 Marks)**

6 a. State the informal guidelines for relational schema design. Illustrate how violation of these guidelines may be harmful. **(12 Marks)**

b. What is normalization? Explain third normal form with example. **(08 Marks)**

7 a. Define multi valued dependency. Explain 4NF with an example. **(10 Marks)**

b. Let R = {Ssn, Ename, Pnumber, Pname, Plocation, Hours} and
D = {R_1, R_2, R_3}, where
R_1 = EMP = {Ssn, Ename}
R_2 = PROJ = (Pnumber, Pname, Plocation)
R_3 = WORKS_ON = {Ssn, Pnumber, Hours}.
The following functional dependencies hold on relation R.
F = {Ssn → Ename; Pnumber → {Pname, Plocation}; {Ssn, Pnumber} → Hours}. Prove that the above decomposition of relation R has the lossless join property. **(10 Marks)**

8 Write a short note on:

a. Two phase locking protocol.

b. Transaction support in SQL.

c. Write ahead log protocol.

d. Time stamp ordering algorithm. **(20 Marks)**

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10CS56

Fifth Semester B.E. Degree Examination, June/July 2014
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. Write the DFAs for the following languages over $\Sigma = \{a, b\}$
(i) The set of all strings ending with a & b.
(ii) The set of all strings not containing the substring aab.
(iii) Set of all strings with exactly three consecutive a's. **(10 Marks)**

b. Define NFA. Convert the following NFA to its equivalent DFA. [Refer Fig.Q1(b)] **(10 Marks)**

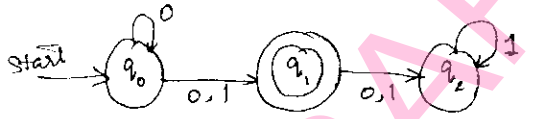

Fig.Q1(b)

2 a. Consider the following ∈- NFA:

	∈	a	b	c
→ p	ϕ	{ p }	{ q }	{ r }
q	{ p }	{ q }	{ r }	ϕ
* r	{ q }	{ r }	ϕ	{ p }

(i) Compute the ∈-closure of each state
(ii) Convert the ∈- NFA to DFA. **(08 Marks)**

b. Define Regular expression. Convert the following automation to a regular expression using state elimination technique. [Refer Fig.Q2(b)] **(08 Marks)**

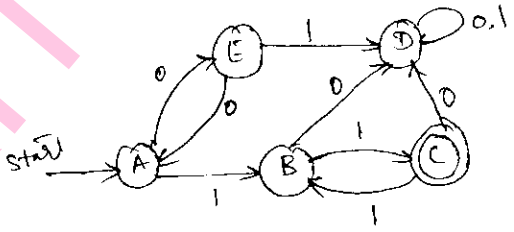

Fig.Q2(b)

c. Convert the regular expression $(0 + 1)^* \mid (0 + 1)$ to an NFA. **(04 Marks)**

3 a. State and prove pumping lemma for regular languages. **(10 Marks)**

b. Define distinguishable and indistinguishable states. Minimize the following DFA using table filling algorithm. **(10 Marks)**

		0	1
	A	B	F
	B	G	C
*	C	A	C
	D	C	G
	E	H	F
	F	C	G
	G	G	E
	H	G	C

4 a. Define CFG. Write CFG for the following languages.
(i) $L = \{0^n 1^n \mid n \geq 1\}$
(ii) L = {String *l* of a's and b's with equal number of a's and b's } **(06 Marks)**

b. What is an ambiguous grammar? Show that the following grammar is ambiguous.
$E \rightarrow E + E \mid E - E \mid E * E \mid E / E \mid (E) \mid a$
where E is the start symbol. Find the unambiguous grammar. **(10 Marks)**

c. Discuss the applications of CFG. **(04 Marks)**

PART – B

5 a. Define PDA. Construct PDA that accepts the language $L = \{ww^R \mid w \in (a+b)^*$ and w^R is the reversal of w }. Write IDs for the string aabbaa. **(10 Marks)**

b. Convert the following CFG to PDA and give the procedure for the same.
$S \rightarrow aABB \mid aAA$
$A \rightarrow aBB \mid a$
$B \rightarrow bBB \mid A$
$C \rightarrow a$ **(10 Marks)**

6 a. Consider the following CFG:
$S \rightarrow ABC \mid BaB$
$A \rightarrow aA \mid BaC \mid aaa$
$B \rightarrow bBb \mid a \mid D$
$C \rightarrow CA \mid AC$
$D \rightarrow \in$
(i) What are useless symbols?
(ii) Eliminate $\in$-productions unit productions and useless productions from the grammar. **(10 Marks)**

b. What is CNF and GNF? Obtain the following grammar in CNF:
$S \rightarrow aBa \mid abba$
$A \rightarrow ab \mid AA$
$B \rightarrow aB \mid a$ **(10 Marks)**

7 a. Define a turing machine and explain with neat diagram, the working of a basic turing machine. **(06 Marks)**

b. Design a turing machine to accept the set of all palindromes over $\{a,b\}^*$. Also, indicate the moves made by turing machine for the string aba. **(14 Marks)**

8 Write short notes on :
a. Multitape turing machine
b. Post's correspondence problem
c. Pumping lemma for CFL
d. Recursive languages. **(20 Marks)**

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