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10IS51

Fifth Semester B.E. Degree Examination, Dec. 2013/Jan. 2014
Software Engineering

Time: 3 hrs.

Max. Marks:100

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

PART – A

1   a.   Define software, software engineering, software process. (06 Marks)
    b.   What are attributes of good software? (08 Marks)
    c.   Explain two types of emergent properties. (06 Marks)

2   a.   Explain system dependability. (10 Marks)
    b.   Explain the process iteration. (10 Marks)

3   a.   Give software requirement document (IEEE standard). (10 Marks)
    b.   Explain requirement validation. (10 Marks)

4   a.   Explain structured methods. (10 Marks)
    b.   Explain risk management. (10 Marks)

PART – B

5   a.   Explain system organization. (10 Marks)
    b.   Give state diagram for weather station and explain design evaluation. (10 Marks)

6   a.   Explain extreme programming. (10 Marks)
    b.   Give Lehman's laws. (10 Marks)

7   a.   Explain clean room software development. (10 Marks)
    b.   Explain component testing. (10 Marks)

8   a.   Give factors governing staff selection. (10 Marks)
    b.   Name factors affecting software engineering productivity and cost estimation techniques. (10 Marks)

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Fifth Semester B.E. Degree Examination, Dec.2013/Jan.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. Bring out the differences between system software and application softwares, with examples.   **(04 Marks)**
     b. Explain the SIC / XE machine architecture in detail.   **(12 Marks)**
     c. Suppose that RECORD contains a 100 byte record. Write a subroutine for SIC / XE that will write this record onto device F1. Use immediate addressing and register-to-register instructions to make the subroutine as efficient as possible.   **(04 Marks)**

2   a. Write and explain the algorithm for a PASS-1 of a two-pass assembler.   **(10 Marks)**
     b. Generate the complete object program for the source program given below:

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

Assume the below opcodes for mnemonics.   **(10 Marks)**

Mnemonic	Opcode
ADD	18
JLT	38
LDA	00
LDB	68
LDX	04
RSUB	4C
STA	0C
TIX	2C

3   a. Distinguish between literal and immediate operands. How does the assembler handle the literal operands?   **(05 Marks)**

3 b. Assuming the following symbol table definitions:

Symbol	Type
BUFFER	Relative
FIRST	Relative
MAXLEN	Absolute
LENGTH	Relative
BUFEND	Relative

Classify the following into absolute, relative or neither absolute nor relative expressions:

(i) BUFFER – FIRST   (ii) BUFFER + 4095
(iii) MAXLEN – 1   (iv) BUFFER + MAXLEN – 1
(v) BUFFER – MAXLEN   (vi) 2 * LENGTH
(vii) 2 * MAXLEN – 1   (viii) MAXLEN – BUFFER
(ix) FIRST + BUFFER   (x) FIRST – BUFFER + BUFEND   **(05 Marks)**

    c. Give the formats of the following records:
        (i) Define record   (ii) Refer record   **(04 Marks)**

    d. Write the schematic of symbol table entries that shows how multipass assembler handles the following forward references:

```
1    HALFSZ    EQU      MAXLEN / 2
2    MAXLEN    EQU      BUFEND – BUFFER
3    BUFFER    RESB     2048
4    BUFEND    EQU      *
```

Assume that when line 3 is read, the location counter contains the hexadecimal value 750.

                                                       (06 Marks)

4 a. Write the SIC/XE source code for a simple bootstrap loader.   **(07 Marks)**
    b. Explain dynamic linking with suitable diagrams.   **(07 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 structure of a text editor.   **(10 Marks)**
    b. Explain the debugging functions and capabilities of an interactive debugging system.
                                                       (06 Marks)
    c. Write a note on the concept of user-interface criteria in a text editor.   **(04 Marks)**

6 a. Explain the various data structures used in the implementation of a macro processor.
                                                       (08 Marks)
    b. Explain the following machine-independent macro processor features with examples:
        (i) Concatenation of macro parameters.
        (ii) Generation of unique labels.
        (iii) Keyword macro parameters.   **(12 Marks)**

7 a. Explain the communication between the Parser and Lexer with a neat block diagram.
                                                       (05 Marks)
    b. What is a regular expression? Explain the various regular expressions in UNIX with examples for each.   **(10 Marks)**
    c. Write a LEX program to count the number of vowels and consonants in a given string.
                                                       (05 Marks)

8 a. Explain the structure of a YACC program.   **(06 Marks)**
    b. Write a YACC program to recognize an arithmetic expression involving operators +, – , * and /.   **(08 Marks)**
    c. What is shift / reduce parsing? Explain with an example.   **(06 Marks)**

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Fifth Semester B.E. Degree Examination, Dec.2013/Jan.2014
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. Explain the advantage of the layered approach with a neat diagram. **(06 Marks)**
   b. What are virtual machines? Explain its advantage with a neat diagram. **(08 Marks)**
   c. What are the essential properties of batch, real time and distributed operating systems? **(06 Marks)**

2 a. Differentiate between:
   i)   Process and a thread.
   ii) Short term and medium term schedules.
   iii) User level and kernel level threads.
   iv) Waiting and turn around time. **(08 Marks)**
   b. Consider the following set of processes with arrival time:

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

   i) Draw Gantt charts using FCFS, SJF preemptive and non preemptive scheduling.
   ii) Calculate the average waiting time for each of the scheduling algorithm. **(08 Marks)**
   c. Describe the actions an operating system takes to context switch between processes. **(04 Marks)**

3 a. Explain Dining-Philosopher's problem using monitors. **(10 Marks)**
   b. What is race condition? Explain Reader's writer's problem with semaphores. **(10 Marks)**

4 a. For the following snapshot find the safe sequence using Banker's algorithm:
   The number of resource units are R_1, R_2, R_3 which are 7, 7, 10 respectively.

Process	Allocated resources			Maximum requirements		
	R_1	R_2	R_3			
P_1	2	2	3	3	6	8
P_2	2	0	3	4	3	3
P_3	1	2	4	3	4	4

   (06 Marks)
   b. Explain different methods to recover from deadlock. **(06 Marks)**
   c. Dead lock exists if a cycle exists. Yes or no. Justify your answer with a suitable example. **(08 Marks)**

PART – B

5 a. Why are translation loan-aside bubbles (TLB) important? In a simple paging system, what information is stored in TLB? Explain. **(08 Marks)**

   b. Given memory partitions of 100K, 500K, 200K, 300K and 600K, apply first fit and best fit algorithm to place 212K, 417K, 112K and 426K. **(04 Marks)**

   c. What is swapping? Does this increase the operating systems overhead? Justify your answer. **(08 Marks)**

6 a. What is a file? Explain the different allocation methods. **(10 Marks)**

   b. What are directories? Write a brief note on mounting file systems. **(05 Marks)**

   c. How is free space managed? Explain. **(05 Marks)**

7 a. Explain the difference between protection and security? Describe the scheme of capability lists to implement protection. **(10 Marks)**

   b. Write short notes on:
   i) Swap space management.
   ii) Revocation of access rights. **(10 Marks)**

8 a. What are the design principles of Linux operating systems? Explain. **(08 Marks)**

   b. What do you mean by cloning? How is it achieved in Linux systems? **(06 Marks)**

   c. How is IPC handled in Linux? Explain with a suitable example. **(06 Marks)**

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Fifth Semester B.E. Degree Examination, Dec.2013 / Jan. 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 are the responsibilities of DBA and Database designers? 　　**(04 Marks)**
　　b.　With a diagram, explain the components modules of DBMS and their interactions. **(08 Marks)**
　　c.　List the advantages and disadvantages of DBMS. Discuss any five advantages by comparing with file systems. 　　**(08 Marks)**

2　a.　Define the following terms : i) Recursive relationship ii) Weak entity type 　iii) Atomic attributes 　iv) Participation role. 　　**(04 Marks)**
　　b.　Discuss the conventions for displaying an ER schemas as an ER diagram. 　　**(04 Marks)**
　　c.　Draw an ER diagram for Musicians who perform for album. Assume any four entities. Indicate all key and cardinality constraints and any assumptions that are made. 　**(12 Marks)**

3　a.　List and explain characteristics of relations. 　　**(06 Marks)**
　　b.　List set theory operations used in relational data model. Explain any two with example. 　　**(06 Marks)**
　　c.　Consider the following relations for a sailors database that keeps track of reservation of boats by sailors.
　　　SAILORS (SID, SNAME , RATING, AGE)
　　　BOATS (BID, BNAME ,COLOR)
　　　RESERVES (SID, BID, DAY)
　　　Specify the following queries in relational algebra.
　　　i)　Find the sids of sailors with age over 20 who have not reserved a 'Red' boat.
　　　ii)　Find the names of sailors who have reserved all boats.
　　　iii)　Find the names of sailors who have reserved boat 103. 　　**(08 Marks)**

4　a.　Describe the six clauses in the syntax of an SQL Retrieval Query. Show what type of constructs can be specified in each of the six clauses. Which of the six clauses are required and which are optional. 　　**(06 Marks)**
　　b.　Explain how the group by clause works. What is the difference between the Where and Having clause? 　　**(04 Marks)**
　　c.　Consider the following relations for a database.
　　　Supplier (Sno, Sname, Status, City)
　　　Product (Pno, Pname, Color, Weight, City)
　　　Shipments (Sno, Pno, Qty)
　　　Specify the following queries in SQL.
　　　i)　Retrieve names of supplier who supply part P_2.
　　　ii)　Retrieve the names of suppliers who do not supply any part supplied by S_2.
　　　iii)　Retrieve parts number for all parts supplied by more than one supplier.
　　　iv)　For each part supplied, get the part number, maximum quantity, minimum quantity supplied for that part.
　　　v)　Retrieve supplier numbers for suppliers with status less than the current maximum in the supplier table. 　　**(10 Marks)**

PART - B

5 a. List the differences between Independent nested and co – related nested query. **(04 Marks)**
   b. Discuss main approaches to database programming. What you mean by Impedance mismatch. **(08 Marks)**
   c. With program segment, explain retrieving of tuples with embedded SQL. **(08 Marks)**

6 a. Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with examples. **(08 Marks)**
   b. What you mean by closure of attribute? Write an algorithm to find closure of attribute. **(06 Marks)**
   c. Given below are two sets of FDs for a relation R(A, B, C, D, E). Are they equivalent?
      i) $A \rightarrow B$, $AB \rightarrow C$, $D \rightarrow AC$, $D \rightarrow E$ ii) $A \rightarrow BC$, $D \rightarrow AE$. **(06 Marks)**

7 a. Consider the following Universal relation
      $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of function dependencies.
      $F = \{ \{A, B\} \rightarrow C, A \rightarrow \{D, E\}, B \rightarrow F, F \rightarrow \{G, H\}, D \rightarrow \{I, J\} \}$. What is the key of R? Decompose R into 2NF, then 3NF relations. **(08 Marks)**
   b. What is the dependency preservation property for a decomposition? Why is it important? **(06 Marks)**
   c. Define fourth normal form. When is it violated? Why is it useful? **(06 Marks)**

8 a. What are the anamalies occur due to interleave execution? Explain them with example. **(08 Marks)**
   b. Consider the three transactions T_1, T_2 and T_3 and schedules S_1 and S_2 given below. Determine whether each schedule is serializable or not. If a schedule is serializable. Write down the equivalent serial schedule (S). **(08 Marks)**
      $T_1 : R_1(X) ; R_1(Z) ; W_1(X) ;$
      $T_2 : R_2(Z) ; R_2(Y) ; W_2(Z) ; W_2(Y) ;$
      $T_3 : R_3(X) ; R_3(Y) ; W_3(Y) ;$
      $S_1 : R_1(X) ; R_2(Z) ; R_1(Z) ; R_3(X) ; R_3(Y) ; W_1(X) ; W_3(Y) ; R_2(Y) ; W_2(Z) ; W_2(Y) ;$
      $S_2 : R_1(X) ; R_2(Z) ; R_3(X) ; R_1(Z) ; R_2(Y) ; R_3(Y) ; W_1(X) ; W_2(Z) ; W_3(Y) ; W_2(Y) ;$
   c. Describe the three steps in crash Recovery in Aries. What is the goal of the each phase? **(04 Marks)**

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Fifth Semester B.E. Degree Examination, Dec. 2013/Jan. 2014
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 data communication? List and explain the five components of data communication system. **(06 Marks)**
    b. Discuss the ISO–OSI layered model, bringing out the functionalities of each layer. **(10 Marks)**
    c. Differentiate between :
      i) ARP and RARP
      ii) UDP and TCP. **(04 Marks)**

2   a. Write a descriptive note on three causes of transmission impairment. **(08 Marks)**
    b. Explain the transmission modes? **(06 Marks)**
    c. Explain delta modulation? **(06 Marks)**

3   a. What is FDM? Briefly explain its multiplexing and demultiplexing process. **(06 Marks)**
    b. Four sources create 250 characters per second. The frame contain one character from each source and one extra bit for synchronization. Find :
      i) The data rate of each source
      ii) Duration of each character in each source
      iii) Frame rate
      iv) Duration of output frame
      v) Frame size in bits
      vi) Data rate of link. **(06 Marks)**
    c. What is time division multiplexing? Explain how statistical TDM overcomes the disadvantages of synchronous TDM. **(08 Marks)**

4   a. Describe different types of errors. **(03 Marks)**
    b. Explain error detection and error correction with respect to block coding. **(08 Marks)**
    c. Find the codeword, using CRC given data word "1001" and generator "1011". **(09 Marks)**

PART – B

5   a. Explain briefly, with neat figure stop and wait ARQ and Go Back N ARQ. **(12 Marks)**
    b. Explain the frame format and transitional phases of point to point protocol. **(08 Marks)**

6   a. Explain :
      i) CSMA
      ii) CSMA/CD. **(12 Marks)**
    b. Describe 802.3 Mac frame. **(08 Marks)**

7   a. Explain IEEE 802.11 architecture. **(10 Marks)**
    b. Bring out the differences between repeaters, bridges, routers and gateways. **(10 Marks)**

8   a. Explain with respect to IPV4, classful addressing and classless addressing. **(10 Marks)**
    b. Explain in detail IPV6 packet format. **(10 Marks)**

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10CS56

Fifth Semester B.E. Degree Examination, Dec.2013/Jan.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. Mention the differences between DFA, NFA and ∈-NFA. **(06 Marks)**
   b. Design a DFA which accepts set of all strings of 0's and 1's. beginning with a 1 that, when interpreted as a binary integer, is a multiple of 5. For example, strings 101, 1010 and 1111 are in the language; 0, 100, 0101 and 111 are not. **(06 Marks)**
   c. Convert the following NFA to DFA using subset construction method: **(08 Marks)**

δ	0	1
→ p	{p, q}	{p}
q	φ	{r}
* r	{p, r}	{q}

2 a. Consider the following ∈-NFA:

δ	∈	a	b
→ p	{r}	{q}	{p, r}
q	φ	{p}	φ
* r	{p, q}	{r}	{p}

   i) Compute the ∈-closure of each state.
   ii) Give the set of all strings of length 3 or less accepted by the automation.
   iii) Convert the automation to DFA. **(08 Marks)**
   b. Give the regular expressions for the following languages:
   i) $L = \{a^n b^m : n \le 4, \ m \ge 2\}$; ii) $L = \{w : w \in (0, 1)^* \text{ and } |w| \bmod 3 = 0\}$. **(04 Marks)**
   c. Mention the applications of regular expressions. **(02 Marks)**
   d. Prove that every language defined by a regular expression is also defined by a finite automation. **(06 Marks)**

3 a. State and prove pumping lemma for regular languages. **(06 Marks)**
   b. Obtain the regular expression from the following finite automation using state elimination method. **(04 Marks)**

   Fig.Q.3(b)
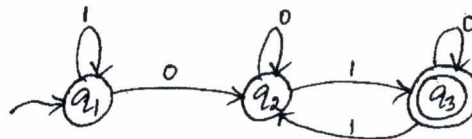
   c. When two states are equivalent or distinguishable? Minimize the following DFA using table filling algorithm. **(10 Marks)**

δ	0	1
→ q₁	q₂	q₃
q₂	q₃	q₅
* q₃	q₄	q₃
q₄	q₃	q₅
* q₅	q₂	q₅

4 a. Define CFG. Design a context free grammar for the languages:
   i) $L = \{a^i b^j c^k$, where $i = j + k$, $i, j, k \geq 0\}$.
   ii) $L = \{0^{n+2} 1^n : n \geq 1\}$. **(08 Marks)**

   b. What is an ambiguous grammar? Show that the grammar shown below is ambiguous on the string "aab".

   $S \rightarrow AB/aaB$

   $A \rightarrow Aa/a$

   $B \rightarrow b$. **(06 Marks)**

   c. Consider the grammar:

   $E \rightarrow + EE\ /\ *\ EE\ /\ -\ EE\ /\ x\ /\ y$

   Find the left most derivation, right most derivation and parse tree for the string "$+ * - xyxy$". **(06 Marks)**

PART – B

5 a. Discuss the languages accepted by a PDA. Design a PDA to accept the following language: $L = \{0^{2n}1^n;\ n \geq 1\}$. Draw the transition diagram for the constructed PDA. Also, show the moves made by PDA for the string "000011". **(14 Marks)**

   b. Convert the following grammar to a PDA that accepts the same language by empty stack:

   $S \rightarrow aABB/aAA$

   $A \rightarrow aBB/a$

   $B \rightarrow bBB/A$

   $C \rightarrow a$. **(06 Marks)**

6 a. What are useless productions? Eliminate $\in$, unit and useless productions from the following grammar:

   $A \rightarrow bA/Bba/aa$

   $B \rightarrow aBa/b/D$

   $C \rightarrow CA/AC/B$

   $D \rightarrow a/\in$. **(10 Marks)**

   b. Define Chomskey normal form. Convert the following CFG to CNF:

   $S \rightarrow aSb/ab/Aa$

   $A \rightarrow aab$. **(06 Marks)**

   c. Prove that the context free languages are closed under union. **(04 Marks)**

7 a. Design a turing machine to accept the language $L = \{ww^R : w \in (a, b)^*\}$. Write its transition diagram. Also show the sequence of moves made by the TM for the string "aabbaa". **(14 Marks)**

   b. Define turing machine. Explain with a diagram general structure of multitape turing machine. **(06 Marks)**

8 Write short notes on:
   a. Recursive languages.
   b. Universal turing machine.
   c. Post's correspondence problem.
   d. Applications of context free grammars. **(20 Marks)**

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