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06CS/IS51

Fifth Semester B.E. Degree Examination, December 2010

Software Engineering

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What are the attributes of good software? What are the key challenges facing software engineering? **(10 Marks)**

b. Describe the general model of design process. **(06 Marks)**

c. Explain the requirements engineering process, with a neat block diagram. **(04 Marks)**

2 a. Describe four different types of non-functional requirement, which may be placed, on the systems. Give examples of each of these types of requirements. **(10 Marks)**

b. Describe the salient features of spiral model of software process, with an illustration diagram. **(10 Marks)**

3 a. With a neat block diagram, explain components of a CASE TOOLS for structured method support. **(10 Marks)**

b. What are the most important dimensions of system dependability? **(06 Marks)**

c. What is requirement elicitation and analysis? Explain. **(04 Marks)**

4 a. Explain state machine model for a simple microwave oven. **(10 Marks)**

b. Write the structure of a requirement document suggest by IEEE standard. **(05 Marks)**

c. What is object aggregation? Explain with an example. **(05 Marks)**

PART – B

5 a. Explain with a figure, the data flow model of an invoice processing system. **(10 Marks)**

b. Draw and explain the sequence and state diagram for a typical weather station. **(10 Marks)**

6 a. Explain the structure of a software test plan. **(07 Marks)**

b. Give a brief description of five principles of agile methods. **(07 Marks)**

c. Discuss the advantages of pair programming. **(06 Marks)**

7 a. Explain the characteristics of clean room software development. **(07 Marks)**

b. What are the characteristics of rapid software development? **(07 Marks)**

c. What is software prototyping? Give benefits of software prototyping. **(06 Marks)**

8 a. Differentiate between black box testing and white box testing. **(07 Marks)**

b. List the factors governing staff selection. **(07 Marks)**

c. Name the various estimation techniques in software systems. **(06 Marks)**

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06CS52

Fifth Semester B.E. Degree Examination, December 2010
System Software

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Give the target address generated for the following machine instruction:
i) 032600h ii) 03C300h iii) 0310C303h
if (B) = 006000, (Pc) = 003000, (X) = 000090. **(06 Marks)**

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

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

2 a. Define assembler directive. Explain the different types of directives used in SIC m/c. **(08 Marks)**

b. What is the need of pass 2 assembler? Reason out with a simple example. **(04 Marks)**

c. Give an algorithm for pass 1 of 2 pass assembler. **(08 Marks)**

3 a. Differentiate between literal and an immediate operand. Give an example for each. **(05 Marks)**

b. Define control section. How does control section differ from the program blocks? Explain with an example. **(10 Marks)**

c. With an example, explain the multipass assembler. **(05 Marks)**

4 a. What do you mean by relocating loaders? Explain the method for relocation as a part of object program. **(10 Marks)**

b. Explain, with a figure, dynamic linking. Discuss its advantage. **(10 Marks)**

PART – B

5 a. List the task performed by document linking process in an interactive system. **(04 Marks)**

b. Give the relationship between editing and viewing process. **(06 Marks)**

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

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

b. With an illustrative example, explain the macro processing features of MASM macro process. **(10 Marks)**

7 a. Explain the structure of Lex program, with an example. **(06 Marks)**

b. Give regular expression for the following :
i) 'C' – variables ii) Integer data iii) Floating point data **(06 Marks)**

c. Write Lex program to count the number of words in a text file. **(08 Marks)**

8 a. Explain shift reduce parsing, with an example. **(06 Marks)**

b. Write yacc program to recognize the given arithmetic expression containing +, –, /, × operator with + and – having highest precedence. **(08 Marks)**

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

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06CS53

Fifth Semester B.E. Degree Examination, December 2010
Operating Systems

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define an operating system. Explain two view points of OS role. **(05 Marks)**

b. What are OS operations? Explain. **(06 Marks)**

c. Define a virtual machine (VM). With a neat diagram, explain the working of a VM. What are the benefits of a VM? **(09 Marks)**

2 a. Define IPC (Inter process communication). What are the different methods used for logical implementation of a message passing system? Explain any one. **(06 Marks)**

b. Discuss three common ways of establishing relationship between the user thread and kernel thread. **(06 Marks)**

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

Process	P_1	P_2	P_3	P_4	P_5
Arrival time	00	02	03	06	30
Burst time	10	12	14	16	05

i) Draw a Gantt chart that illustrates the execution of these processes using the preemptive shortest job first (SJF) algorithm. Hence find the average waiting time.

ii) Draw a Gantt chart that illustrate the execution of these processes using preemptive priority scheduling algorithm. Given priority of each process is $P_1 = 4$, $P_2 = 3$, $P_3 = 5$, $P_4 = 1$ and $P_5 = 1$. Also find the average waiting time. **(08 Marks)**

3 a. What do you mean by a binary semaphore and a counting semaphore? Along with the necessary 'C'-struct, explain the implementation of wait() and signal() semaphore operations. **(10 Marks)**

b. With the necessary syntax, describe the term monitor. Explain the solution to the classical dining philosopher's problem, using monitor. **(10 Marks)**

4 a. Define the terms: safe state and safe sequence. Give an algorithm to find whether or not a system is in a safe state. **(10 Marks)**

b. Consider the following snapshot of the system.

	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				

Using the Bankers algorithm, answer the following:

i) What is the content of a matrix NEED?

ii) Is the system in SAFE state? If yes, give the SAFE state.

iii) If a request from a process P_1 arrives for (0,4,2,0), can the request be granted immediately? **(10 Marks)**

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.

PART – B

5 a. What do you mean by a address binding? Explain with the necessary steps, the binding of instructions and data to memory addresses. **(08 Marks)**

b. On a system using demand paged memory it takes 0.12 μs to satisfy a memory request, if the page is in memory. If the page is not in memory the request takes 5000 μs. What would the page fault rate need to be to achieve an effective access time 1000 μs? Assume the system is only running a single process and the CPU is idle during the page swaps. **(08 Marks)**

c. What do you mean by a copy-on-write? Where is it used? Explain in brief. **(04 Marks)**

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

b. What are the major methods used for allocating a disk space? Explain each, with suitable examples. **(12 Marks)**

7 a. Discuss the steps in handling a page fault, with the help of a neat diagram. **(10 Marks)**

b. Given the page reference string:

0 9 0 1 8 1 8 7 8 7 1 2 8 2 7 8 2 3 8 3

Three frames allocated for the program in the main memory. Determine the number of page faults using i) LRU policy ii) Optimal replacement policy. **(10 Marks)**

8 a. Discuss the directory implementation using

i) Linear list ii) Hash table **(10 Marks)**

b. What are the components that the kernel module support under Linux? Explain in detail. **(10 Marks)**

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06CS54

Fifth Semester B.E. Degree Examination, December 2010
Database Management Systems

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Discuss the main characteristics of the database approach. How does it differ from traditional file systems? **(08 Marks)**

b. Explain the difference between logical and physical data independence. **(04 Marks)**

c. Explain the operation of two – tier client/server architecture for RDBMS. **(08 Marks)**

2 a. Design an ER – diagram for keeping track of information about bank database, taking into account at least 4 entities. **(10 Marks)**

b. Describe how to map the following scenarios in ER – model to schema, with suitable examples : i) Strong entity ; ii) One – to – one relationship. **(10 Marks)**

3 a. List the characteristics of relation. Discuss each one. **(05 Marks)**

b. Discuss various types of inner join operations. **(06 Marks)**

c. Consider the following schema –
Sailors (sal – ID, sal – name, rating, age)
Reserves (sal – ID, boat – ID, day)
Boats (boat – ID, boat – name, color)
Using the above schema solve the queries in relational algebra.
i) Find the names of sailors, who have reserved all boats, called Interlake.
ii) Find the sids of sailors, with age over 20, who have not reserved a red boat.
iii) Find the names of sailors, who have reserved at least two boats. **(09 Marks)**

4 a. Explain how the GROUP by clause works. What is the difference between the WHERE and HAVING clause? **(04 Marks)**

b. How does SQL implement the entity integrity constraints of the relational data model? Explain with an example. **(04 Marks)**

c. Using the same tables given in Q.No.3(c), write SQL queries to :
i) Find all sailors ID of sailors who have a rating of 10 or reserved the boat 105.
ii) Find sailors whose rating is better than a sailor called "RAJ".
iii) Find the names of sailors who are older than the oldest sailor with a rating of 10. **(12 Marks)**

PART – B

5 a. List the approaches to DB programming. What are the main issues involved in DB programming? **(08 Marks)**

b. What is the impedance mismatch problem? Which of the three programming approaches minimizes this problem? **(06 Marks)**

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

6 a. Explain any two informal quality measures employed for a relational schema design. **(06 Marks)**

b. Consider the following relations : CAR – SALE (car – no, date – sold, salesman – no, commission %, discount). Assume a car can be sold by multiple salesmen and hence primary key is {car – no, salesman – no}.
Additional dependencies are :
Date – sold → Discount and
Salesman – no → Commission %.
i) Is this relation in 1NF, 2NF or 3NF? Why or why not?
ii) How would you normalize this completely? **(10 Marks)**

c. Discuss the minimal sets of functional dependencies. **(04 Marks)**

7 a. What are the ACID properties? Explain each one. **(06 Marks)**

b. What is serializability? How can serializability be ensured? Do you need to restrict concurrent execution of transaction to ensure serializability? Justify your answer. **(10 Marks)**

c. What is the phantom problem? Explain with an example. **(04 Marks)**

8 Write short notes on :
a. 2PL protocol
b. Deadlocks
c. Aries
d. Multivalued dependency. **(20 Marks)**

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06CS55

Fifth Semester B.E. Degree Examination, December 2010
Computer Networks – I

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is data communication? List and explain the five components of a data communication system, with examples. **(07 Marks)**

b. Discuss the ISO – OSI layered model, bringing out the functionalities of each layer. **(10 Marks)**

c. Define the key elements of a protocol. **(03 Marks)**

2 a. An analog signal has a bandwidth of 40 kHz. If we use four levels in the signal, what is the minimum bandwidth of the digital signal? **(04 Marks)**

b. What is the Nyquist sampling rate for each of the following signals?
i) A low pass signal with bandwidth of 200 kHz.
ii) A band pass signal with bandwidth of 300 kHz, having lowest frequency of 200 kHz. **(04 Marks)**

c. Write a descriptive note on the three causes of transmission impairments. **(12 Marks)**

3 a. What is time division multiplexing? Explain how statistical TDM overcomes the disadvantages of synchronous TDM. **(08 Marks)**

b. An analog signal has a bit rate of 10000 bps and bandwidth of 2000 band. How many data elements are carried by each signal element? How many signal elements do we need? **(04 Marks)**

c. Explain phase shift keying, in detail. **(08 Marks)**

4 a. What is reflection? Briefly explain the fibre optic cable media, with a neat sketch. **(08 Marks)**

b. Draw a CRC encoder and decoder for CRC code with C (7, 4). Also explain how this CRC design works, with an example. **(10 Marks)**

c. Define line of sight propagation. **(02 Marks)**

PART – B

5 a. List the protocols for noisy channels. Explain stop and wait protocol for noiseless channels. **(08 Marks)**

b. Define piggybacking and its usefulness. **(04 Marks)**

c. Write explanatory notes on the different phases of PPP. **(08 Marks)**

6 a. Describe the different controlled access methods. **(10 Marks)**

b. Explain 802.3 MAC frame format and frame length. **(10 Marks)**

7 a. Discuss the 802.11 MAC layer frame format. **(08 Marks)**

b. Differentiate bus back – bone from star back – bone. Explain each in detail. **(10 Marks)**

c. Differentiate between amplifier and repeater. **(02 Marks)**

8 a. Explain in detail, the architecture of a SONET system. **(10 Marks)**

b. Write a note on byte interleaving. **(04 Marks)**

c. Give the architecture of ATM. Show how VPs and VCs are established. **(06 Marks)**

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06CS56

Fifth Semester B.E. Degree Examination, December 2010
Formal Languages and Automata Theory

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting at least TWO questions from each part.***
2. Assume any missing data, if any.

PART – A

1 a. Define the following terms:
i) Alphabet ii) Power of an alphabet iii) Strings iv) Language **(04 Marks)**

b. Write the DFA's for the following languages over $\Sigma = \{a, b\}$:
i) The set of all strings ending with abb
ii) The set of all strings not containing the substring aab
iii) $L = \{a\, w\, a \mid w \in (a + b)^*\}$
iv) $L = \{w \mid |w| \bmod 3 = 0\}$ **(08 Marks)**

c. Convert the following NFA to its equivalent DFA. **(08 Marks)**

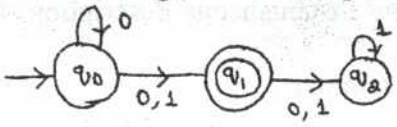

Fig.Q1(c)

2 a. Compute $\in$- closure of each state from the following $\in$ - NFA : **(04 Marks)**

	$\in$	a	b
→p	{ r }	{ q }	{ p, r }
q	ϕ	{ p }	ϕ
r	{ p, q }	{ r }	{ p }
*s	{ p }	{ p }	{ p }

b. Define regular expression. Write the regular expression for the following languages:
i) $L = \{a^n\, b^m \mid n \leq 4, m \geq 2\}$
ii) Strings of 0's and 1's having no two consecutive zeros
iii) Strings of 0's and 1's whose lengths are multiples of 3. **(06 Marks)**

c. Design an $\in$-NFA for the regular expression $(a + b)^*ab$. **(04 Marks)**

d. Obtain a regular expression from the following DFA using state elimination method:

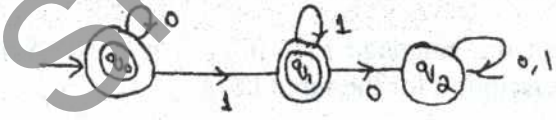

Fig.Q2(d)

(06 Marks)

3 a. Apply pumping lemma for the following languages and prove that they are not regular :
i) $L = \{ w\, w^R \mid w \in (0 + 1)^*\}$ ii) $L = \{ a^n\, b^n \mid n \geq 0\}$ **(10 Marks)**

b. Prove that the regular languages are closed under complementation. **(04 Marks)**

c. Consider the two DFA's shown below. Using table filling algorithm, show that the language accepted by both the DFA's is same. **(06 Marks)**

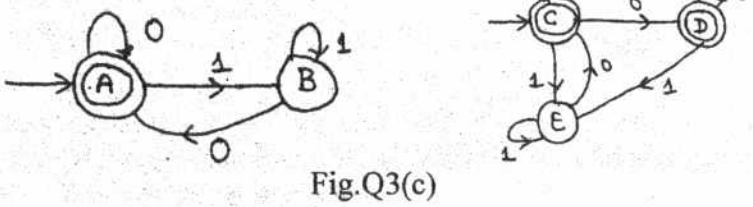

Fig.Q3(c)

4 a. Define context free grammar. Write the grammar for the following languages :
i) $L = \{ 0^{n+2} 1^n \mid n \geq 1\}$ ii) $L = \{a^n b^m \mid m > n \text{ and } n \geq 0\}$ **(07 Marks)**

b. Consider the grammar G, with productions:
$S \rightarrow Ab\ B$
$A \rightarrow aA \mid \in$
$B \rightarrow aB \mid bB \mid \in$
Give leftmost derivation, right most derivation and parse tree for the string aaabab. **(08 Marks)**

c. What is ambiguous grammar? Show that the following grammar is ambiguous.
$S \rightarrow AB \mid aaB$
$A \rightarrow a \mid Aa$
$B \rightarrow b$ **(05 Marks)**

PART – B

5 a. Define PDA. Describe the language accepted by PDA. **(04 Marks)**

b. Construct a PDA that accepts the language $L = \{a^n b^n \mid n \geq 1\}$. Give the graphical representation for PDA obtained. Show the instantaneous description of the PDA on the input string aaabbb. **(10 Marks)**

c. Obtain a PDA equivalent to the following grammar:
$S \rightarrow AS \mid \in$
$A \rightarrow 0A1 \mid A1 \mid 01$ **(06 Marks)**

6 a. What are useless symbols? Explain with an example. **(04 Marks)**

b. Obtain the nullable set and hence eliminate all $\in$ productions from the following grammar:
$S \rightarrow aAa \mid AB$
$A \rightarrow BS \mid aBa \mid \in$
$B \rightarrow aB \mid \in$ **(06 Marks)**

c. Define CNF. Convert the following grammar to CNF:
$S \rightarrow aSb \mid ab \mid Aa$
$A \rightarrow aab$ **(10 Marks)**

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

b. Design a turing machine to accept the language $L = \{0^n 1^n \mid n \geq 1\}$. Write its transition diagram and give instantaneous description for the input 0011. **(14 Marks)**

8 Write short notes on the following : **(20 Marks)**

a. Application of regular expressions
b. Post's correspondence problem
c. Recursive languages
d. Universal turing machine

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