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06IS51

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. Explain the term software engineering. List and explain the key challenges that a software engineering is facing. (06 Marks)
b. With a neat diagram, explain the system engineering process. (08 Marks)
c. What are the professional responsibilities of a software engineer? (06 Marks)
- 2 a. What are critical systems? Explain different types of critical systems. (06 Marks)
b. Explain Boehm's spiral model of software process with a neat diagram. (08 Marks)
c. With a neat diagram, describe the component based software engineering. (06 Marks)
- 3 a. Differentiate between functional and non-functional requirements. Give examples for each. (05 Marks)
b. List and explain the metrics used for specifying non-functional requirements. (06 Marks)
c. Write a structure of requirement documents suggested by IEEE standards. (04 Marks)
d. Explain the requirements engineering process with a neat diagram. (05 Marks)
- 4 a. Describe different types of system models. (05 Marks)
b. Based on your experience with a bank ATM, draw a data flow diagram modeling the data processing involved when a customer withdraws cash from a machine. (08 Marks)
c. State and explain different management activities. (07 Marks)

PART – B

- 5 a. Write short note on:
 - i) The repository model.
 - ii) The client server model.
 - iii) The layered model. (12 Marks)
b. Explain object-oriented design process with example. (08 Marks)
- 6 a. Give brief descriptions of five principles of agile methods. (06 Marks)
b. Explain re-engineering process with a neat diagram. (07 Marks)
c. With a neat diagram describe the system evolution process. (07 Marks)
- 7 a. Explain the following:
 - i) Unit testing.
 - ii) Integration testing.
 - iii) Release testing. (09 Marks)
b. Explain the clean-room software development process with a neat diagram. (07 Marks)
c. Explain the stages involved in static analysis. (04 Marks)
- 8 a. Describe people's CMM levels. (05 Marks)
b. Explain any two cost estimation techniques with example. (10 Marks)
c. List and explain factors governing the staff selection. (05 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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06CS52

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

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Explain all the addressing modes supported by SIC/XE by indicating the different bit settings in an instruction. (08 Marks)
- b. Write a sequence of instructions for SIC/XE to set BETA equal to ALPHA + INCR – 1 and DELTA equal to GAMMA + INCR – 1. (Use register operation). (06 Marks)
- c. Write a subroutine in SIC to read a 100 – byte record from a device 'F5' into memory. (06 Marks)
- 2 a. Explain the following assembler directives, with an example each :
 i) START ii) BYTE iii) RESW iv) BASE. (04 Marks)
- b. Write an algorithm for pass – 1 of assembler. (06 Marks)
- c. Generate the complete object program for the following ALP. Assume standard SIC model and assume the following :
- LDA → 00 TIX – 2C
 LDX → 04 JLT – 38
 STA → 0C RSUB – 4C
 ADD → 18
- Source program

SUM	START	4000
FIRST	LDX	ZERO
	LDA	ZERO
LOOP	ADD	TABLE, X
	TIX	COUNT
	JLT	LOOP
	STA	TOTAL
	RSUB	
TABLE	RESW	2000
COUNT	RESW	1
ZERO	WORD	0
TOTAL	RESW	1
	END	FIRST

(10 Marks)

- 3 a. Distinguish between literal and immediate operands. How does the assembler handle the literal operand? (06 Marks)
- b. Explain the absolute and relative expression? How these are processed by an assembler? (06 Marks)
- c. Explain how multipass assembler handles the following forward reference (08 Marks)

1	HALFSZ	EQU	MAXLEN/2
2	MAXLEN	EQU	BUFEND - BUFFER
3	PREVIST	EQU	BUFFER - 1
4	BUFFER	RESB	4096
5	BUFEND	EQU	*

Assume that when assembler reaches line no.4, location counter contains 1034 (Hex).

- 4 a. Explain the functions of loader. Also write an SIC /XE ALP for boot strap loader. (08 Marks)
 b. Explain the various data structures used for a linking loader? (06 Marks)
 c. Discuss the different loader options, with an example each. (06 Marks)

PART – B

- 5 a. What is an interactive editor? Explain briefly structure of a typical editor, with help of suitable block diagram (10 Marks)
 b. Explain the functions and capabilities of an interactive debugging system. (06 Marks)
 c. Write a note on user – interface criteria. (04 Marks)
- 6 a. Explain the various data structures used in the implementation of macroprocessors. (08 Marks)
 b. Describe the concatenation of macro processors. (04 Marks)
 c. Using the following definition, expand the following macro invocation statements.
 i) RDBUFF F2, BUFFER, LENGTH, (00, 03, 04)
 ii) RDBUFF F1, BUFFER, LENGTH, (04, 12)

RDBUFF	MACRO	&INDEV, &BUFADR, &RECLTH, &EOR %
&EORCT	SET	NITEMS (&EOR)
	CLEAR	X
	CLEAR	A
	+LDT	#4096
\$LOOP	TD	=X '&INDEV'
	.JEQ	\$LOOP
	RD	= X '&INDEV'
&CTR	SET	1
	WHILE	(&CTR LE &EORCT)
	COMP	=X '0000 &EOR [&CTR]
	JEQ	\$EXIT
&CTR	SET	&CTR + 1
	ENDW	
	STCH	&BUFADR, X
	TIXR	T
	JLT	\$LOOP
\$EXIT	STX	&RECLTH
	MEND	

(08 Marks)

- 7 a. Explain the structure of a LEX program? (06 Marks)
 b. What is a regular expression? Explain the following characters that form regular expression with example each?
 i) [] ii) { } iii) \. (08 Marks)
 c. Write is LEX program to count the number of vowels and consonants in a given string. (06 Marks)
- 8 a. What is shift – reduce parsing? Explain the processing of input “fred = 14 + 23 – 11” and represent it, using parse tree. (10 Marks)
 b. Write YACC program to evaluate the arithmetic expression. Consider all possible cases. (08 Marks)
 c. Explain the use of rule’s action? (02 Marks)

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06CS53

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

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Define an operating system. Discuss its role with respect to user and system viewpoints. (06 Marks)
 b. Briefly explain the clustered systems and real time systems. (04 Marks)
 c. Define a virtual machine. With a neat sketch, explain the working of a virtual machine. What are the benefits of virtual machine? (10 Marks)
- 2 a. What is a process? With a state diagram, explain states of a process. Also write the structure of process control block. (08 Marks)
 b. Discuss the three common ways of establishing relationship between user and kernel threads. (06 Marks)
 c. For the following set of processes, find the average waiting time and average turn around time along with Gantt chart illustrations for
 i) Shortest remaining time first ii) Preemptive priority scheduling algorithms (06 Marks)

Process	Burst time	Arrival time	Priority
P ₁	6	2.0	5
P ₂	4	0.0	4
P ₃	7	1.6	3
P ₄	2	1.0	1
P ₅	1	0.4	2

- 3 a. Define mutual exclusion and critical section. Write the software solution for 2 – process synchronization. (07 Marks)
 b. What is semaphore? Explain how it can be used to solve the producer – consumer problem. (07 Marks)
 c. Explain the solution to dining philosopher problem using monitors. (06 Marks)
- 4 a. Define the necessary and sufficient conditions for deadlock to occur. (04 Marks)
 b. Consider the following snapshot of a system:

Process	Allocated resources			Maximum requirements			Total resources		
	R ₁	R ₂	R ₃	R ₁	R ₂	R ₃	R ₁	R ₂	R ₃
P ₁	2	2	3	3	6	8	7	7	10
P ₂	2	0	3	4	3	3			
P ₃	1	2	4	3	4	4			

- i) What is the content of need matrix?
- ii) Is the system in a safe state?
- iii) If the following requests are made, can they be satisfied /granted immediately in the current state : P₁ requests for (1, 1, 0)
 P₃ requests for (0, 1, 0) resources additionally. (10 Marks)
- c. Given three processes A, B and C, 3 resources X, Y and Z and the following events :
 i) A requests X ii) A requests Y iii) B requests Y iv) B requests Z
 v) C requests Z vi) C requests X vii) C requests Y.

Assume the requested resource is always allocated to requesting process if it is available. Draw the resource allocation graph (RAG) for the sequence (2, 6, 3, 5, 1, 4 and 7). Also mention if deadlock occurs. If so, how do you recover from the deadlock? (06 Marks)

PART – B

- 5 a. Explain with illustrations, the internal and external fragmentation problem encountered in contiguous memory allocation. (06 Marks)
- b. Explain the concept of forward – mapped page table. (06 Marks)
- c. Consider the following sequence of memory references from a 460 word program.
10, 11, 104, 170, 73, 309, 185, 245, 246, 434, 458, 364
- i) Show the reference string assuming page size of 100 words
- ii) Find page fault rate for the above reference string assuming 200 words of primary memory available and FIFO and LRU replacement algorithms. (08 Marks)
- 6 a. Describe the different access methods on files. (09 Marks)
- b. Explain the concept of file mounting. (05 Marks)
- c. With neat sketch, explain the linked file allocation and indexed file allocation methods. (06 Marks)
- 7 a. A drive has 5000 cylinders numbered 0 to 4999. The drive is currently serving a request at 143 and previously serviced a request at 125. The queue of pending requests in FIFO order is : 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 starting from current head position, what is total distance traveled(in cylinders) by disk arm to satisfy the requests using FCFS, SSTF, SCAN and look algorithms. (10 Marks)
- b. Explain the access matrix model of implementing protection in operating system. (10 Marks)
- 8 a. Explain the different system components of LINUX operating system. (10 Marks)
- b. Discuss the interprocess communication facility in LINUX operating system. (10 Marks)

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06CS54

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

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Define the following terms :
 i) Database ii) Canned Transactions iii) Data model iv) Meta data v) Database designer. (10 Marks)
 b. List advantages of DBMS over traditional file systems. Briefly explain them. (10 Marks)
- 2 a. Define the following, with an example
 i) Weak entity type ii) participation constraints iii) cardinality ratio iv) Ternary relationship v) recursive relationship. (10 Marks)
 b. List the summary of the notations for ER diagrams. Include symbols used in ER diagrams and their meaning. (10 Marks)
- 3 a. Discuss the characterisation of a relation, with example. (06 Marks)
 b. Define referential integrity constraint. Explain the importance of referential integrity constraint. (06 Marks)
 c. Briefly discuss the different typer of update operations on relational database. Show an example of a violation of the referential integrity in each of the update operations. (08 Marks)
- 4 a. Given the schema
 EMP(Fname, Lname, SSN, Bdate, Address, Sex, salary, super SIN, Dno.)
 DEPT(Dname, Dnumber, Mgr SSN, Mgrestartdate)
 DEPT_LOC(Dnumber, Dloc), PROJECT(Pname, Pnumber, Ploc, Dnum), works_on (ESSN, Pno, Hours) DEPENDENT (ESSN, Dep_name, Sex, Bdate, relation) give the relation algebra expression for the following :
 List female employees from Dno = 20 earning more than 50000
 List 'CSE' department details
 Retrieve the first name, last name and salary of all employees also work in department no 50
 Retrieve the name of the manager of each department
 Retrieve the name and address of all employees who work for the sport department
 Retrieve the names of employer who have no dependents. (12 Marks)
 b. Explain the ALTER TABLE command? Explain how a new constraint can be added and also an existing constraint can be removed, using suitable examples. (08 Marks)

PART – B

- 5 a. Explain the syntax of a SELECT statement in SQL. Write the SQL query for the following relation algebra expression $\pi_{Bdate, Address} (\sigma_{fname = 'John' \text{ AND } Minit = 'B' \text{ AND } Lname = 'SMITH'} (\text{Employee}))$ (06 Marks)
 b. Explain DROP command, with an example. (04 Marks)
 c. Write a note on aggregate functions in SQL, with example. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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- 6 a. What is functional dependency? Write an algorithm to find a minimal cover for a sets of functional dependencies. (10 Marks)
b. What is embedded SQL? With an example, illustrate how would you connect to a data base, fetch records and display. Also explain the concept of stored procedures, in brief. (10 Marks)
- 7 a. Define multivalued dependency. Explain 4NF, with an example. (10 Marks)
b. Define JOIN dependency. Explain 5NF, with an example. (10 Marks)
- 8 a. Briefly discuss the two phase locking protocol used in concurrency control. (10 Marks)
b. Write a short note on :
i) Transaction support in SQL
ii) Write ahead los protocol. (10 Marks)

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06CS55

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

Time: 3 hrs.

Max. Marks:100

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

PART – A

1.
 - a. What are different modes of communication? (04 Marks)
 - b. What are four fundamental characteristics on which the effectiveness of a data communication depends on? (06 Marks)
 - c. What is protocol? What are its key elements? (02 Marks)
 - d. Briefly describe OSI reference model and differentiate with TCP/IP. (08 Marks)

2.
 - a. Write a short note on line coding schemes. (04 Marks)
 - b. Explain delta modulation technique used in analog to digital conversion. (06 Marks)
 - c. List three causes for transmission impairment. (02 Marks)
 - d. Define Nyquist bit rate and Shannon capacity. What are the propagation time and the transmission time for a 2.5 Kbyte message, if the bandwidth of the network is 1 Gbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 m/s. (08 Marks)

3.
 - a. The power of a signal is 10 mw and the power of the noise is $1 \mu\text{w}$ (microwatts), What are the values of SNR and SNR_{dB} . (04 Marks)
 - b. A network with bandwidth of 10 Mbps can pass only an average of 12,000 frames per minutes with each frame carrying an average of 10,000 bits. What is the through put of this network? (02 Marks)
 - c. What is multiplexing? With neat diagram, explain FDM. (06 Marks)
 - d. What is TDM? A 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. (08 Marks)

4.
 - a. Describe the physical and transmission characteristic of the following :
 - i) Coaxial cable
 - ii) Fiber optic cable, with neat diagram. (08 Marks)
 - b. Define hamming distance and CRC. (02 Marks)
 - c. Distinguish between radio waves and infrared waves. (04 Marks)
 - d. What is CRC? Explain with suitable example. (06 Marks)

PART – B

5.
 - a. Explain salient features of
 - i) Stop -and - wait protocol (08 Marks)
 - ii) Go – back – N ARQ. (06 Marks)
 - b. Explain briefly point – to – point protocol. (06 Marks)
 - c. Differentiate between character oriented and bit oriented format for framing. (06 Marks)

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- 6 a. What is channelization? Explain CDMA. (06 Marks)
b. What is random access? Explain following random access protocols.
i) Slotted ALOHA (08 Marks)
ii) CSMA/ CD. (06 Marks)
c. Describe the MAC layers in IEEE 802.11 standard. (06 Marks)
- 7 a. Explain the hidden and exposed station problem in IEEE 802.11. (08 Marks)
b. Describe frame format for IEEE 802.3 MAC frame format. (06 Marks)
c. In brief explain Bluetooth layers. (06 Marks)
- 8 a. With neat diagram, describe cellular telephony network. (06 Marks)
b. Explain briefly SONET/ SDH protocol. (06 Marks)
c. What is ATM and its design goals. Explain ATM architecture, with neat diagram. (08 Marks)

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06CS56

**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 automata and discuss why study automata. (06 Marks)
- b. Write the DFA's for the following languages over $\Sigma = \{a, b\}$
 - i) {set of all string having two consecutive a's}
 - ii) $L = \{w : |w| \bmod 3 = 0\}$
 - iii) $L = \{awa : w \in (a + b)^*\}$. (08 Marks)
- c. Define NFA convert the following NFA to its equivalent DFA. (06 Marks)

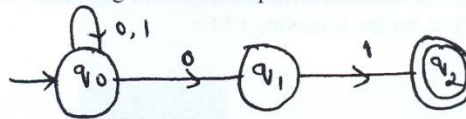


Fig.Q.1(c)

- 2 a. Write regular expression for the following languages:
 - i) {strings of a's and b's having two consecutive a's}
 - ii) {strings of a's and b's whose 3rd symbol from right end is a}
 - iii) $L = \{w : |w| \bmod 3 = 0\}$. (06 Marks)
- b. Obtain a regular expression for the DFA shown below using Kleen's theorem. (10 Marks)

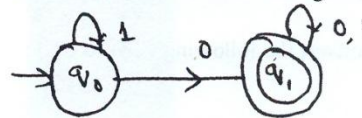


Fig.Q.2(b)

- c. Obtain an ϵ - NFA for the regular expression $a^* + b^* + c^*$. (04 Marks)
- 3 a. State and prove pumping lemma for regular languages. (08 Marks)
 - b. Show that the language $L = \{w | n_a(w) = n_b(w)\}$ is not regular. (04 Marks)
 - c. Minimize the following DFA using table filling method. (08 Marks)

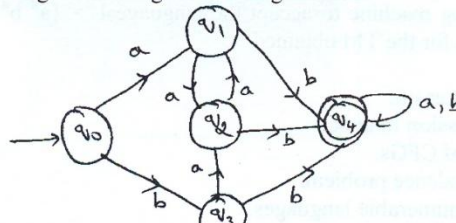


Fig.Q.3(c)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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- 4 a. Write CFG for the following languages:
 i) $L = \{\text{set of all non-palindromes over } \{a, b\}\}$
 ii) For the regular expression $(011 + 1)^*(01)$. (06 Marks)
- b. Consider the following grammar G,
 $S \rightarrow aAS \mid a$
 $A \rightarrow SbA \mid SS \mid ba$
 Obtain : i) LMD; ii) RMD; iii) Parse tree for LMD; iv) Parse tree for RMD for the string aabbaa. (08 Marks)
- c. Show that the following grammar is ambiguous.
 $S \rightarrow iCtS \mid iCtSeS \mid a$
 $C \rightarrow b$. (06 Marks)

PART – B

- 5 a. Define PDA. Design PDA for the language $L = \{wCw^R, w \in (a + b)^*\}$. Show that ID's for the string abcba and also write the transition diagram. (12 Marks)
- b. Obtain a PDA for the following CFG:
 $S \rightarrow SS$
 $S \rightarrow aSb$
 $S \rightarrow bSa$
 $S \rightarrow t$. (08 Marks)
- 6 a. Remove useless symbols from the following grammar:
 $S \rightarrow aA \mid \beta$
 $A \rightarrow aA \mid a$
 $B \rightarrow bB$
 $D \rightarrow ab \mid Ea$
 $E \rightarrow ac \mid d$. (08 Marks)
- b. Define CNF. Convert the following CFG to CNF:
 $E \rightarrow E + E$
 $E \rightarrow E * E$
 $E \rightarrow (E)$
 $E \rightarrow id$. (08 Marks)
- c. Prove that context tree languages are closed under union operation. (04 Marks)
- 7 a. Define turing machine and multitape turing machine. Show that the languages accepted by these machines are same. (08 Marks)
- b. Design a turing machine to accept the language $L = \{a^n b^n c^n / n \geq 1\}$. Give the graphical representation for the TM obtained. (12 Marks)
- 8 Write short notes on:
 a. Regular expression in unix.
 b. Applications of CFGs.
 c. Post correspondence problem.
 d. Recursively enumerable languages. (20 Marks)
