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10IS51

Fifth Semester B.E. Degree Examination, June/July 2017

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. List and explain all FAQ's about software engineering. **(08 Marks)**

b. Explain four professional and ethical responsibilities of a software engineer. **(04 Marks)**

c. Explain:
i) Socio-technical systems
ii) People and computer systems
iii) Legacy systems **(08 Marks)**

2 a. With neat diagram explain insulin pump structure and dimensions of dependability. **(06 Marks)**

b. What are software process models? Explain with neat diagram the water fall model. **(07 Marks)**

c. What is process iteration? Explain Boehm's spiral model of the software process. **(07 Marks)**

3 a. Differentiate functional and non-functional requirements. And with neat diagram, explain types of non-functional requirements. **(08 Marks)**

b. Tabulate the structure of requirements document. **(04 Marks)**

c. Explain four steps in spiral modal of requirements elicitation and analysis process. And brief requirements validation and management. **(08 Marks)**

4 a. Enumerate the concepts of behavioural modeling, data modeling and object modeling. **(08 Marks)**

b. Explain six project management activities. **(04 Marks)**

c. Draw the activity network and activity bar chart for the following task durations and dependencies. **(08 Marks)**

Rask	Duration (days)	Dependencies
T_1	8	
T_2	15	
T_3	15	T_1 (M_1)
T_4	10	
T_5	10	T_2, T_4 (M_2)
T_6	05	T_1, T_2 (M_3)
T_7	20	T_1 (M_1)
T_8	25	T_4 (M_5)
T_9	15	T_3, T_6 (M_4)
T_{10}	15	T_5, T_7 (M_7)
T_{11}	07	T_9 (M_6)
T_{12}	10	T_{11} (M_8)

PART – B

5 a. What are the 3 complementary architectural styles covering the overall system organization? **(10 Marks)**

b. Explain five different stages in an object oriented design process. **(10 Marks)**

6 a. Describe the principles of agile methods. **(05 Marks)**

b. Summarize the practices involved in the extreme programming. **(07 Marks)**

c. Describe Lehman's laws and legacy system evolution. **(08 Marks)**

7 a. Explain V-model for test plans as a link between development and testing. **(08 Marks)**

b. What are the two phases of testing process? Explain system testing and component testing. **(12 Marks)**

8 a. What is the role of organization in selecting staff and motivating people? **(06 Marks)**

b. With neat diagram, explain the P-CMM and cost estimation techniques. **(14 Marks)**

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10CS52

Fifth Semester B.E. Degree Examination, June/July 2017
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. Calculate the target address and value loaded into register A for the following machine instructions. **(10 Marks)**

i) 0310C303
ii) 03C300
iii) 022030
iv) 010030
v) 032600.

if (B) = 6000, (PC) = 3000, (X) = 90,

Memory location	Contents
3030	3600
3600	103000
6390	C303
C303	3030

b. Differentiate between system software and application software. **(05 Marks)**

c. Explain the registers and addressing modes of SIC machine architecture. **(05 Marks)**

2 a. Generate the complete object program for the following assembly level 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
```

Assume : LDX = 04, LDA = 00, ADD = 18, TIX = 2C, JLT = 38, STA = 0C RSUB = 4C **(10 Marks)**

b. Explain the program relocation with an example. **(10 Marks)**

3 a. Explain the structure of load and go assembler. **(10 Marks)**

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

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

4 a. What is dynamic loading? Explain the process of loading and calling of subroutines using dynamic binding. **(10 Marks)**

b. What is relocating loader? Explain the creation of object program with relocation by bit mask. **(10 Marks)**

PART – B

5 a. Explain briefly structure of a typical editor with the help of suitable block diagram. **(10 Marks)**

b. Explain different debugging functions and capabilities. **(10 Marks)**

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

b. Explain the data structures involved in macro-processor algorithm. **(05 Marks)**

c. Explain the features of MASM macro-processor. **(05 Marks)**

7 a. Explain the structure of a lex program with an example. **(08 Marks)**

b. Explain yylex ( ) and yywrap( ) functions. **(04 Marks)**

c. Write a Lex program to count the number of characters, words, spaces and lines in a given input file. **(08 Marks)**

8 a. Write a yacc program to accept the grammar $a^n b^n$ where $n \geq 0$. **(10 Marks)**

b. Write a short note on Parser – Lexer communication. **(05 Marks)**

c. Explain the following functions : **(05 Marks)**

i) yyparse
ii) yytext
iii) atoi
iv) yylval
v) yyerror.

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10CS53

Fifth Semester B.E. Degree Examination, June/July 2017
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. What is operating system? Explain multiprogramming and time sharing systems. **(06 Marks)**

b. Explain dual mode operation in OS with a neat block diagram. **(04 Marks)**

c. What are system calls? Briefly point out its types. **(04 Marks)**

d. What are virtual machines? Explain with block diagram. Point out its benefits. **(06 Marks)**

2 a. Why is it important for the scheduler to distinguish I/O bound programs from CPU bound programs? **(02 Marks)**

b. What is interprocess communication? Explain its types. **(06 Marks)**

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

Process	Burst time	Priority
P_1	10	3
P_2	1	1
P_3	2	3
P_4	1	4
P_5	5	2

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5 all at time 0.

(i) Draw the Gantt charts for the following scheduling algorithms, FCFS, SJF and RR (quantum = 1)

(ii) Find out turn around time and waiting time of each process for each of these scheduling algorithm and also find out average turn around time and average waiting time. **(12 Marks)**

3 a. Define Semaphores. Explain its usage and implementation. **(06 Marks)**

b. What are monitors? Explain its usage and implementation. **(08 Marks)**

c. Explain Dining philosophers solution using monitors. **(06 Marks)**

4 a. What are deadlocks? What are its characteristics? **(05 Marks)**

b. Consider the following snapshot of a 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				

(i) Find out need matrix. **(02 Marks)**

(ii) If a request from process P_1 arrived for (0, 4, 2, 0) can the request be granted immediately? **(02 Marks)**

(iii) Is the system in a safe state? **(06 Marks)**

c. Explain the process of recovery from deadlock. **(05 Marks)**

PART – B

5 a. Explain the multistep processing of a user program with a neat block diagram. **(05 Marks)**

b. Distinguish between internal and external fragmentation. **(02 Marks)**

c. Explain segmentation with an example. **(06 Marks)**

d. Consider the following segment table:

Segment	Base	Length
0	219	600
1	2300	14
2		
90	100	
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses?

(i) 0, 430 (ii) 1, 10 (iii) 2, 500 (iv) 3, 400 (v) 4, 112 **(07 Marks)**

6 a. Explain briefly the various operations performed on files. **(06 Marks)**

b. Explain the various access method of files. **(06 Marks)**

c. Explain various allocation methods in implementing file systems. **(08 Marks)**

7 a. Explain the various Disk Scheduling algorithms with example. **(10 Marks)**

b. Point out and explain briefly the problems with RAID. **(05 Marks)**

c. Explain Access Matrix method of system protection. **(05 Marks)**

8 a. Explain the various components of a Linux system. **(06 Marks)**

b. Explain process scheduling in a linux system. **(06 Marks)**

c. Explain file systems implementation in linux. **(08 Marks)**

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10CS54

Fifth Semester B.E. Degree Examination, June/July 2017
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. Discuss the main characteristics of the database approach. How does it differ from traditional file system? **(08 Marks)**

b. With a neat diagram, explain the component modules of DBMS and their interactions. **(08 Marks)**

c. Define i) Snapshot ii) Metadata iii) Intention iv) Database. **(04 Marks)**

2 a. Design an ER diagram for an employee database with atleast four entities considering all the constraints. **(08 Marks)**

b. What are the structural constraints on a relationship type? Explain with examples. **(04 Marks)**

c. Define i) Primary key ii) Weak entity type iii) Candidate key iv) Recursive relationship with an example. **(08 Marks)**

3 a. Explain Explicit or Schema based constraint on relational model. **(06 Marks)**

b. Discuss any 4 relational algebra operations with examples. **(08 Marks)**

c. Consider the following schema :
Sailors (Sid, Sname, rating, age)
Boats (bid, bname, color)
Reserves (Sid, bid, day)
Write the queries in relational algebra.
i) Find the names of sailors who have reserved boat no '103'.
ii) Names of Sailors who have reserved red and green boat. **(06 Marks)**

4 a. Explain the different constraints that can be applied during table creation in SQL with example. **(06 Marks)**

b. Explain how group by clause works. What is the difference between where and having clause. **(04 Marks)**

c. Consider the following schema and write the SQL queries :
Emp (SSN, name, Addr, Sal, Sex, Dno)
Dep (Dno, Dname, Mgrssn)
DeptLoCN(Dno, DLocn)
Proj (Pno, Pname, Plocn, Dno)
Workson (SSN, Pno, Nohrs)
Dependent (SSN, Deptname, Depntsex, Depnt Relationship)
i) Retrieve the managername with atleast one dependent.
ii) Retrieve the Pno, Pname, no of hrs works done on each project.
iii) Retrieve the Pname which are controlled by 'Research' dept.
iv) Retrieve employee name who works for dept no 10 and have a daughter.
v) Retrieve the employee name who work on any project that Kumar works. **(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. State the informal guidelines for relational schema design. **(06 Marks)**

b. Define First, Second and Third normal forms by taking an example. **(08 Marks)**

c. What are the inference rules on FDs? How they are useful? Explain with examples. **(06 Marks)**

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

b. Define Multivalued dependency. Explain 4NF with an example. **(08 Marks)**

c. Consider R = {A, B, C, D, E, F}
FDS { AB → CD ; D → CF , B → F , BYD → F , D → F , DE → F}
What is the key of R? Find an irreducible cover for this set of FD's. **(06 Marks)**

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

b. Briefly discuss the two phase locking protocol used in concurrency control. **(08 Marks)**

c. Briefly explain the recovery process. **(06 Marks)**

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10CS55

Fifth Semester B.E. Degree Examination, June/July 2017
Computer Networks – I

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define protocol. List and explain key elements of a protocol. **(05 Marks)**

b. With a necessary diagram correlate TCP/IP with layers of OSI model. **(10 Marks)**

c. List and explain different addresses in TCP/IP. **(05 Marks)**

2 a. The signal-to-noise ratio is often given in decibels. Assume that $SNR_{dB} = 36$ and the channel bandwidth is 2 MHz. Calculate the channel capacity. **(06 Marks)**

b. Define line coding. Describe RZ encoding by applying on the information sequence 01001001. **(08 Marks)**

c. Distinguish between parallel and serial transmission. List and explain different ways of serial transmission. **(06 Marks)**

3 a. Define spread spectrum and its goal. List and explain two spread spectrum techniques. **(10 Marks)**

b. Compare and contrast a circuit switched network and a packet switched network. **(06 Marks)**

c. List and explain two types of addressing of virtual circuit network. **(04 Marks)**

4 a. Given dataword "1010" and divisor "1011". Using CRC find the codeword. **(06 Marks)**

b. With a necessary diagram, explain structure of the encoder and decoder for Hamming code with 4 bit dataword. **(10 Marks)**

c. Consider the table shown to represent code.

Dataword	Codeword
0	00000
1	01011
2	10111
3	11111

Check whether the code is linear code or non-linear code. **(04 Marks)**

PART – B

5 a. List and explain three types of HDLC frames. How HDLC is different from PPP? **(10 Marks)**

b. Explain the importance of framing and piggybacking technique. **(04 Marks)**

c. Explain simplest protocol with a neat diagram. **(06 Marks)**

6 a. A pure ALOHA network transmits 200 bit frames on a shared channel of 200 kbps. What is the throughput if system produces (i) 1000 frames/sec (ii) 500 frames/sec (iii) 250 frames/sec. **(06 Marks)**

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

c. What is the difference between Unicast, multicast and broadcast address? Define the type of the following destination addresses:

(i) 47 : 20 : 1B : 2E : 08 : EE

(ii) 4A : 30 : 10 : 21 : 10 : 1A

(iii) FF : FF : FF : FF : FF : FF **(06 Marks)**

7 a. Explain different kinds of services defined by IEEE 802.11 architecture. **(10 Marks)**

b. With a neat diagram, explain different categories of connecting devices. **(10 Marks)**

8 a. Draw format of an IPV6 datagram and explain. **(08 Marks)**

b. Explain the concept of tunneling in IPV6 communication. **(04 Marks)**

c. Draw IPV4 header format and explain. **(08 Marks)**

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10CS56

Fifth Semester B.E. Degree Examination, June/July 2017
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. Give Formal definition of DFA. And also Design a DFA to read a string made up of letters "computer" and recognize the strings that contains the word "cut" as a substring. **(10 Marks)**

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

c. Covert the following NFA to DFA **(05 Marks)**

δ	0	1
$\rightarrow q_0$	$\{q_0\}$	$\{q_0, q_1\}$
q_1	q_2	q_2
$*q_2$	ϕ	ϕ

2 a. Consider the following $\in$ – NFA

δ	$\in$	a	b
$\rightarrow$ P	{r}	{q}	{p, r}
q	Φ	{p}	Φ
*r	{p, q}	{r}	{p}

i) Compute the $\in$-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. Describe regular expression recursively. Write the regular expression for the following:
i) Strings of a's and b's that do not end with ab over $\{a, b\}^*$
ii) String of 0^s and 1^s such that starts and ends with the same symbol. **(06 Marks)**

c. Obtain regular expression from the following DFA using state elimination method. **(06 Marks)**

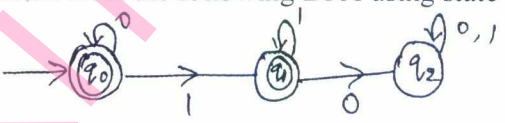

Fig Q2(c)

3 a. State and prove pumping lemma for regular languages. **(05 Marks)**

b. Prove that if L is a regular language so L^R. **(05 Marks)**

c. Minimize the following DFA using table filling Algorithm. **(10 Marks)**

δ	0	1
$\rightarrow$ A	B	E
B	C	F
*C	D	H
D	E	H
E	F	I
*F	G	B
G	H	B
H	I	C
*I	A	E

4 a. Define context free grammar. Write a CFG for palindromes over $\{0, 1\}^*$. **(05 Marks)**

b. What is ambiguous grammar? Show that following grammar is ambiguous for the string "abababa". $S \rightarrow Sbs|a$ **(05 Marks)**

c. What is inherent ambiguity? Explain with an example. **(05 Marks)**

d. Explain the application of CFG with respect to parsers. **(05 Marks)**

PART – B

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

b. Design a PDA for accepting the language $L = \{0^{2n}1^n | n \geq 1\}$. Draw the transition diagram for PDA obtained. Show the instantaneous description of the PDA for the string "000011". **(10 Marks)**

c. Convert the following grammar to PDA **(05 Marks)**

$I \rightarrow a|b|I_a|I_b|I_0|I_1$

$E \rightarrow I|E*E|E+E|(E)$.

6 a. Consider the following grammar

$S \rightarrow ASA|aB$

$A \rightarrow B|S$

$B \rightarrow b|E$

i) Eliminate E - production

ii) Eliminate any unit productions in the resulting grammar

iii) Eliminate any useless symbols in the resulting grammar

iv) Put the resulting grammar in to CNF. **(10 Marks)**

b. Show that $L = \{ 0^n1^n2^n | n \geq 1 \}$ is not context free. **(06 Marks)**

c. Prove that CFL are closed under union operation. **(04 Marks)**

7 a. Design a Turing machine to accept the Language $L = \{ a^n b^n c^n | n \geq 1\}$. Give the graphical representation for the Turing machine obtained. **(12 Marks)**

b. Define a Turing machine. Show that a multitape Turing machine is equivalent to a basic Turing machine. **(08 Marks)**

8 Write short notes on :

a. Recursively Enumerable Language

b. Post correspondence problem

c. Languages of PDA

d. Applications of regular expression. **(20 Marks)**

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