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10IS51

**Fifth Semester B.E. Degree Examination, June/July 2016**  
**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. What are the attributes of good software? Explain the key challenges facing in software engineering. (08 Marks)
- b. What are emergent system properties? Give the example for each. (06 Marks)
- c. Describe the general model of design process. (06 Marks)
  
- 2 a. What are critical systems, with its types? Explain. (08 Marks)
- b. With the neat diagram, explain water fall model. (06 Marks)
- c. Explain the requirement engineering process with its four phases. (06 Marks)
  
- 3 a. Define and differentiate functional and non functional requirements. (06 Marks)
- b. Write IEEE standard format for requirement documentation. (06 Marks)
- c. What is requirement Elicitation and analysis? (04 Marks)
- d. Write short note on Ethnography. (04 Marks)
  
- 4 a. Explain data flow model with an example of insulin pump. (08 Marks)
- b. Define object model and explain object aggregation. (04 Marks)
- c. Explain different section of project plan and define milestones and deliverables. (08 Marks)

**PART – B**

- 5 a. Explain the architectural design decision. (06 Marks)
- b. Explain : i) Repository model                      ii) Layered model (06 Marks)
- c. Explain object oriented design process with example of weather mapping system of the layered architecture. (08 Marks)
  
- 6 a. What are agile methods? Discuss the principles of agile method. (06 Marks)
- b. Explain the Lehman's laws. (04 Marks)
- c. Explain the steps involved in reengineering process with a neat diagram. (10 Marks)
  
- 7 a. Define validation and verification and explain two complementary approaches to system checking and analysis. (04 Marks)
- b. Explain clean room software development process with neat diagram. (08 Marks)
- c. Explain interface testing with neat diagram. (08 Marks)
  
- 8 a. Explain the factors governing staff selection. (10 Marks)
- b. Write short notes on group communication. (04 Marks)
- c. Explain briefly the algorithmic cost modeling and write the difficulties. (06 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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10CS52

**Fifth Semester B.E. Degree Examination, June/July 2016**  
**System Software**

Time: 3 hrs.

Max. Marks:100

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

**PART – A**

1.
  - a. Bring out the differences between system software and application software, with examples. (05 Marks)
  - b. Write the program in both SIC and SIC/XE to copy a character string 'SYSTEM SOFTWARE' to another character string. (05 Marks)
  - c. Briefly explain the SIC/XE machine architecture. (10 Marks)
2.
  - a. Write and explain the algorithm for a pass – 1 of two – pass assembler. (08 Marks)
  - b. Explain the data structures used in assembler algorithms. (04 Marks)
  - c. Generate the object code for the source program given below :

WRREC	START	105D
	CLEAR	X
	LDT	LENGTH
WLOOP	TD	OUTPUT
	JEQ	WLOOP
	LDCH	BUFFER, X
	WD	OUTPUT
	TIXR	T
	JLT	WLOOP
	RSUB	
OUTPUT	BYTE	X '05'
BUFFER	RESB	400
LENGTH	RESB	2
	END	WRREC

CLEAR = B4, LDT = 74, TD = E0, JEQ = 30, LDCH = 50, WD = DC, TIXR = B8,  
JLT = 38, RSUB = 4C, X = 1 T = 5. (08 Marks)

3.
  - a. Differentiate between literal and immediate operand with example. (05 Marks)
  - b. Discuss different design options of assembler. (10 Marks)
  - c. What are control sections? How are they processed? (05 Marks)
4.
  - a. What is loader? What are its advantages and disadvantages? Explain the boot strap loader, with algorithm. (10 Marks)
  - b. Explain the two design options of loaders. (10 Marks)

**PART – B**

5.
  - a. List the task performed by document linking process in an interactive system. (04 Marks)
  - b. Explain the structure of a text editor with a neat diagram. (10 Marks)
  - c. Explain the functions and capabilities of an interactive debugging system. (06 Marks)

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- 6 a. Explain the data structures involved in macro-processor algorithm. (06 Marks)  
b. Briefly explain the machine – independent macro-processor features. (10 Marks)  
c. Write a note on MASM macro-processor. (04 Marks)
- 7 a. Explain the structure of a LEX program with example. (06 Marks)  
b. What is regular expression? Explain any 8 characteristics that form a regular expression. (08 Marks)  
c. List any 3 LEX – YACC variables and functions. (06 Marks)
- 8 a. Write a YACC program to recognize an arithmetic expression involving operations +, –, \*, /. (08 Marks)  
b. What is shift reduce parsing? Explain with an example. (06 Marks)  
c. Differentiate between LEX and YACC. (06 Marks)

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**Fifth Semester B.E. Degree Examination, June/July 2016**  
**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. List and explain the functions and services of an operating system and OS operations. (08 Marks)
- b. What are virtual machines? Explain VM-WARE architecture with a neat diagram. (08 Marks)
- c. Differentiate between multiprogramming, multiprocessing and multitasking systems. (04 Marks)
- 2 a. Explain process states with state transition diagram. Also explain PCB with a neat diagram. (08 Marks)
- b. What is IPC? Explain Direct and Indirect communication with respect to message passing systems. (05 Marks)
- c. Consider the following set of process with arrival time and Burst time.  
A LARGER priority number has a higher priority

Jobs	Arrival Time ms	Burst Time ms	Priority
J <sub>1</sub>	0	6	4
J <sub>2</sub>	3	5	2
J <sub>3</sub>	3	3	6
J <sub>4</sub>	5	5	3

Draw the Gantt chart and calculate waiting time and turnaround time using

- i) FCFS    ii) Pre-emptive priority scheduling algorithm. (07 Marks)
- 3 a. What are semaphores? Explain Binary and counting semaphores with an example. (05 Marks)
- b. What do you mean by RACE? Explain Readers – writer's problem with semaphore in detail. (08 Marks)
- c. What are monitors? Explain with a neat diagram how monitors are used to solve bounded buffer problem. (07 Marks)
- 4 a. What is a dead lock? What are necessary conditions an OS must satisfy for a deadlock to occur? (05 Marks)
- b. What are the different methods to handle deadlocks? Also explain Deadlock prevention and deadlock avoidance. (06 Marks)
- c. For the following snapshot. Find the safe sequence using Banker's algorithm.

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P <sub>0</sub>	0	0	2	0	0	4	1	0	2
P <sub>1</sub>	1	0	0	2	0	1			
P <sub>2</sub>	1	3	5	1	3	7			
P <sub>3</sub>	6	3	2	8	4	2			
P <sub>4</sub>	1	4	3	1	5	7			

- i) Is the system in safe state?
- ii) If a request from process P<sub>2</sub> arrives for (002), can the request be granted immediately? (09 Marks)

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**PART – B**

- 5 a. What are Translation load aside buffers (TLB)? Explain TLB in detail with a simple paging system with a neat diagram. (08 Marks)
- b. Given the memory partitions of 100K, 500K, 200K, 300K, and 600K apply First fit and Best fit algorithm to place 212K, 417K, 112K, 426K. (04 Marks)
- c. Consider the following page reference string 70120304230321201701 for a memory with three (03) Frames. How many page Faults occur for LRU and FIFO page replacement algorithms? Which is efficient among both? (08 Marks)
- 6 a. What is a file? Explain in detail different allocation methods. (08 Marks)
- b. What are directories? List different types of directory structures with examples. Mention their advantages and disadvantages. (08 Marks)
- c. Explain how free space is managed. (04 Marks)
- 7 a. Let a disk drive has 5000 cylinders from 0 to 4999. Currently drive is at 143<sup>rd</sup> cylinder, and the previous request was at cylinder 125. Queue of pending request in FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. What is the total distance the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms from current position i) FCFS ii) SCAN iii) LOOK. (12 Marks)
- b. What is protection? Distinguish between mechanism and policies. Explain briefly Access matrix with domains as objects. (08 Marks)
- 8 a. With a neat diagram explain in detail components of a Linux system. (07 Marks)
- b. Explain the different IPC mechanisms available in Linux in detail. (08 Marks)
- c. Explain process scheduling and kernel synchronization in detail. (05 Marks)

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**Fifth Semester B.E. Degree Examination, June/July 2016**  
**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 does defining, manipulating and sharing of a database mean? (06 Marks)
  - b. Discuss the main characteristics of the database approach and how it differs from traditional file systems. (08 Marks)
  - c. Describe the three – schema architecture. What is the difference between logical and physical data Independence? (06 Marks)
- 2**
- a. Differentiate the following :
    - i) Entity and Attribute
    - ii) Entity type and Entity set
    - iii) Strong and weak Entity
    - iv) Recursive relationship and Identifying relationship. (08 Marks)
  - b. A database is being constructed to keep track of the teams and games of a sports league. A team has a number of players, not all of whom participate in each game. It is desired to keep track of the players participating in each game for each team, the positions they played in that game and the result of the game. Design an ER diagram for this application, stating any assumptions you make. Choose your favorite sport (e.g Cricket , Base ball , Football). (12 Marks)
- 3**
- a. Explain the entity integrity and referential integrity constraints. Why each is considered important? (06 Marks)
  - b. Briefly discuss the different types of update operations on a relation. (06 Marks)
  - c. Consider the following relational schema.
 

Emp (eid, ename, age, sal)  
 Works\_for (eid, pid, #hrs)  
 Proj (pid, pname)

 Write the Queries in Relational algebra for the following :
    - i) Retrieve Employee Id and Name of the employees who work for all the projects.
    - ii) Retrieve Name and Age of employees whose salary > 10000.
    - iii) For each employee, get the number of projects and number of hours worked on projects.
    - iv) Retrieve Names of employees working on ‘CSE’ project. (08 Marks)
- 4**
- a. Give the complete syntax of SELECT statement in SQL and discuss all the clauses with examples. (05 Marks)
  - b. What are Aggregate functions in SQL? Explain with examples. (05 Marks)
  - c. Consider the following Relational schema :
 

Lives (Name, Street, City)  
 Works (Name, Cname, Salary)  
 Located (Cname, City)  
 Manager (Name, MGR\_Name)

 Write the Queries in SQL for the following :
    - i) Find the people who earn more than every employee of ‘Canara Bank’.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
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- ii) Find the company employing the most people.
- iii) Find the Name and city of all the people who work for “SBI” and earn more than 55000 rupees.
- iv) Show 20% raise in salary of all managers.
- v) Find the companies located in every city in which “ICICI” is located. (10 Marks)

**PART – B**

- 5 a. Explain Insert, Delete and Update statements in SQL with examples. (06 Marks)  
 b. What are views in SQL? Show how views are specified in SQL. List the advantages of views. (06 Marks)  
 c. Differentiate : i) Trigger and Assertion ii) Embedded and Dynamic SQL  
 iii) Outer join and Self Join iv) Super key and Candidate key. (08 Marks)
- 6 a. What are the informal guidelines for relation schemas? Explain. (06 Marks)  
 b. Define 1NF, 2NF and 3NF with examples. (06 Marks)  
 c. What is BCNF? How it is different from 3NF? Prove that a relation with two attributes is always in BCNF. (08 Marks)
- 7 a. What do you mean by MVD? When does it arise? Define 4NF. (05 Marks)  
 b. Define Join Dependency and 5NF. (05 Marks)  
 c. Let  $R = \{SSN, Ename, Pnumber, Pname, Plocn, Hrs\}$   
 and  $D = \{R_1, R_2, R_3\}$  where  
 $R_1 = Emp = \{SSN, Ename\}$   
 $R_2 = Proj = \{Pnumber, Pname, Plocn\}$   
 $R_3 = Work\_ON = \{SSN, Pnumber, Hrs\}$   
 The following functional dependencies hold on relation R.  
 $F = \{SSN \rightarrow Ename ;$   
 $Pnumber \rightarrow \{Pname, Plocn\} ;$   
 $\{SSN, Pnumber\} \rightarrow Hrs\}.$   
 Prove that above decomposition of relation ‘R’ has the lossless join property. (10 Marks)
- 8 a. What are the problems with concurrency? Explain each with an example. (06 Marks)  
 b. With a neat state transition diagram, discuss the different states of a transaction. (06 Marks)  
 c. Write and explain the Two – phase locking protocol for concurrency control. (08 Marks)

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**Fifth Semester B.E. Degree Examination, June/July 2016**  
**Computer Networks – I**

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 data communication? Explain with neat sketch three types of communications between the devices considering data flow. (06 Marks)
  - b. With sketch, explain two types of wide area network in use. (04 Marks)
  - c. List out the functionalities of physical layer, data link layer and network layer. Explain in brief. (06 Marks)
  - d. Give four levels of addresses used in TCP/IP protocol and give its significances. (04 Marks)
  
2.
  - a. Define the following :
    - i) Frequency shift keying
    - ii) Band width of composite signal
    - iii) Base band transmission
    - iv) Broad band transmission
    - v) SNR
    - vi) Nyquist bit rate. (06 Marks)
  - b. What is latency? List out its components. Find the total delay in a line of length 2000 km, to transfer 5 M bytes of data if band width is 1 Gbps. (04 Marks)
  - c. What is line coding? Draw line code of the sequence 01001110 in NRZ\_L, Manchester, differential Manchester, RZ and AMI coding scheme. (06 Marks)
  - d. Give the block diagram of PCM encoder and state the role of each processes. (04 Marks)
  
3.
  - a. What is multiplexing? Differentiate synchronous TDM with statistical TDM giving the working of both procedures in brief. (06 Marks)
  - b. State and explain the data rate management to handle disparity in input data rates in TDM. (04 Marks)
  - c. Explain in brief FHSS technique. (06 Marks)
  - d. List out the differences between datagram switching and virtual circuit switching. (04 Marks)
  
4.
  - a. What is hamming code? With the structure of the encoder and decoder for hamming code C(7, 4), explain how it can find the error and corrects the same. (06 Marks)
  - b. Find codeword, using cyclic redundancy code given generator 1011, data word 1001 and show how it is used to check for error detection in the receiver side. (08 Marks)
  - c. Write note on error detection method using 16 bit check sum used in internet. Calculate check sum for a text 'Food' given ASCII values of F is 46, o is 6F and d is 64. (06 Marks)

**PART – B**

5.
  - a. With neat sketch, explain two approaches used in variable size framing. (06 Marks)
  - b. What should be send window size in Go-Back-N ARQ? Justify your answer. (06 Marks)
  - c. What are the 3 types of HDLC frames used in HDLC bit oriented protocol? Explain its significance with its structure. Show how that frames can be used for exchange of data using piggy backing. (08 Marks)



- 6 a. With flow diagram, explain the working of CSMA/CD. (08 Marks)  
b. Explain working of CDMA with suitable example. (06 Marks)  
c. Give the details of minimum and maximum length of Ethernet frame. With an example, explain the format of Ethernet address. (06 Marks)
- 7 a. With neat sketch, explain BSS and ESS. (06 Marks)  
b. Explain with necessary sketch IEEE 802.11 addressing mechanism. (08 Marks)  
c. Show two types of networks used in Bluetooth. Explain in brief the same. (06 Marks)
- 8 a. Write note on five classes of address used in IPV4 addressing. Give the details of address space. (10 Marks)  
b. Give the IPV4 datagram format and brief description of each field. (10 Marks)

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**Fifth Semester B.E. Degree Examination, June/July 2016**  
**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 the following with examples: i) Alphabet, ii) String. (04 Marks)
- b. Define DFA. Write the DFA's for the following languages on  $\Sigma = \{a, b\}$ .
  - i) The set of all strings containing the substring 'ab'.
  - ii)  $L = \{\omega \mid |\omega| \bmod 3 = 0\}$  (08 Marks)
- c. Convert the following NFA to its equivalent DFA.



Fig.Q1(c)

(08 Marks)

- 2 a. Define a regular expression. Also write the regular expressions for the following languages.
  - i) The set of all strings ending in the substring '00' on  $\Sigma = \{0, 1\}$
  - ii)  $L = \{a^n b^m \mid n \geq 4, m \leq 3\}$ . (08 Marks)
- b. Prove that every language defined by a regular expression is also defined by a finite automation. (08 Marks)
- c. Write the  $\epsilon$ -NFA for the regular expression  $ab(a + b)^*$ . (04 Marks)
- 3 a. State and prove pumping lemma for regular languages. (07 Marks)
- b. Show that the language  $L = \{a^n b^n \mid n \geq 0\}$  is not regular. (06 Marks)
- c. Minimize the following DFA using table filling algorithm. (07 Marks)

$\delta$	0	1
$\rightarrow q_1$	$q_2$	$q_3$
$q_2$	$q_3$	$q_5$
$*q_3$	$q_4$	$q_3$
$q_4$	$q_3$	$q_5$
$*q_5$	$q_2$	$q_5$

- 4 a. Define CFG. Design CFG's for the following languages:
  - i)  $L = \{a^n b^{2n} \mid n \geq 0\}$
  - ii)  $L = \{\omega \omega^R \mid \omega \in \{a, b\}^*\}$  (08 Marks)
- b. Write the LMD, RMD and parse tree for the string '+\*-xyxy' using the grammar  $E \rightarrow +EE \mid *EE \mid -EE \mid x \mid y$  (06 Marks)
- c. What is an ambiguous grammar? Show that the following grammar is ambiguous:  $E \rightarrow E + E \mid E * E \mid (E) \mid id$  (06 Marks)

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**PART – B**

- 5 a. Define a PDA and explain the working of it with a neat diagram. (05 Marks)
- b. Design a PDA for the language  $L = \{\omega\omega^R \mid \omega \in \{a, b\}^+\}$ . Draw the transition diagram and also write the sequence of ID's for the string 'abba'. (10 Marks)
- c. Convert the following CFG to an equivalent PDA:
- $$S \rightarrow aA$$
- $$A \rightarrow aABC \mid bB \mid a$$
- $$B \rightarrow b$$
- $$C \rightarrow c$$
- (05 Marks)
- 6 a. Eliminate the useless symbols and productions from the following grammar.
- $$S \rightarrow AB \mid AC$$
- $$A \rightarrow aA \mid bAa \mid a$$
- $$B \rightarrow bbA \mid aB \mid AB$$
- $$C \rightarrow aCa \mid aD$$
- $$D \rightarrow aD \mid bC$$
- (07 Marks)
- b. Define CNF and convert the following grammar into CNF.
- $$S \rightarrow ABa$$
- $$A \rightarrow aab$$
- $$B \rightarrow Ac$$
- (06 Marks)
- c. Prove that the family of context-free languages is closed under union, concatenation and star-closure. (07 Marks)
- 7 a. Define a turing machine and explain the working of a basic turing machine with a neat diagram. (08 Marks)
- b. Design a turing machine for the language  $L = \{a^n b^n \mid n \geq 1\}$ . Write the transition diagram for the same and also, indicate the moves made by the turing machine for the input 'aabb'. (12 Marks)
- 8 Write short notes on:
- Multitape turing machine
  - Post's correspondence problem
  - Applications of context-free languages
  - Chomsky hierarchy
- (20 Marks)

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