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10IS51

**Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016**  
**Software Engineering**

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 four important attributes which all software products should have? Explain. (04 Marks)  
b. Explain the system design process with diagram. (06 Marks)  
c. What are legacy systems? Explain the components of legacy system with neat diagram. (10 Marks)
- 2 a. Explain four dimensions of dependability. (04 Marks)  
b. With diagram explain rational unified process. (06 Marks)  
c. What is process iteration? Explain Boehm's spiral model. (10 Marks)
- 3 a. Discuss the problems of using natural language for defining user and system requirements with examples. (10 Marks)  
b. Explain the following : i) Ethnography ii) Scenarios. (10 Marks)
- 4 a. With neat diagram, explain state machine model of a simple microwave oven. (10 Marks)  
b. Refer the following table. Draw an activity chart showing the project schedule. Find the critical path.

Task	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>	T <sub>7</sub>	T <sub>8</sub>	T <sub>9</sub>	T <sub>10</sub>	T <sub>11</sub>	T <sub>12</sub>
Duration (Days)	8	15	15	10	10	5	20	25	15	15	7	10
Dependencies			T <sub>1</sub> (m <sub>1</sub> )		T <sub>2</sub> T <sub>4</sub> (m <sub>2</sub> )	T <sub>1</sub> T <sub>2</sub> (m <sub>3</sub> )	T <sub>1</sub> (m <sub>1</sub> )	T <sub>4</sub> (m <sub>5</sub> )	T <sub>3</sub> T <sub>6</sub> (m <sub>4</sub> )	T <sub>5</sub> T <sub>7</sub> (m <sub>7</sub> )	T <sub>9</sub> (m <sub>6</sub> )	T <sub>11</sub> (m <sub>8</sub> )

(10 Marks)

**PART – B**

- 5 a. Explain with example objects and object class. (04 Marks)  
b. Define concurrent objects. Explain the implementation of concurrent objects. (06 Marks)  
c. Define control styles. Explain event – driven system. (10 Marks)
- 6 a. What is prototype? Explain the process prototype development with diagram. Mention benefits of using prototype. (10 Marks)  
b. Explain Lehman's laws. (10 Marks)
- 7 a. With neat diagram, explain clean-room software development. (10 Marks)  
b. Explain the following : i) Integration testing ii) Release testing. (10 Marks)
- 8 a. Explain the factors of governing staff selection. (10 Marks)  
b. Describe with neat diagram COCOMO II model. (10 Marks)

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10CS52

**Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016**  
**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. Differentiate between system software and application software. (04 Marks)
- b. Explain the instruction formats and addressing modes of SIC/XE machine architecture. (10 Marks)
- c. Write an ALP in SIC/XE to add two arrays of 100 words. (06 Marks)
- 2 a. Explain the different data structures used in designing SIC assembler. (04 Marks)
- b. Discuss pass 2 algorithm of two pass assembler. (10 Marks)
- c. What is program relocation? Explain the problems associated with it and their solutions. (06 Marks)
- 3 a. Explain load and go assembler with an example. (10 Marks)
- b. Explain multipass assembler. (06 Marks)
- c. Give the format for define and refer records. (04 Marks)
- 4 a. What is a loader? Develop an algorithm for a bootstrap loader. (10 Marks)
- b. What is dynamic loading? What are its advantages and disadvantages? Explain with a neat diagram loading and calling of a subroutine using dynamic linking. (10 Marks)

**PART – B**

- 5 a. With a neat diagram, explain the structure of a text editor. (10 Marks)
- b. Explain the features of interactive debugging system. (10 Marks)
- 6 a. Explain any three machine independent macro processor features. (10 Marks)
- b. Write an algorithm for a one pass macro processor. (10 Marks)
- 7 a. What is regular expression? Briefly explain all the characters that form regular expression. (12 Marks)
- b. Write a LEX program to count the number of characters, words, spaces and lines in a given input. (08 Marks)
- 8 a. Write a YACC program to evaluate an arithmetic expression involving operators +, -, \*, /. (08 Marks)
- b. Explain shift reduce parsing with an example. (08 Marks)
- c. Define the following terms: i) yytext, ii) yylval, iii) yylex, iv) yyparse. (04 Marks)

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**Fifth Semester B.E. Degree Examination, Dec.2015/Jan.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. Define an operating system? What is system's viewpoint of an operating system? Explain the dual mode operation of an operating system. (08 Marks)
- b. Explain the types of multiprocessor systems and the types of clustering. What are fault tolerant systems? (06 Marks)
- c. Explain the concept of virtual machines. (06 Marks)
- 2 a. What is a process? Draw and explain the state diagram of a process. Give a note on context switch. (08 Marks)
- b. Consider the following set of processes. Assume the length of the CPU burst time is given in milli seconds.

Process	Arrival Time	Burst Time	Priority
P <sub>1</sub>	0	10	3
P <sub>2</sub>	0	1	1
P <sub>3</sub>	3	2	3
P <sub>4</sub>	5	1	4
P <sub>5</sub>	10	5	2

Draw Gantt charts illustrating the execution of these processes using FCFS and pre-emptive priority scheduling algorithms. Assume highest priority = 1 and lowest priority = 4. Also, calculate average waiting time and average turn around time of both the algorithms. (06 Marks)

- c. Discuss any 3 threading issues that come with multithreaded programs. (06 Marks)
- 3 a. What are semaphores? Explain any three use cases of semaphores. (04 Marks)
- b. Describe an n-process solution to critical section problem which uses test and set ( ) hardware instruction. Prove how this algorithm satisfies all the requirements of critical section problem's solution. (08 Marks)
- c. Discuss how Readers – writers problem can be solved using semaphores. (08 Marks)
- 4 a. With the help of a system model, explain a deadlock and discuss the necessary conditions that must hold simultaneously in a system for a deadlock to occur. (06 Marks)
- b. Using Banker's algorithm determine whether the following system is in a safe state.

Process	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			

If a request from process P<sub>2</sub> arrives for (0 0 2), can the request be granted immediately? (10 Marks)

- c. How is a system recovered from deadlock? (04 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. Discuss paging with an example. (08 Marks)  
b. Consider the following page reference string  
1, 2, 3, 5, 2, 3, 5, 7, 2, 1, 2, 3, 8, 6, 4, 3, 2, 2, 3, 6.  
Assuming there are 3 memory frames, how many page faults would occur in the case of  
i) LRU ii) Optimal Algorithm.  
Note that initially all frames are empty. (06 Marks)  
c. What is thrashing? Explain. (06 Marks)
- 6 a. Explain the different file access methods. (06 Marks)  
b. Describe the various directory structures. (08 Marks)  
c. Write a note on any four different methods for managing free space. (06 Marks)
- 7 a. Suppose the position of cylinder is at 53. The disk drive has cylinders numbered from 0 to 199. The queue of pending request in FIFO order is : 98, 183, 37, 122, 14, 124, 65, 67. Starting from the current head position, what is the total distance traveled (in cylinders) by the disk arm to satisfy the requests using algorithms FCFS, SSTF, SCAN and LOOK. Illustrate with figures in each case. (12 Marks)  
b. Describe the access matrix model used for protection purpose. (08 Marks)
- 8 Write short notes on :  
a. Process Management in Linux  
b. Linux file system.  
c. Benefits of Multi threading  
d. Inter process communication. (20 Marks)

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10CS54

**Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016**

**Database Management System**

Time: 3 hrs.

Max. Marks:100

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

**PART – A**

- 1 a. Write a note on various types of end users who use DBMS. (08 Marks)
- b. Explain the three level DBMS architecture, with a neat diagram. Why do we need mappings between schema levels? Explain mapping in DBMS architecture. (12 Marks)
- 2 a. Explain the ER notations used for various constructs in database schema (10 Marks)
- b. With respect to ER model, explain with example
  - i) Composite attributes
  - ii) Cardinality ratio
  - iii) Participation constraints
  - iv) Binary relationship (10 Marks)
- 3 a. Discuss the various type of JOIN operations. Why is theta join required? (06 Marks)
- b. Consider the following relational schema;
  - users (uid, uname, cost)
  - groups (gid, title, category, n, gsize, owner)
  - posts (pid, uid, gid, tid, ptext, pdate)
 Write the following queries in relational algebra.
  - i) Show the text and number of all the posts made by user number 4 before March 1, 2007.
  - ii) Show the names of the all the users who responded to post number 2.
  - iii) Show the uid and cost of all the users who are group owners and posted a thread on 1.1.2003. (09 Marks)
- c. Explain the SELECT and PROJECT operations in relational algebra with example. (05 Marks)
- 4 a. Explain the following :
  - i) Primary key
  - ii) Foreign key
  - iii) Candidate key (06 Marks)
- b. Consider the following relations:
  - Hotel (hotelno, name, address)
  - Room (roomno, hotelno, type, price)
  - Booking (hotelno, guestno, datefrom, dateto, roomno)
  - Guest (guestno, name, address)
 Write the SQL statements for the following :
  - i) List the names and addresses of all guest booked the hotel, which is located in Chandigarh, alphabetically ordered by name.
  - ii) List all family rooms with a price below Rs 400 per night, in ascending order of price in hotel "RVH"
  - iii) How many hotels are there? (09 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
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- c. Explain with example in SQL  
 i) Drop command  
 ii) Delete command

(05 Marks)

**PART – B**

- 5 a. What is a view? Explain how to create the view and how view can be dropped? (08 Marks)  
 b. Explain the following  
 i) Embedded SQL  
 ii) Database stored procedure (12 Marks)
- 6 a. Explain informal design guidelines for relation schemas. (06 Marks)  
 b. What is the need for normalization? Explain the first, second and third normal forms with examples. (14 Marks)
- 7 a. Consider the schema  
 $R = (A, B, C, D, E)$ . Suppose the following functional dependencies hold  
 $E \rightarrow A$   
 $CD \rightarrow E$   
 $A \rightarrow BC$   
 $B \rightarrow D$   
 State whether the following decomposition of R are lossless join decomposition or not, Justify.  
 $\{(A, B, C), (A, D, E)\}$   
 $\{(A, B, C), (C, D, E)\}$  (10 Marks)
- b. Explain the following  
 i) Inclusion dependencies  
 ii) Domain key Normal Form (10 Marks)
- 8 a. Explain why a transaction execution should be atomic? Explain ACID properties by considering the following transaction  
 $T_i$ : read (A);  
 $A := A - 50$ ;  
 write (A);  
 read (B);  
 $B := B + 50$ ;  
 write (B); (10 Marks)
- b. Briefly discuss on the two phase locking protocol used in concurrency control. (10 Marks)

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10CS55

## Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016

### 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 network. With a neat diagram, explain the four basic topologies. (05 Marks)
  - b. With the help of a diagram, explain the functionalities of each layer of OSI reference model. (10 Marks)
  - c. List and explain the four levels of addresses used in an internet employing the TCP/IP protocols. (05 Marks)
  
- 2
  - a. Define latency. Briefly explain the components of latency. What are the propagation time and transmission time for a 5 Mbyte message (image), if the bandwidth of the network is 1 Mbps? Assume that the distance between the sender and receiver is 12000 km and that light travels at  $2.4 \times 10^8$  m/s. (08 Marks)
  - b. Explain the PCM technique used for analog to digital conversion. (Taking suitable example). (08 Marks)
  - c. What is line coding? Represent the sequence "01001110" using NRZ-L, NRZ-I and Manchester schemes. (04 Marks)
  
- 3
  - a. What is TDM? Explain in detail. (07 Marks)
  - b. Explain virtual circuit network with an example, and also briefly discuss the phases. (10 Marks)
  - c. Five channels, each with a 100 kHz bandwidth are to be multiplexed together. What is the minimum bandwidth of the link is there is a need for a guard band of 10 kHz between the channels to prevent interference? (03 Marks)
  
- 4
  - a. How does datawords and codewords is represented in block coding and also explain how can errors be detected and corrected by using block coding. (10 Marks)
  - b. Find the code word using CRC given data "1101" and generator "1100". (10 Marks)

#### PART – B

- 5
  - a. With a neat diagram, explain any two protocols of noisy channel. (12 Marks)
  - b. Explain the frame format of HDLC protocol. (08 Marks)
  
- 6
  - a. Describe pure ALOHA and slotted ALOHA. (10 Marks)
  - b. What is channelization? List and explain the channelization protocols. (10 Marks)
  
- 7
  - a. Explain the different types of addressing mechanism in IEEE 802.11. (05 Marks)
  - b. Define Bluetooth and explain the architecture of Bluetooth. (05 Marks)
  - c. With a neat diagram, explain the categories of connecting devices. (10 Marks)
  
- 8
  - a. Explain classful addressing and classless addressing with respect to IPV4. (08 Marks)
  - b. Explain in detail IPV6 packet format. (08 Marks)
  - c. Give a comparison between IPV4 and IPV6. (04 Marks)

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10CS56

**Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016**  
**Formal Languages & 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. What is Automata? Discuss why study automata. (06 Marks)  
 b. Mention the differences between DFA, NFA and NFA-ε. (04 Marks)  
 c. Design a DFA to accept the language  $L = \{W / W \text{ is of even length and begins with } 01\}$ . (06 Marks)  
 d. Design the NFA-ε or NFA for the languages given below:  
 i)  $abc, abd \text{ and } aacd$  {Assume  $\Sigma = a, b, c, d$ }  
 ii)  $\{ab, abc\}^*$  {Assume  $\Sigma = a, b, c$ } (04 Marks)

2. a. Convert the following NFA-ε to DFA using “Subset construction scheme”. (08 Marks)

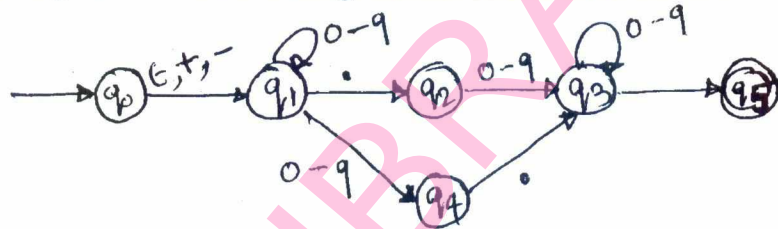


Fig. Q2 (a)

- b. Define Regular expression and write regular expression for the following languages:  
 i)  $L = \{a^{2n}b^{2m} : n \geq 0, m \geq 0\}$   
 ii) Language over  $\{0, 1\}$  having all strings not containing 00. (06 Marks)  
 c. Convert the regular expression  $(0+1)^*1(0+1)$  to a NFA-ε. (06 Marks)
3. a. State and prove pumping Lemma theorem for regular languages. Show that  $L = \{a^n b^n \mid n \geq 0\}$  is not regular. (08 Marks)  
 b. What is Homomorphism? Explain with an example. (04 Marks)  
 c. Consider the transition table of DFA given below:

	0	1
→A	B	A
B	A	C
C	D	B
*D	D	A
E	D	F
F	G	E
G	F	G
H	G	D

Fig. Q3 (c)

- i) Draw the table of distinguishabilities of states. (08 Marks)  
 ii) Construct the equivalent minimized DFA.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
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- 4 a. Obtain a grammar to generate integers and write derivation for the unsigned integer 1965. (08 Marks)
- b. Consider the grammar:  
 $S \rightarrow aS \mid aSbS \mid \epsilon$   
 Is the above grammar ambiguous? Show that the string aab has two –  
 i) Parse trees  
 ii) Left most derivations  
 iii) Rightmost derivations (12 Marks)

**PART – B**

- 5 a. Define PDA. Design PDA to accept the language  $L(M) = \{\omega C \omega^R \mid \omega \in (a+b)^*\}$  by a final state and also give the graphical representation of PDA. (12 Marks)
- b. Convert the following CFG to PDA:  
 $S \rightarrow aABB \mid aAA$   
 $A \rightarrow aBB \mid a$   
 $B \rightarrow bBB \mid A$   
 $C \rightarrow a$  (08 Marks)
- 6 a. Consider the following grammar:  
 $S \rightarrow ASB \mid \epsilon$   
 $A \rightarrow aAS \mid a$   
 $B \rightarrow SbS \mid A \mid bb$   
 i) Are there any useless symbols? Eliminate if so.  
 ii) Eliminate  $\epsilon$  productions.  
 iii) Eliminate unit productions.  
 iv) Put the grammar into Chomsky Normal Form. (08 Marks)
- b. Show that  $L = \{a^n b^n c^n \mid n \geq 0\}$  is not context free. (04 Marks)
- c. Prove that the context free languages are closed under union, concatenation and reversal. (08 Marks)
- 7 a. Design a turing machine that performs the following function:  
 $q_0 \omega \vdash^* q_f \omega \omega$  for any  $\omega \in \{1\}^*$   
 and also write its transition diagram. (12 Marks)
- b. Explain the general structure of multitape and non deterministic turing machines. (08 Marks)
- 8 Write short notes on:  
 a. Applications of regular expressions.  
 b. Applications of context free Grammars.  
 c. Post's correspondence problem.  
 d. Chomsky hierarchy. (20 Marks)

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